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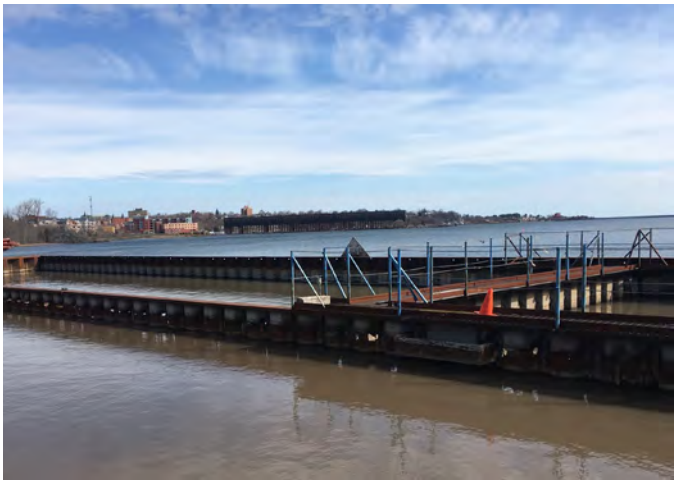

2019 Annual Groundwater Monitoring and Corrective Action Report – Shiras Steam Plant Holding Pond

Marquette, Michigan

Submitted to:
Marquette Board of Light and Power
2200 Wright Street
Marquette, Michigan 49855

Submitted by:
GEI Consultants of Michigan P.C.
109 W. Baraga Avenue
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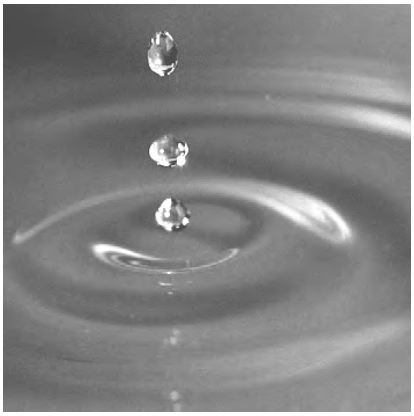
January 17, 2020
Project 1903625



Michael A. Cummings, P.G.
Hydrogeologist

Michael D. Carpenter, P.E.
Senior Consultant, Project Manager

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PROFESSIONAL ENGINEER CERTIFICATION

"I hereby certify that the 2019 Annual Groundwater Monitoring and Corrective Action Report for the Shiras Steam Plant Holding Pond owned and operated by the Marquette Board of Light and Power meets requirements in federal regulation 40 CFR § 257.90 of the Standards of Coal Combustion Residuals (CCR) in Landfills and Impoundments published April 17, 2015. I am a duly licensed Professional Engineer under the laws of the State of Michigan."

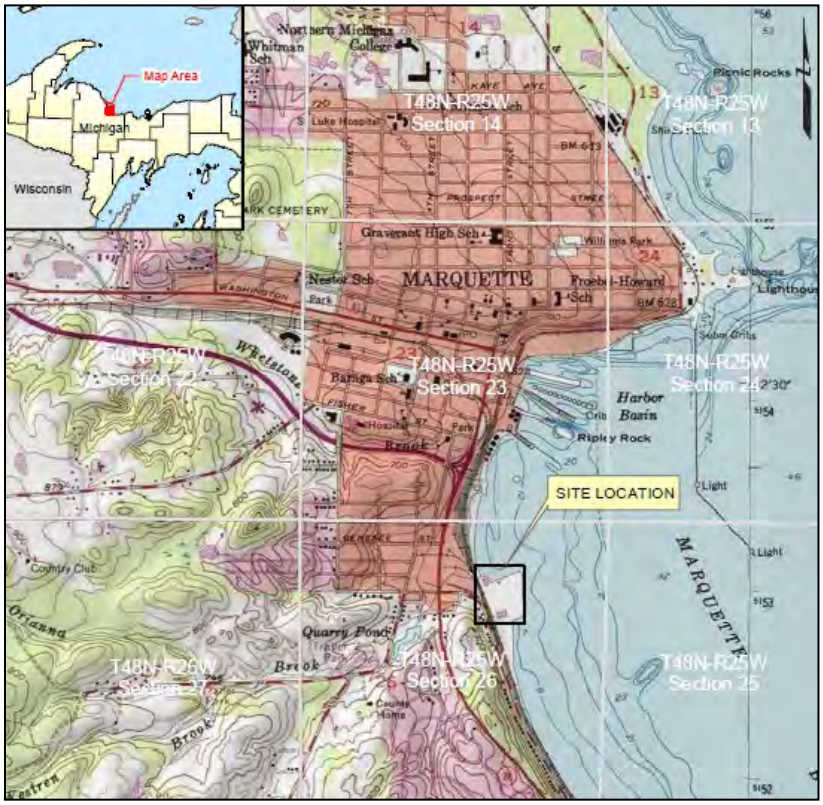
Sincerely,

Michael D. Carpenter, PE (MI No. 6201046532)

1. Introduction

1.1 General

The Marquette Board of Light and Power (MBLP) owns and has historically operated a fossil fuel-fired electrical generating plant known as the Shiras Steam Plant (Plant) located at 400 East Hampton Street in Marquette, Michigan. The Plant was built in 1967 and consisted of three power generating units that have been removed from service and are currently undergoing decommissioning. The Plant has a single coal combustion residuals (CCR) Holding Pond that meets the criteria of a CCR surface impoundment per Part 257.2 of the CCR Rule. The Holding Pond (WDS ID# 478988) consists of five individual sluicing cells that are enclosed by sheet pile walls against the shoreline of Lake Superior. The Holding Pond operated as a zero-discharge CCR unit and, following sluicing through the five cells, contact water was recirculated back to the plant as process water or to a storage tank for future use. Since plant shutdown in June 2018, contact water has been pumped to the local sanitary sewer system.



1.2 CCR Rule Background and Detection Monitoring and Reporting

This Annual Groundwater Monitoring and Corrective Action Report (Annual Groundwater Report) for the Hold Pond at the Shiras Facility was prepared as required by Part 257.90(e), and includes:

- A site map with well locations;
- Documentation of sampling activities;
- Status of monitoring (detection, assessment, corrective action monitoring);
- Groundwater quality monitoring results;
- Data analysis; and
- Recommendations and planned events for 2020.

Specifically, this report provides a summary and statistical evaluation of detection monitoring groundwater analytical results from samples collected from the groundwater monitoring network at the Shiras facility in accordance with methods described in the *Coal Combustion Residuals Rule Statistical Methods Certification (AECOM, 2018)* prepared for the facility dated January 30, 2018.

2. Groundwater Monitoring System

A *Groundwater Monitoring System Certification* (AECOM, 2018) was prepared to satisfy the groundwater monitoring system performance standard in 40 CFR 27 Part 257.91 and describes groundwater sampling and analysis procedures at the Holding Pond. Detection monitoring at the Holding Pond was performed on a semiannual basis in 2019 and included samples collected at each groundwater monitoring system location for the Appendix III analytes listed in Table 1. The groundwater system monitoring locations and their relative hydraulic location to the Holding Pond unit are summarized on Table 2. A description of the CCR Rule groundwater monitoring network is provided below.

2.1 Groundwater Monitoring Network

The CCR groundwater monitoring well network at the Holding Pond is designed to monitor groundwater quality in the uppermost aquifer at the facility and satisfy the performance standard in Part 257.91(a). Designated CCR Rule compliance monitoring wells are located upgradient and down gradient of the CCR Holding Pond. Table 2 provides a summary of the groundwater monitoring locations and their hydraulic relationship to the Holding Pond. CCR Rule groundwater monitoring well locations are shown on Figure 1. Monitoring wells MW-4 and MW-5 serve as background groundwater quality points as required in 40 CFR Part 257.91. Monitoring wells MW-1, MW-2, and MW-3 are situated downgradient of the Holding Pond as shown on Figure 1.

2.2 Groundwater Flow Direction and Rate

The following section outlines the direction and rate of groundwater flow in the uppermost aquifer at the facility in accordance with Part 257.93(c).

2.2.1 Groundwater Flow

A groundwater contour map for the Holding Pond is provided on Figure 1 and presents groundwater elevations and contours in the uppermost aquifer for the August 2019 sampling event. As shown on the figure, groundwater flow is eastward toward Lake Superior. The rate of groundwater flow, or average linear velocity of groundwater in the uppermost aquifer is calculated by the following equation:

$$V = \frac{Ki}{n_e}$$

Where:
V = average linear velocity (ft/day)
K = hydraulic conductivity (ft/day)
i = horizontal hydraulic gradient (ft/ft)
n_e = effective porosity (dimensionless)

The average linear velocity for groundwater at the Holding Pond was calculated between upgradient monitoring well MW-5 and downgradient monitoring well MW-1. The hydraulic gradient calculated for the August 2019 sampling event at the Holding Pond was 0.007 ft/ft. An effective porosity value of 0.25 (Fetter, 1994) and an average hydraulic conductivity value of 0.31 ft/day (AECOM, 2018) were used to represent the unconsolidated materials in the uppermost aquifer. The calculation of average linear groundwater velocity at the Holding Pond is therefore as follows:

$$V = \frac{0.31\frac{ft}{day} \times 0.007\frac{ft}{ft}}{0.25}$$

$$V = 0.009\ \frac{ft}{day}$$

3. 2019 CCR Rule Compliance Activities

3.1 2019 Groundwater Monitoring

Groundwater samples were collected at each CCR Groundwater System monitoring location in accordance with the on the following dates:

- August 13, 2019 (first semi-annual detection monitoring event)
- October 17, 2019 (second semi-annual detection monitoring event)

Groundwater elevations were measured at each groundwater monitoring location prior to well purging and sampling. A summary of groundwater elevations is provided in Table 3. Groundwater field sampling logs are provided in Appendix A. Samples in all wells were collected utilizing dedicated sampling equipment at each location to eliminate the potential for cross-contamination at monitoring locations. Water quality parameters including temperature, oxidation-reduction potential, dissolved oxygen, pH, specific conductance, and turbidity were monitored during well purging to assure representative samples were collected at each location. Samples that were collected for total metals analysis were unfiltered, with a sample turbidity goal of less than 50 nephelometric turbidity units (NTU). Samples were collected into laboratory-provided sample containers and couriered under chain-of-custody procedures to Pace Analytical Laboratories located in Green Bay, Wisconsin. Laboratory analytical packages for the first and second semi-annual monitoring events are provided in Appendix B. A summary of groundwater analytical results is provided in Table 4.

3.2 2019 Reporting and Notifications

Statistically significant increases (SSIs) were not identified during 2019 detection monitoring events. Therefore, no additional operational reporting and notification requirements were necessary for 2019.

4. QA/QC Procedures

Quality assurance and quality control (QA/QC) measures were taken to ensure the reliability of Holding Pond operational data (field and laboratory) generated during the 2019 detection monitoring sampling events. These measures included field QA/QC with the collection of a field blank sample (equipment blanks were not required since dedicated sampling equipment is used at each monitoring location) and laboratory QA/QC.

4.1 Laboratory Data Usability

Samples collected during each semi-annual monitoring event were analyzed by Pace Analytical Services, LLC located in Green Bay, Wisconsin. The laboratory performs an internal validation and prepares a case narrative as necessary to describe any non-conformance issues and data qualifications. GEI Consultants of Michigan, P.C. (GEI) reviewed the data qualifications and blank analyses to establish usability of the data. All data were found to be usable in the subsequent statistical evaluations as qualified.

5. Statistical Evaluation of Groundwater Results

The Sanitas™ groundwater statistical software was used to perform the statistical analyses (Sanitas™, 2007). Sanitas™ is a proprietary decision support software package, developed in 1991, that incorporates the statistical tests required of Subtitle C and D facilities by US Environmental Protection Agency (USEPA) regulations and guidance as recommended in the USEPA Unified Guidance (USEPA, 2009) document.

The first and second semi-annual 2019 detection monitoring groundwater data were screened for outliers using either Dixon's or Tukey's test for outliers. A visual evaluation of suspected outlying data was also performed, and no data outliers were verified for the 2019 monitoring period. A summary of the data outlier evaluations is provided in Appendices C1 and C2.

In accordance with the certified statistical analysis plan prepared for the facility (*Groundwater Monitoring System Certification* (AECOM, 2018)) an interwell data evaluation approach was used to evaluate the detection monitoring data at the Holding Pond and was used to generate interwell prediction intervals for Appendix III parameters at CCR monitoring location shown on Figure 1. Interwell upper prediction limit plots are provided in Appendix C1 and C2 for the first and second semi-annual events, respectively. Each Appendix III parameter was below its respective Upper Prediction Limit (UPL) except for pH in downgradient monitoring well MW-3 during the first semi-annual (August 2019) sampling event with a result of 8.6 compared to a UPL of 8.07. Fishbeck, Thompson, Carr & Huber, Inc. (FTC&H) prepared an Alternative Source Demonstration (ASD) in September 2018 to address the SSI of pH in monitoring wells MW-2 and MW-3. The ASD successfully identified the source of elevated pH at these locations as attributable to natural variability. As such, the September 2018 ASD supports the pH value in MW-3 during the August 2019 sampling event and no SSI was verified.

Trend tests using the Mann-Kendall analyses are included in Appendices C1 and C2. The Mann-Kendall evaluation, when combined with the Sen's Estimate of Slope collectively evaluate the statistical significance of concentration trends present in the analytical results. The results of the Mann-Kendall/Sen's Slope evaluations indicate that significantly increasing trends in calcium, chloride, and pH were present in both upgradient and downgradient monitoring wells during the 2019 monitoring period. Sulfate concentrations downgradient of the Holding Pond exhibited both increasing (MW-1) and decreasing (MW-3) concentration trends during throughout 2019. These increasing and decreasing concentration trends upgradient and downgradient of the Holding Pond indicate natural variability in groundwater. Interwell prediction limit comparison between upgradient and downgradient wells indicate all Appendix III parameters are well below the respective UPLs and no SSIs have been identified for 2019.

6. Recommendations and Planned Events for 2020

The Holding Pond is currently sampled under the requirements of the detection monitoring program. Detection monitoring analytical results indicate that all Appendix III parameters are below their respective UPLs and no SSIs have been identified during the 2019 monitoring period. Detection monitoring and statistical evaluation of groundwater data will occur at the Holding Pond on a semi-annual basis for 2020 in accordance with the certified statistical methods plan for the facility.

7. References

(Fetter, C.W., 1994) "Applied Hydrogeology, Third Edition," 1994.

(US Environmental Protection Agency, 2009) "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities; Unified Guidance. EPA 530/R-09-007," 2009.

(US Environmental Protection Agency, 2009) "National Primary Drinking Water Regulations. EPA 816-F-09-004," May 2009.

Sanitas Technologies User Manual v.9.4.41, 2014.

(AECOM, 2017) Technical Services of Michigan, January 2018. "First Annual CCR Groundwater Monitoring and Corrective Action Report," 2017.

(Fishbeck, Thompson, Carr & Huber, Inc.) "Second Annual Coal Combustion Residuals Groundwater Monitoring and Corrective Action Report 2018," January 2019.

Attachments

Tables

Table 1. CCR Groundwater Monitoring Parameters
Year 2019 Annual Solid Waste and Groundwater Quality Monitoring Report
Shiras Steam Plant Holding Pond
Marquette, Michigan

Appendix III Parameters	Appendix IV Parameters
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
TDS	Cobalt
	Fluoride
	Lead
	Lithium
	Mercury
	Radium 226
	Radium 228
	Selenium
	Thallium

Note: Iron was also sampled as a State-required parameter.

Table 2. CCR Groundwater Monitoring Network
Year 2019 Annual Solid Waste and Groundwater Quality Monitoring Report
Shiras Steam Plant Holding Pond
Marquette, Michigan

Well ID	Well Installation Date	TOC Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Total Depth (ft)	Bottom Elevation (ft MSL)	Screen Length (ft)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen Elevation (ft MSL)	Bottom of Screen Elevation (ft MSL)	Hydraulic Relationship to Holding Pond
MW-1	6/27/2017	606.95	N/A	20.0	576.99	5	24.5	29.5	581.99	576.99	Downgradient
MW-2	6/28/2017	605.95	N/A	22.0	576.73	5	23.8	28.8	581.73	576.73	Downgradient
MW-3	6/29/2017	606.42	N/A	21.0	576.89	5	15.0	20.0	581.89	576.89	Downgradient
MW-4	7/6/2017	624.27	622.27	47.0	577.27	5	41.6	46.6	582.67	587.67	Upgradient
MW-5	7/7/2017	623.87	621.87	45.0	578.87	5	39.8	44.8	584.07	589.07	Upgradient

Notes:
TOC- Top of Casing
ft MSL- feet above mean sea level
bgs- below ground surface

Table 3. Groundwater Elevation Summary

Year 2019 Annual Solid Waste and Groundwater Quality Monitoring Report
Shiras Steam Plant Holding Pond
Marquette, Michigan

Well ID	Reference Elevation	August-19		October-19	
		DTW (ft.)	GW Elevation (ft MSL)	DTW (ft.)	GW Elevation (ft MSL)
MW-1	606.95	0.30	606.65	0.60	606.35
MW-2	605.95	0.20	605.75	0.20	605.75
MW-3	606.42	0.10	606.32	0.10	606.32
MW-4	624.27	14.80	609.47	14.85	609.42
MW-5	623.87	15.10	608.77	15.30	608.57

DTW - Depth to water
GW - Groundwater
ft MSL- feet above mean sea level

Table 4. CCR Rule Groundwater Analytical Summary
Year 2019 Annual Solid Waste and Groundwater Quality Monitoring Report
Shiras Steam Plant Holding Pond
Marquette, Michigan

Lab Suite:				CCR Appendix III								CCR Appendix IV															
Parameter:				Boron	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids (TDS)	pH (lab)	Iron	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 228 Combined (Michigan?)	Radium 226	Radium 228	Selenium	Thallium
Units:				µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	SU	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	pCi/L	pCi/L	µg/L	µg/L
U.S. EPA MCL:				*NE*	*NE*	*NE*	*4.0*	*NE*	*NE*	*NE*	*300.0*	*6.0*	*10*	*2.0*	*4.0*	*5.0*	*100*	*40 (MI)*	*2 (MI)*	*4 (MI)*	*170 (MI)*	*2.0*	*73 (MI)*	*5.0*	*NE*	*NE*	*50*	*2.0*
Location	Well ID	Collection Date	Duplicate																									
Downgradient	MW-1	07/19/17		300 U	100,000	230	0.38 U	19	700	7.58		2.0 U	6.6	0.21	1.0 U	1.0 U	10 U	20 U	--	17	10 U	0.20 U	50 U	2.33	1.00 U	2.33	5.0 U	2.0 U
		07/24/17		300 U	110,000	230	0.38 U	20	800	7.45		2.0 U	5.0 U	0.15	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.43	1.00 U	1.43	5.0 U	2.0 U
		08/23/17		300 U	120,000	260	0.10 U	21	800	7.54		2.0 U	5.0 U	0.14	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	130,000	270	0.10 U	20	960	6.56		2.0 U	5.0 U	0.13	1.0 U	1.0 U	18	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	130,000	270	0.10 U	21	930	7.56		2.0 U	5.0 U	0.13	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/14/17		300 U	110,000	290	0.10 U	22	980	7.60		2.0 U	5.0 U	0.13	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/28/17		530	120,000	270	0.10 U	20	920	7.58		2.0 U	5.0 U	0.13	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/28/17	X	300 U	120,000	270	0.10 U	21	990	7.58		2.0 U	5.0 U	0.13	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.16	1.00 U	1.16	5.0 U	2.0 U
		10/05/17		300 U	130,000	280	0.10 U	21	820	7.55		2.0 U	5.0 U	0.13	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		10/05/17	X	300 U	120,000	270	0.10 U	21	880	7.55		2.0 U	5.0 U	0.14	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		05/31/18		66 J	110,000	310	0.046 J	25	770	7.8		2.0 U	5.0 U	0.15	1.0 U	1.0 U	2.1	0.77 J	0.042 J	1.0 U	12	0.20 UJ	1.6 J	0.516	0.409	0.107 U	5.0 U	1.0 U
		09/20/18		67 J	120,000	300	0.044 J	24	740	7.9		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		08/13/19		73	109,000	269	0.10 U	27	694	7.9	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		10/17/19		91	109,000	247	0.10 U	27	616	7.8	110 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-2	07/19/17		300 U	51,000	60	0.38 U	22	220	8.41		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		07/24/17		300 U	63,000	59	0.38 U	21	350	8.09		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.56	1.00 U	1.56	5.0 U	2.0 U
		08/23/17		300 U	51,000	62	0.10 U	26	190	8.13		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	240	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	52,000	61	0.10 U	22	350	7.03		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	2.00	1.00 U	2.00	5.0 U	2.0 U
		08/29/17	X	300 U	53,000	61	0.10 U	22	320	7.03		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	53,000	60	0.10 U	21	310	8.15		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/14/17		300 U	52,000	64	0.10 U	23	300	8.13		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/28/17		300 U	58,000	65	0.10 U	21	350	8.07		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		10/05/17		300 U	61,000	65	0.10 U	21	310	7.99		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		05/31/18		74 J	68,000	86	0.056	31	330	8.0		2.0 U	0.84 J	0.073	1.0 U	1.0 U	2.2	0.38 J	0.055	1.0 U	5.9 J	0.20 U	1.1 J	0.519	0.204 U	0.315 U	5.0 U	1.0 U
		05/31/18	X	75 J	70,000	86	0.057	31	330	8.0		2.0 U	1.0 J	0.072	1.0 U	1.0 U	1.7 J	0.38 J	0.055	1.0 U	6.0 J	0.20 U	5.0 U	0.299 U	0.193	0.106 U	5.0 U	1.0 U
		09/20/18		55 J	64,000	85	0.058	29	310	8.0		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		08/13/19		63	62,600	86	0.10 U	31	336	7.9	790	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		10/17/19		56 J	55,800	55	0.10 U	21	238	8.0	110 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-3	07/19/17		300 U	68,000	98	0.38 U	49	360	8.00		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		07/24/17		300 U	69,000	89	0.38 U	36	440	7.86		2.0 U	5.0 U	0.23	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/23/17		300 U	75,000	95	0.10 U	44	300	7.81		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	62,000	86	0.10 U	28	390	6.32		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	62,000	85	0.10 U	26	380	7.77		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.05	1.00 U	1.05	5.0 U	2.0 U
		09/14/17		300 U	57,000	83	0.10 U	25	380	7.85		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.17	1.00 U	1.17	5.0 U	2.0 U
		09/14/17	X	300 U	56,000	84	0.10 U	24	380	7.85		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/28/17		300 U	67,000	89	0.10 U	20	440	8.09		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		10/05/17		300 U	69,000	87	0.10 U	21	350	8.10		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		05/31/18		45 J	55,000	67	0.067	20	290	8.2		2.0 U	1.5 J	0.066	1.0 U	1.0 U	2.4	0.32 J	0.065	1.0 U	4.9 J	0.20 U	1.2 J	0.128 U	0.199 U	-0.0711 U	5.0 U	1.0 U
		09/20/18		41 J	70,000	92	0.055	22	340	8.1		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		08/13/19		36 J	72,800	99	0.10 U	23	326	8.1	720	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		10/17/19		47 J	64,900	78	0.10 U	19	278	8.0	45 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Upgradient	MW-4	07/19/17		300 U	93,000	260	0.38 U	19	700	7.92		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.07	1.00 U	1.07	5.0 U	2.0 U
		07/24/17		300 U	89,000	220	0.38 U	18	730	7.86		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		07/24/17	X	300 U	89,000	230	0.38 U	19	710	7.86		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/23/17		300 U	100,000	300	0.10 U	24	830	7.93		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	120,000	340	0.10 U	47	1,000	7.32		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	110,000	340	0.20	53	1,000	7.75		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/14/17		300 U	100,000	360	0.18	49	1,000	7.77		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/28/17		300 U	160,000	370	0.12	46	1,200	7.74		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.1 U	13	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		10/05/17		300 U	120,000	380	0.10	43	1,100	7.70		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	11	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		05/31/18		120	130,000	450	0.23	42	1,000	7.8		1.0 J	1.4 J	0.11	1.0 U	0.24 J	1.2 J	0.48 J	0.23	0.50 J	9.8	0.20 U	16	0.639	0.400	0.240 U	5.0 U	1.0 U
		09/20/18		110	130,000	450	0.23	42	970	7.7		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		09/20/18	X	110	130,000	450	0.23	42	1,000	7.7		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		08/13/19		96	122,000	466	0.10 U	42	1,110	7.6	1800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		10/17/19		110	126,000	417	0.12 J	35	986	7.7	1700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-5	07/19/17		300 U	100,000	200	0.38 U	25	640	7.36		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.51	1.00 U	1.51	5.0 U	2.0 U
		07/19/17	X	300 U	100,000	190	0.38 U	24	530	7.36		2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		07/24/17		300 U	100,000	190	0.38 U	21	730	7.17		2.0 U	5.0 U	0.16	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/23/17		300 U	110,000	210	0.10 U	19	590	7.41		2.0 U	5.0 U	0.13	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.44	1.00 U	1.44	5.0 U	2.0 U
		08/23/17	X	300 U	110,000	190	0.10 U	19	620	7.41		2.0 U	5.0 U	0.13	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	110,000	190	0.10 U	18	750	6.76		2.0 U	5.0 U	0.12	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	100,000	190	0.10 U	18	660	7.43		2.0 U	5.0 U	0.11	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17	X	300 U	100,000	190	0.10 U	18	730	7.43		2.0 U	5.0 U	0.11	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/14/17		300 U	96,000	200	0.10 U	19	720	7.51		2.0 U	5.0 U	0.11	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/28/17		300 U	120,000	190	0.10 U	18	2,300	7.54		2.0 U	5.0 U	0.11	1.0 U	1.0 U	10 U	20 U	--	3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		10/05/17		300 U	120,000	190	0.10 U	18	700	7.45		2.0 U	5.0 U	0.12	1.0 U	1.0 U	10 U	20 U	--	3.0 U	13	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		05/31/18		42 J	100,000	210	0.043 J	19	640	7.6		2.0 U	5.0 U	0.095	1.0 U	1.0 U	1.5 J	0.25 J	0.046 J	1.0 U	7.6 J	0.20 U	7.1	0.470	0.272	0.198 U	5.0 U	1.0 U
		09/20/18		39 J	120,000	220	0.031 J	22	630	7.6		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		08/13/19		34 J	126,000	275	0.10 U	23	730	7.6	77 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		10/17/19		45 J	140,000	274	0.10 U	20	748	7.6	35 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Bolded values exceed an applicable criterion.
Data Qualifiers:
U - Not detected
Footnotes/Abbreviations:
MCL - maximum contaminant limit NA - Not Analyzed
NE - Value has not been established

Figures

LEGEND

- Monitoring Well Location
- 606.16 — Groundwater Elevation (feet above sea level, August 2019 data)
- Groundwater Isocontour (feet above sea level)
- Groundwater Flow Direction

0 100

SCALE (ft., approximate)

2019 Annual CCR Groundwater Monitoring and Corrective Action Report	GEI Consultants	MONITORING WELL NETWORK and GROUNDWATER CONTOUR MAP
Shiras Steam Plant Holding Pond Marquette, Michigan	Project 1903625	January 2020 Figure 1

Appendix A- Monitoring Well Sampling Logs

MONITORING WELL SAMPLING RECORD

PID Reading —
Job Number
Location
Well Number MW-1

Job Name Shiras CCR
By TJA Date 8/13
Measurement Datum

Pre-Development Information

Water Level 4.3
One Purge Vol 4.7

Time (start) 10:20
Total Depth of Well 29.3
Three Well Volume 14.2

Water Characteristics

Color —
Clear ___ Cloudy X
Odor X None ___ Weak ___ Moderate ___ Strong
Any films or immiscible material —

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
4.25	12.51	7.78	15.1	1191	102	1.08	26.0	[redacted]
4.25	12:59	7.66	15.1	1190	90	0.51	47.2	
4.25	1:02	7.66	14.9	1191	93	0.45	50.9	
4.25	1:05	7.66	14.6	1189	85	0.44	53.2	
4.25	1:08	7.66	14.3	1186	70	0.46	54.4	
4.25	1:11	7.67	14.0	1184	63	0.49	53.8	
4.25	1:14	7.67	13.8	1182	59	0.52	51.3	

Total Volume Removed (gal) ___
Temperature (°C) ___
DO Concentration (mg/L) ___

pH ___
Specific Conductance (µS/cm) ___
ORP (mV) ___
TDS ___

(Sampled @ 1:14 p.m.)

Post Development Information

Time (Finished) 1:14 P.M.

Water Level _____ Total Depth of Well _____

Approximate Volume Removed (gal) _____

Water Characteristics

Color _____ ____ Clear ____ Cloudy

Odor ____ None ____ Weak ____ Moderate ____ Strong

Any films or immiscible material _____

Comments

Time	SWL
10:20	0.3
10:40	3.0
10:45	5.11
10:52	6.43
11:06	8.35
11:15	9.42

0.031 gal/min

Volumetric test
85 sec / 0.5 L ≈ 0.115 gal/min

32 min = 0.999 gal
(32 min)(0.115 gal/min) = 3.68
3.68 − 0.999 = 2.68
recharge = 0.084 gal/min

$\frac{X}{4.7\,gal} = \frac{0.084\,gal}{1\,min}$

X = 56 min/well vol.

pumping rate = 0.318 L/min

MONITORING WELL SAMPLING RECORD

PID Reading —
Job Number
Location
Well Number MW-2

Job Name Shiras CCR
By TJX Date 8/13
Measurement Datum

Pre-Development Information

Water Level ϕ.2ϕ
One Purge Vol 4.7

Time (start) 11:22
Total Depth of Well 29.0
Three Well Volume 14.1

Water Characteristics

Color — X Clear ___ Cloudy
Odor X None ___ Weak ___ Moderate ___ Strong
Any films or immiscible material —

	Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
ϕ.15	~~ϕ.25~~	1:27	7.96	14.0	546	45	1.26	99.4	
ϕ.15	~~ϕ.25~~	1:30	7.90	14.0	545	44	0.68	93.1	
ϕ.15	~~ϕ.25~~	1:33	7.91	14.2	542	44	0.47	87.0	
	ϕ.15	1:36	7.94	14.0	538	39	0.41	81.6	

Total Volume Removed (gal) ___
Temperature (°C) ___
DO Concentration (mg/L) ___

pH ___
Specific Conductance (µS/cm) ___
ORP (mV) ___
TDS ___

(Sampled @ 1:37 p.m.)

Post Development Information

Time (Finished) 1:37 p.m.

Water Level _____ Total Depth of Well _____

Approximate Volume Removed (gal) _____

Water Characteristics

Color _____ ____ Clear ____ Cloudy

Odor ____ None ____ Weak ____ Moderate ____ Strong

Any films or immiscible material _____

Comments

Time	SWL
11:22	ϕ.2
11:34	4.89
11:45	8.47
11:53	10.50
12:03	12.55

Flow rate = ϕ.115 gal/min

12 min = ϕ.764 gal

(12 min)(ϕ.115 gal/min) = 1.38 gal

1.38 - ϕ.764 = ϕ.616

Recharge = ϕ.ϕ513 gal/min (ϕ.194 L/min)

92 min/well volume.

Left well to recharge @ 12:03

MONITORING WELL SAMPLING RECORD

PID Reading —
Job Number
Location
Well Number MW-3

Job Name Shiras CCR
By TJA Date 8/13
Measurement Datum

Pre-Development Information

Water Level ~~0.10~~
One Purge Vol 4.5

Time (start) 11:05
Total Depth of Well 28.7
Three Well Volume 13.5

Water Characteristics

Color —
Clear X Cloudy
Odor X None Weak Moderate Strong
Any films or immiscible material —

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
~~0.12~~	1:49	8.58	12.3	562	109	1.60	65.5	
~~0.12~~	1:52	8.53	12.5	558	66	0.64	37.0	
~~0.12~~	1.55	8.52	12.7	565	55	0.45	18.3	
~~0.12~~	1:58	8.56	12.9	576	48-50	0.40	7.1	
~~0.12~~	2:01	8.59	12.8	585	47	0.40	0.6	
~~0.12~~	2:04	8.66	12.9	589	45	0.43	-6.4	

SWL

Total Volume Removed (gal) —
Temperature (°C)
DO Concentration (mg/L)

pH
Specific Conductance (µS/cm)
ORP (mV)
TDS

Sampled @ 2:04p.m.

Post Development Information

Time (Finished) 2:04 P.M.

Water Level _____ Total Depth of Well _____

Approximate Volume Removed (gal) _____

Water Characteristics

Color _____ ___ Clear ___ Cloudy

Odor ___ None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material _____

Comments

Time	SWL
12:09	0.00
12:20	5.30
12:30	9.50

Flow rate = 0.115 gal/min

11 min = 0.848 gal

(11 min)(0.115 gal/min) = 1.27 gal

1.27 - .848 = 0.422 gal / 11 min

Recharge = 0.0384 gal/min (0.145 L/min)

117 min to recharge 1 well volume

Left well @ 12:50 to sample MW-1

MONITORING WELL SAMPLING RECORD

PID Reading —

Job Name Shiras CCR

Job Number

By TJA Date 8/13

Location

Measurement Datum

Well Number MW-4

Pre-Development Information

Time (start) 1500

Water Level 14.80

Total Depth of Well 47.2

One Purge Vol 5.28

Three Well Volume 15.8

Water Characteristics

Color — X Clear ___ Cloudy

Odor X None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material —

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
	8:16	7.82	10.1	1899	4.66	1.35	-84	
	8:19	7.74	9.9	1897	5.00	0.74	-97.8	
	8:22	7.73	9.8	1895	5.40	0.58	-102.2	
	8:25	7.72	10.0	1894	5.43	0.51	-103.3	
	8:28	7.71	9.9	1897	5.8	0.47	-104.1	

Total Volume Removed (gal) ___

pH ___

Temperature (°C) ___

Specific Conductance (µS/cm) ___

DO Concentration (mg/L) ___

ORP (mV) ___

TDS ___

Post Development Information

Time (Finished) 8:33 AM

Water Level _____ Total Depth of Well _____

Approximate Volume Removed (gal) _____

Water Characteristics

Color _____ ___ Clear ___ Cloudy

Odor ___ None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material _____

Comments

Time	SWL
1506	14.80
1517	20.20
1525	23.30
1532	25.78
1539	28.94
1544	29.47
Stopped pump: 1556	31.07

* 66 min to dry

Flow = 0.30 L/min = 0.08 gal/min

11 min = 0.88 gal

(11 min)(0.08 gal/min) = 0.88 gal

0.0 Recharge!

19 min = 1.39 gal

(19 min)(0.08 gal/min) = 1.52 gal

1.52 − 1.39 = 0.13 gal / 19 min = 0.007 gal/min Recharge

50 min = 2.65 gal

(50)(0.08) = 4 0.027 gal/min recharge

8/11/19:

Initial Water Level: 15.1 8:02 AM

17.1 8:08 AM

18.2 8:10 AM

19.7 8:14 AM

23.3 8:21 AM

24.1 8:24 AM

24.9 8:27 AM

Sample taken @ 26.1' @ 8:30 AM

Finished @ 8:33 AM

MONITORING WELL SAMPLING RECORD

PID Reading ~~—~~ Job Name Shiras CCR

Job Number _____ By TJA Date 8/13

Location _____ Measurement Datum _____

Well Number MW-5

Pre-Development Information

Water Level 15.10 Time (start) 1610

One Purge Vol 4.84 Total Depth of Well 44.80

Three Well Volume 14.5

Water Characteristics

Color ~~—~~ X Clear ____ Cloudy

Odor X None ____ Weak ____ Moderate ____ Strong

Any films or immiscible material ~~—~~

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
	5:50	7.63	10.9	1265	3.7	3.87	114.8	
	5:53	7.41	10.4	1261	4.05	3.08	125.8	
	5:56	7.40	10.6	1262	3.80	2.87	130.3	
	5:59	7.41	10.4	1265	3.70	2.80	133.3	
	6:02	7.41	10.4	1264	3.50	2.75	135.7	

Total Volume Removed (gal) _____ pH _____

Temperature (°C) _____ Specific Conductance (µS/cm) _____

DO Concentration (mg/L) _____ ORP (mV) _____

TDS _____

(Sampled @ 18:02 [redacted] p.m.)

Post Development Information

Time (Finished) 18:04

Water Level 17.65

Total Depth of Well _____

Approximate Volume Removed (gal) _____

Water Characteristics

Color _____ ____ Clear ____ Cloudy

Odor ____ None ____ Weak ____ Moderate ____ Strong

Any films or immiscible material _____

Comments

Time	SWL
1614	15.30
1624	17.20
1636	17.55
1641	17.64
1650	17.64
1710	17.70

1 purge = 60 min

Flow rate = 300 mL/min = .08 gal/min
10 min = .8 gal
actual drop = .31 gal (.49 gal recharge)
.049 gal/min recharge

MONITORING WELL SAMPLING RECORD

PID Reading ——— Job Name Shiras CCK

Job Number 1903625 By JJA Date 10/17/19

Location ——— Measurement Datum ———

Well Number MW-1

Pre-Development Information

Time (start) 0930 EST

Water Level 6.6' Total Depth of Well 29.3'

One Purge Vol 4.64 Three Well Volume 13.9

Water Characteristics

Color ——— ___ Clear X Cloudy

Odor X None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material ———

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
0	1325	7.91	9.7	1041	-7.61	0.58	94.9	676
0.13	1330	7.62	9.7	1036	-6.50	0.0	85.4	673
0.13	1335	7.56	9.8	1033	-8.46	0	78.7	672
0.13	1340	7.54	9.7	1032	3.68	0	75.0	671
0.13	1345	7.53	9.8	1032	11.75	0	71.1	671
0.13	1350	7.52	9.8	1032	31.93	0	69.3	671
	1355	7.52	9.8	1032	-2.40	0	67.7	670
		Sampled @ 1356						

Total Volume Removed (gal) ——— pH ———

Temperature (°C) ——— Specific Conductance (µS/cm) ———

DO Concentration (mg/L) ——— ORP (mV) ———

TDS ———

Post Development Information

Time (Finished) 1356

Water Level 5.25

Total Depth of Well _____

Approximate Volume Removed (gal) _____

Water Characteristics

Color _____ ___ Clear ___ Cloudy

Odor ___ None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material _____

Comments

Time	SWL
0930	4.6
0943	6.06
0957	9.20
1013	11.64
1021	11.85
1030	12.60
1310	4.60
1320	5.15

MONITORING WELL SAMPLING RECORD

PID Reading —
Job Number 1903625
Location
Well Number MW-2

Job Name Shiras CCR
By DA Date 6/17
Measurement Datum

Pre-Development Information

Water Level 4.3
One Purge Vol 4.63

Time (start) 1055
Total Depth of Well 28.9
Three Well Volume 13.9

Water Characteristics

Color — X Clear ___ Cloudy
Odor X None ___ Weak ___ Moderate ___ Strong
Any films or immiscible material —

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
0	1425	8.18	9.9	413.1	-15.52	0.58	114.9	267
0.15	1430	7.99	9.8	403.0	-15.50	0.01	108.7	262
0.15	1435	7.98	9.8	400.4	-14.90	0.07	106.2	260
0.15	1440	8.00	9.7	397.0	-14.80	0.14	103.2	258
0.15	1445	8.02	9.7	395.1	-15.80	0.19	100.9	257
	Sampled @	1448						

Total Volume Removed (gal) ___
Temperature (°C) ___
DO Concentration (mg/L) ___

pH ___
Specific Conductance (µS/cm) ___
ORP (mV) ___
TDS ___

Post Development Information

Water Level 8.12

Time (Finished) 1448

Total Depth of Well

Approximate Volume Removed (gal)

Water Characteristics

Color ____ ___ Clear ___ Cloudy

Odor ___ None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material

Comments

1055	0.3
11.08	6.95
1122	11.75
1131	13.90
1141	16.1
1156	18.45 – 2.94 gal
1407	2.15
1415	5.85
1420	7.30

Vol Test: $\frac{1\,L}{2.75\,min} = 0.363\ L/min$
$= 0.096\ gpm$

$\frac{0.363\ L}{min} \left| \frac{0.264\ gal}{1\,L} \right.$

$(61\,min)(0.096\ \frac{gal}{min}) = 5.86\ gal$

0.048 gpm recharge

MONITORING WELL SAMPLING RECORD

PID Reading _____ Job Name Shiras CCR

Job Number 1903625 By TJA Date 10/17

Location _____ Measurement Datum _____

Well Number MW-3

Pre-Development Information Time (start) 1213

Water Level 0.19 Total Depth of Well 29.1

One Purge Vol 4.7 Three Well Volume 14.1

Water Characteristics

Color _____ X Clear ___ Cloudy

Odor X None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material ___

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
0	1500	8.12	9.6	425.2	-15.7	1.19	130.6	316
0.15	1505	8.04	9.6	469.5	-20.5	0.12	116.1	305
0.15	1510	8.04	9.6	474.3	-18.70	0	99.5	308
0.15	1515	8.02	9.8	481.0	-18.56	0	86.6	311
0.15	1520	8.06	9.7	460.6	-20.21	0	75.1	299
0.15	1525	8.07	9.6	463.9	-22.57	0	68.7	302
		Sampled @ 1528						

Total Volume Removed (gal) _____ pH _____

Temperature (°C) _____ Specific Conductance (µS/cm) _____

DO Concentration (mg/L) _____ ORP (mV) _____

TDS _____

Post Development Information

Time (Finished) 1528

Water Level 12.01

Total Depth of Well _____

Approximate Volume Removed (gal) _____

Water Characteristics

Color _____ ___ Clear ___ Cloudy

Odor ___ None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material _____

Comments

1213	4.1
1225	7.5
1243	14.9
1253	18.45
1304	21.2
1452	5.9
1458	8.6

MONITORING WELL SAMPLING RECORD

PID Reading —
Job Number 1903625
Location
Well Number MW-4

Job Name Shiras CCR
By TJA Date 10/16/19
Measurement Datum

Pre-Development Information

Water Level 14.85
One Purge Vol 5.18

Time (start) 1250 EST
Total Depth of Well 46.80
Three Well Volume 15.54

Water Characteristics

Color —
X Clear ___ Cloudy
Odor X None ___ Weak ___ Moderate ___ Strong
Any films or immiscible material —

Volume (gal)	Time	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
0	1545	7.55	9.6	1619	-20.65	2.93	-65.6	1053
0.345	1550	7.54	10.0	1624	-21.50	0.51	-95.2	1056
0.345	1555	7.52	10.0	1627	-20.67	0.12	-109.7	1057
0.345	1600	—	—	No Reading	—	—	—	—
0.345	1605	7.55	9.9	1624	-21.30	2.11	-86.1	1055
0.345	1610	7.54	10.0	1628	-21.74	0.98	-102	1059
0.345	1615	7.55	10.0	1631	-21.20	0.25	-116	1060
0.345	1620	7.54	10.1	1631	-22.58	0.01	-123.2	1060
		Sampled @ 1624						

Total Volume Removed (gal) ___
Temperature (°C) ___
DO Concentration (mg/L) ___

pH ___
Specific Conductance (µS/cm) ___
ORP (mV) ___
TDS ___

Post Development Information

Time (Finished) 1630

Water Level 31.57

Total Depth of Well _____

Approximate Volume Removed (gal) 5.18 L

Water Characteristics

Color _____ ___ Clear ___ Cloudy

Odor ___ None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material _____

Comments

(CST) Time	SWL
12:04	15.20
12:12	18.40
12:23	23.70
12:30	26.2
12:42	30.25
Resumed 1430	25.24
1440	28.10
1450	30.45
1500	31.84
1510	33.15
1520	36.01
1530	39.04
1540	42.14

0.073 gal / 1 min | 3.785 L / 1 gal

Volumetric Test

115 sec / 0.5 L = 0.26 L/min - 0.069 gpm

38 min = 2.40 gal ÷ 0.064 gal/min

(26 min)(0.069 gal/min) = 1.80 gal

Recharge ≈ 0.05 gpm

MONITORING WELL SAMPLING RECORD

PID Reading —
Job Number 1903625
Location
Well Number MW-5

Job Name Shiras CCR
By TJD Date 10/16/19
Measurement Datum

Pre-Development Information

Water Level 15.30
One Purge Vol 4.79

Time (start) 1200 CST
Total Depth of Well 44.85
Three Well Volume 14.4

Water Characteristics

Color — ✓ Clear ___ Cloudy
Odor ✓ None ___ Weak ___ Moderate ___ Strong
Any films or immiscible material

Volume (gal)	Time CST	pH	Temp (°C)	Spec. Conductance (µS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS
0.0	1400	7.95	9.2	1181	-25.26	2.99	117.8	768
0.345	1405	7.34	9.8	1178	-25.70	2.46	123.7	766
0.345	1410	7.32	9.8	1178	-25.70	2.28	124.7	766
0.345	1415	7.31	9.7	1179	-25.64	2.25	127.8	766
			Sampled @ 1418 CST					

Total Volume Removed (gal) ___
Temperature (°C) ___
DO Concentration (mg/L) ___

pH ___
Specific Conductance (µS/cm) ___
ORP (mV) ___
TDS ___

Post Development Information

Time (Finished) 1426 CST

Water Level 16.62

Total Depth of Well _____

Approximate Volume Removed (gal) 4.79 + (0.345 x 3) = _____

Water Characteristics

Color _____ ___ Clear ___ Cloudy

Odor ___ None ___ Weak ___ Moderate ___ Strong

Any films or immiscible material _____

Comments

Time	SWL
1406	16.20
1413	17.30
1423	17.7
1449	17.95

17 min = 0.243 gal

17 min = 1.41 gal → Recharge = 0.069 gpm

Volumetric Test:
955 = 0.5L 0.083gpm

Appendix B- Laboratory Analytical Packages

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 29, 2019

Trent Kohl
GEI Consultants
10501 West Research Drive
Suite G100
Milwaukee, WI 53226

RE: Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Dear Trent Kohl:
Enclosed are the analytical results for sample(s) received by the laboratory on October 19, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Christopher Hyska
christopher.hyska@pacelabs.com
(920)469-2436
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Green Bay Certification IDs

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
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(920)469-2436

SAMPLE SUMMARY

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40197612001	**MW-01**	Water	10/17/19 13:56	10/19/19 10:10
40197612002	**MW-02**	Water	10/17/19 14:48	10/19/19 10:10
40197612003	**MW-03**	Water	10/17/19 15:28	10/19/19 10:10
40197612004	**MW-04**	Water	10/16/19 16:24	10/19/19 10:10
40197612005	**MW-05**	Water	10/16/19 14:18	10/19/19 10:10
40197612006	**FIELD BLANK**	Water	10/17/19 16:08	10/19/19 10:10

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SAMPLE ANALYTE COUNT

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40197612001	**MW-01**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40197612002	**MW-02**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40197612003	**MW-03**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40197612004	**MW-04**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40197612005	**MW-05**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40197612006	**FIELD BLANK**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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SUMMARY OF DETECTION

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
40197612001	**MW-01**					
EPA 200.7	Boron	0.091	mg/L	0.058	10/23/19 11:44	
EPA 200.7	Calcium	109	mg/L	0.50	10/23/19 11:44	
EPA 200.7	Iron	0.11J	mg/L	0.12	10/23/19 11:44	
SM 2540C	Total Dissolved Solids	616	mg/L	20.0	10/23/19 17:49	
EPA 9040	pH at 25 Degrees C	7.8	Std. Units	0.10	10/28/19 11:23	H6
EPA 300.0	Chloride	247	mg/L	20.0	10/24/19 03:22	
EPA 300.0	Sulfate	27.0	mg/L	3.0	10/24/19 01:59	
40197612002	**MW-02**					
EPA 200.7	Boron	0.056J	mg/L	0.058	10/23/19 11:51	
EPA 200.7	Calcium	55.8	mg/L	0.50	10/23/19 11:51	
EPA 200.7	Iron	0.11J	mg/L	0.12	10/23/19 11:51	
SM 2540C	Total Dissolved Solids	238	mg/L	20.0	10/23/19 17:49	
EPA 9040	pH at 25 Degrees C	8.0	Std. Units	0.10	10/28/19 11:25	H6
EPA 300.0	Chloride	55.2	mg/L	2.0	10/25/19 14:04	
EPA 300.0	Sulfate	21.1	mg/L	3.0	10/25/19 14:04	
40197612003	**MW-03**					
EPA 200.7	Boron	0.047J	mg/L	0.058	10/23/19 11:53	
EPA 200.7	Calcium	64.9	mg/L	0.50	10/23/19 11:53	
EPA 200.7	Iron	0.045J	mg/L	0.12	10/23/19 11:53	
SM 2540C	Total Dissolved Solids	278	mg/L	20.0	10/23/19 17:49	
EPA 9040	pH at 25 Degrees C	8.0	Std. Units	0.10	10/28/19 11:27	H6
EPA 300.0	Chloride	78.3	mg/L	10.0	10/25/19 20:16	
EPA 300.0	Sulfate	19.2	mg/L	3.0	10/25/19 14:17	
40197612004	**MW-04**					
EPA 200.7	Boron	0.11	mg/L	0.058	10/23/19 11:56	
EPA 200.7	Calcium	126	mg/L	0.50	10/23/19 11:56	
EPA 200.7	Iron	1.7	mg/L	0.12	10/23/19 11:56	
SM 2540C	Total Dissolved Solids	986	mg/L	20.0	10/23/19 17:49	
EPA 9040	pH at 25 Degrees C	7.7	Std. Units	0.10	10/28/19 11:28	H6
EPA 300.0	Chloride	417	mg/L	40.0	10/25/19 20:29	
EPA 300.0	Fluoride	0.12J	mg/L	0.30	10/25/19 14:30	
EPA 300.0	Sulfate	35.4	mg/L	3.0	10/25/19 14:30	
40197612005	**MW-05**					
EPA 200.7	Boron	0.045J	mg/L	0.058	10/23/19 11:58	
EPA 200.7	Calcium	140	mg/L	0.50	10/23/19 11:58	
SM 2540C	Total Dissolved Solids	748	mg/L	20.0	10/23/19 17:49	
EPA 9040	pH at 25 Degrees C	7.6	Std. Units	0.10	10/28/19 11:30	H6
EPA 300.0	Chloride	274	mg/L	20.0	10/25/19 20:42	
EPA 300.0	Sulfate	20.3	mg/L	3.0	10/25/19 14:43	
40197612006	**FIELD BLANK**					
EPA 200.7	Boron	0.023J	mg/L	0.058	10/23/19 12:01	
EPA 200.7	Calcium	4.4	mg/L	0.50	10/23/19 12:01	
EPA 9040	pH at 25 Degrees C	5.8	Std. Units	0.10	10/28/19 11:33	H6
EPA 300.0	Chloride	10.2	mg/L	2.0	10/25/19 14:56	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Sample: MW-01 **Lab ID: 40197612001** Collected: 10/17/19 13:56 Received: 10/19/19 10:10 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.091**	mg/L	0.058	0.017	1	10/22/19 13:20	10/23/19 11:44	7440-42-8	
Calcium	**109**	mg/L	0.50	0.11	1	10/22/19 13:20	10/23/19 11:44	7440-70-2	
Iron	**0.11J**	mg/L	0.12	0.035	1	10/22/19 13:20	10/23/19 11:44	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**616**	mg/L	20.0	8.7	1		10/23/19 17:49		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		10/28/19 11:23		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**247**	mg/L	20.0	5.0	10		10/24/19 03:22	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/24/19 01:59	16984-48-8	M0
Sulfate	**27.0**	mg/L	3.0	1.0	1		10/24/19 01:59	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Sample: MW-02 **Lab ID: 40197612002** Collected: 10/17/19 14:48 Received: 10/19/19 10:10 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.056J**	mg/L	0.058	0.017	1	10/22/19 13:20	10/23/19 11:51	7440-42-8	
Calcium	**55.8**	mg/L	0.50	0.11	1	10/22/19 13:20	10/23/19 11:51	7440-70-2	
Iron	**0.11J**	mg/L	0.12	0.035	1	10/22/19 13:20	10/23/19 11:51	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**238**	mg/L	20.0	8.7	1		10/23/19 17:49		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/28/19 11:25		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**55.2**	mg/L	2.0	0.50	1		10/25/19 14:04	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/25/19 14:04	16984-48-8	
Sulfate	**21.1**	mg/L	3.0	1.0	1		10/25/19 14:04	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Sample: MW-03 **Lab ID: 40197612003** Collected: 10/17/19 15:28 Received: 10/19/19 10:10 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.047J**	mg/L	0.058	0.017	1	10/22/19 13:20	10/23/19 11:53	7440-42-8	
Calcium	**64.9**	mg/L	0.50	0.11	1	10/22/19 13:20	10/23/19 11:53	7440-70-2	
Iron	**0.045J**	mg/L	0.12	0.035	1	10/22/19 13:20	10/23/19 11:53	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**278**	mg/L	20.0	8.7	1		10/23/19 17:49		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/28/19 11:27		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**78.3**	mg/L	10.0	2.5	5		10/25/19 20:16	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/25/19 14:17	16984-48-8	
Sulfate	**19.2**	mg/L	3.0	1.0	1		10/25/19 14:17	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Sample: MW-04 **Lab ID: 40197612004** Collected: 10/16/19 16:24 Received: 10/19/19 10:10 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.11**	mg/L	0.058	0.017	1	10/22/19 13:20	10/23/19 11:56	7440-42-8	
Calcium	**126**	mg/L	0.50	0.11	1	10/22/19 13:20	10/23/19 11:56	7440-70-2	
Iron	**1.7**	mg/L	0.12	0.035	1	10/22/19 13:20	10/23/19 11:56	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**986**	mg/L	20.0	8.7	1		10/23/19 17:49		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		10/28/19 11:28		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**417**	mg/L	40.0	10.0	20		10/25/19 20:29	16887-00-6	
Fluoride	**0.12J**	mg/L	0.30	0.10	1		10/25/19 14:30	16984-48-8	
Sulfate	**35.4**	mg/L	3.0	1.0	1		10/25/19 14:30	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Sample: MW-05 **Lab ID: 40197612005** Collected: 10/16/19 14:18 Received: 10/19/19 10:10 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.045J**	mg/L	0.058	0.017	1	10/22/19 13:20	10/23/19 11:58	7440-42-8	
Calcium	**140**	mg/L	0.50	0.11	1	10/22/19 13:20	10/23/19 11:58	7440-70-2	
Iron	**<0.035**	mg/L	0.12	0.035	1	10/22/19 13:20	10/23/19 11:58	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**748**	mg/L	20.0	8.7	1		10/23/19 17:49		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		10/28/19 11:30		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**274**	mg/L	20.0	5.0	10		10/25/19 20:42	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/25/19 14:43	16984-48-8	
Sulfate	**20.3**	mg/L	3.0	1.0	1		10/25/19 14:43	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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(920)469-2436

ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Sample: FIELD BLANK **Lab ID: 40197612006** Collected: 10/17/19 16:08 Received: 10/19/19 10:10 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.023J**	mg/L	0.058	0.017	1	10/22/19 13:20	10/23/19 12:01	7440-42-8	
Calcium	**4.4**	mg/L	0.50	0.11	1	10/22/19 13:20	10/23/19 12:01	7440-70-2	
Iron	**<0.035**	mg/L	0.12	0.035	1	10/22/19 13:20	10/23/19 12:01	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		10/23/19 17:50		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**5.8**	Std. Units	0.10	0.010	1		10/28/19 11:33		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**10.2**	mg/L	2.0	0.50	1		10/25/19 14:56	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/25/19 14:56	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		10/25/19 14:56	14808-79-8	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

QC Batch: 338344 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 MET
Associated Lab Samples: 40197612001, 40197612002, 40197612003, 40197612004, 40197612005, 40197612006

METHOD BLANK: 1964814 Matrix: Water
Associated Lab Samples: 40197612001, 40197612002, 40197612003, 40197612004, 40197612005, 40197612006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	mg/L	<0.017	0.058	0.017	10/23/19 10:52	
Calcium	mg/L	<0.11	0.50	0.11	10/23/19 10:52	
Iron	mg/L	<0.035	0.12	0.035	10/23/19 10:52	

LABORATORY CONTROL SAMPLE: 1964815

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	mg/L	0.5	0.50	101	85-115	
Calcium	mg/L	5	5.2	104	85-115	
Iron	mg/L	5	5.2	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964816 1964817

Parameter	Units	40197558001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	mg/L	935 ug/L	0.5	0.5	1.5	1.4	106	98	70-130	3	20	
Calcium	mg/L	2970 ug/L	5	5	8.4	8.2	108	105	70-130	2	20	
Iron	mg/L	88.4J ug/L	5	5	5.5	5.4	108	106	70-130	2	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964818 1964819

Parameter	Units	40197595001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	mg/L	499 ug/L	0.5	0.5	1.0	1.0	106	101	70-130	3	20	
Calcium	mg/L	216000 ug/L	5	5	225	215	170	-28	70-130	5	20	P6
Iron	mg/L	2250 ug/L	5	5	7.5	7.3	105	101	70-130	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

QC Batch: 338523 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40197612001, 40197612002, 40197612003, 40197612004, 40197612005, 40197612006

METHOD BLANK: 1965846 Matrix: Water
Associated Lab Samples: 40197612001, 40197612002, 40197612003, 40197612004, 40197612005, 40197612006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	8.7	10/23/19 17:46	

LABORATORY CONTROL SAMPLE: 1965847

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	600	562	94	80-120	

SAMPLE DUPLICATE: 1965848

Parameter	Units	40197564001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	490	490	0	10	

SAMPLE DUPLICATE: 1965849

Parameter	Units	40197612001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	616	638	4	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

QC Batch: 338857 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40197612001, 40197612002, 40197612003, 40197612004, 40197612005, 40197612006

SAMPLE DUPLICATE: 1968480

Parameter	Units	40197444001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	6.9	6.9	1	20	H6

SAMPLE DUPLICATE: 1968481

Parameter	Units	40197624003 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	1	20	H6

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

QC Batch: 338223
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40197612001

METHOD BLANK: 1964379 Matrix: Water
Associated Lab Samples: 40197612001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	0.50	10/23/19 19:17	
Fluoride	mg/L	<0.10	0.30	0.10	10/23/19 19:17	
Sulfate	mg/L	<1.0	3.0	1.0	10/23/19 19:17	

LABORATORY CONTROL SAMPLE: 1964380

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.5	103	90-110	
Fluoride	mg/L	2	2.1	106	90-110	
Sulfate	mg/L	20	20.7	104	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964381 1964382

Parameter	Units	40197445003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	36.4	200	200	246	245	105	104	90-110	0	15	
Fluoride	mg/L	122	200	200	338	336	108	107	90-110	1	15	
Sulfate	mg/L	11.2J	200	200	226	227	108	108	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964383 1964384

Parameter	Units	40197612001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	247	200	200	440	438	96	96	90-110	0	15	
Fluoride	mg/L	<0.10	2	2	2.3	2.4	117	118	90-110	1	15	M0
Sulfate	mg/L	27.0	20	20	48.7	48.6	108	108	90-110	0	15	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

QC Batch: 338580 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40197612002, 40197612003, 40197612004, 40197612005, 40197612006

METHOD BLANK: 1966361 Matrix: Water
Associated Lab Samples: 40197612002, 40197612003, 40197612004, 40197612005, 40197612006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	0.50	10/25/19 11:12	
Fluoride	mg/L	<0.10	0.30	0.10	10/25/19 11:12	
Sulfate	mg/L	<1.0	3.0	1.0	10/25/19 11:12	

LABORATORY CONTROL SAMPLE: 1966362

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.1	106	90-110	
Fluoride	mg/L	2	2.2	108	90-110	
Sulfate	mg/L	20	21.1	105	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1966363 1966364

Parameter	Units	40197727007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	12.2	20	20	32.3	32.6	100	102	90-110	1	15	
Fluoride	mg/L	0.42	2	2	2.5	2.6	106	107	90-110	1	15	
Sulfate	mg/L	110	100	100	202	203	92	93	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1966365 1966366

Parameter	Units	40197360001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	430	400	400	827	815	99	96	90-110	2	15	
Fluoride	mg/L	6.9	40	40	45.4	45.0	96	95	90-110	1	15	
Sulfate	mg/L	571	400	400	959	941	97	92	90-110	2	15	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

ANALYTE QUALIFIERS

H6	Analysis initiated outside of the 15 minute EPA required holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40197612

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40197612001	**MW-01**	EPA 200.7	338344	EPA 200.7	338445
40197612002	**MW-02**	EPA 200.7	338344	EPA 200.7	338445
40197612003	**MW-03**	EPA 200.7	338344	EPA 200.7	338445
40197612004	**MW-04**	EPA 200.7	338344	EPA 200.7	338445
40197612005	**MW-05**	EPA 200.7	338344	EPA 200.7	338445
40197612006	**FIELD BLANK**	EPA 200.7	338344	EPA 200.7	338445
40197612001	**MW-01**	SM 2540C	338523		
40197612002	**MW-02**	SM 2540C	338523		
40197612003	**MW-03**	SM 2540C	338523		
40197612004	**MW-04**	SM 2540C	338523		
40197612005	**MW-05**	SM 2540C	338523		
40197612006	**FIELD BLANK**	SM 2540C	338523		
40197612001	**MW-01**	EPA 9040	338857		
40197612002	**MW-02**	EPA 9040	338857		
40197612003	**MW-03**	EPA 9040	338857		
40197612004	**MW-04**	EPA 9040	338857		
40197612005	**MW-05**	EPA 9040	338857		
40197612006	**FIELD BLANK**	EPA 9040	338857		
40197612001	**MW-01**	EPA 300.0	338223		
40197612002	**MW-02**	EPA 300.0	338580		
40197612003	**MW-03**	EPA 300.0	338580		
40197612004	**MW-04**	EPA 300.0	338580		
40197612005	**MW-05**	EPA 300.0	338580		
40197612006	**FIELD BLANK**	EPA 300.0	338580		

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

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CHAIN OF CUSTODY

COC No. 40197612

(Please Print Clearly)	
Company Name:	GEI Consultants
Branch/Location:	Milwaukee, WI
Project Contact:	Trent Kohl
Phone:	(414) 930-7535
Project Number:	1903625
Project Name:	MBLP CCR Impoundment GW
Project State:	MI
Sampled By (Print):	Travis Anderson
Sampled By (Sign):	T- A
PO #:	N/A
Regulatory Program:	

Quote #:	
Mail To Contact:	Trent Kohl
Mail To Company:	GEI Consultants
Mail To Address:	10501 West Research Dr, STE G100 Milwaukee, WI 5322[illegible]
Invoice To Contact:	SAA
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Data Package Options (billable)
- ☐ EPA Level III
- ☐ EPA Level IV

MS/MSD
- ☐ On your sample (billable)
- ☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO)	Boron, Calcium, Iron	TDS, pH	Cl, F, SO4	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)
	Pick Letter					D	A	A		
	Analyses Requested				Y / N	N	N	N		
001	MW-01	10/17	1356	GW		X	X	X		
002	MW-02	10/17	1448	GW		X	X	X		
003	MW-03	10/17	1528	GW		X	X	X		
004	MW-04	10/16	1624	GW		X	X	X		
005	MW-05	10/16	1418	GW		X	X	X		
006	FIELD BLANK	10/17	1608	W		X	X	X		

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):

Email #1:	
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
TJA T- A	10/18 @1200		
Fed Ex	10/18/19 1010	Alan Pace	10/18/19 1010

PACE Project No.
40197612

Receipt Temp = 2 °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

Client Name: GEI

Sample Preservation Receipt Form

Project # 401977612

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

All containers needing preservation have been checked and noted below: ☑Yes ☐No ☐N/A

Lab Lot# of pH paper: 10053581 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: AS Date/ Time:

	Glass							Plastic							Vials						Jars			General							
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	WGFU	WPFU	SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001											1		1																			2.5 / 5 / 10
002											1		1																			2.5 / 5 / 10
003											1		1																			2.5 / 5 / 10
004											1		1																			2.5 / 5 / 10
005											1		1																			2.5 / 5 / 10
006											1		1																			2.5 / 5 / 10
007																																2.5 / 5 / 10
008																																2.5 / 5 / 10
009																																2.5 / 5 / 10
010																																2.5 / 5 / 10
011																																2.5 / 5 / 10
012																																2.5 / 5 / 10
013																																2.5 / 5 / 10
014																																2.5 / 5 / 10
015																																2.5 / 5 / 10
016																																2.5 / 5 / 10
017																																2.5 / 5 / 10
018																																2.5 / 5 / 10
019																																2.5 / 5 / 10
020																																2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other: _____ Headspace in VOA Vials (>6mm) : ☐Yes ☐No ~~☐N/A~~ ***If yes look in headspace column**

AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 25Apr2018
	Document No.: F-GB-C-031-Rev.07	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40197612

40197612

Client Name: GEI

Courier: ☐ CS Logistics ☑ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #: 8136 6883 3070

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Thermometer Used SR - 40 **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 1.5 /Corr: 2

Temp Blank Present: ☑ yes ☐ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

Person examining contents:
Date: 10/19/19
Initials: AS

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume: For Analysis: ☑Yes ☐No MS/MSD: ☐Yes ☑No ☐N/A		8.
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: OK **Date:** 10/21/19

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

August 27, 2019

Trent Kohl
GEI Consultants
10501 West Research Drive
Suite G100
Milwaukee, WI 53226

RE: Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Dear Trent Kohl:
Enclosed are the analytical results for sample(s) received by the laboratory on August 15, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Christopher Hyska
christopher.hyska@pacelabs.com
(920)469-2436
Project Manager

Enclosures

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Green Bay Certification IDs

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
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SAMPLE SUMMARY

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40193034001	**MW-01**	Water	08/13/19 13:13	08/15/19 10:00
40193034002	**MW-02**	Water	08/13/19 13:37	08/15/19 10:00
40193034003	**MW-03**	Water	08/13/19 14:13	08/15/19 10:00
40193034004	**MW-04**	Water	08/14/19 08:30	08/15/19 10:00
40193034005	**MW-05**	Water	08/13/19 17:59	08/15/19 10:00
40193034006	**FIELD BLANK**	Water	08/13/19 16:40	08/15/19 10:00

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SAMPLE ANALYTE COUNT

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40193034001	**MW-01**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40193034002	**MW-02**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40193034003	**MW-03**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40193034004	**MW-04**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40193034005	**MW-05**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40193034006	**FIELD BLANK**	EPA 200.7	TXW	3	PASI-G
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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SUMMARY OF DETECTION

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
40193034001	**MW-01**					
EPA 200.7	Boron	0.073	mg/L	0.058	08/19/19 20:10	
EPA 200.7	Calcium	109	mg/L	0.50	08/19/19 20:10	
EPA 200.7	Iron	1.3	mg/L	0.25	08/19/19 20:10	
SM 2540C	Total Dissolved Solids	694	mg/L	20.0	08/19/19 16:38	
EPA 9040	pH at 25 Degrees C	7.9	Std. Units	0.10	08/27/19 10:22	H6
EPA 300.0	Chloride	269	mg/L	20.0	08/21/19 11:05	
EPA 300.0	Sulfate	26.7	mg/L	3.0	08/20/19 14:09	M0
40193034002	**MW-02**					
EPA 200.7	Boron	0.063	mg/L	0.058	08/19/19 20:13	
EPA 200.7	Calcium	62.6	mg/L	0.50	08/19/19 20:13	
EPA 200.7	Iron	0.79	mg/L	0.25	08/19/19 20:13	
SM 2540C	Total Dissolved Solids	336	mg/L	20.0	08/19/19 16:38	
EPA 9040	pH at 25 Degrees C	7.9	Std. Units	0.10	08/27/19 10:24	H6
EPA 300.0	Chloride	85.9	mg/L	10.0	08/21/19 11:46	
EPA 300.0	Sulfate	30.7	mg/L	3.0	08/20/19 14:50	
40193034003	**MW-03**					
EPA 200.7	Boron	0.036J	mg/L	0.058	08/19/19 20:15	
EPA 200.7	Calcium	72.8	mg/L	0.50	08/19/19 20:15	
EPA 200.7	Iron	0.72	mg/L	0.25	08/19/19 20:15	
SM 2540C	Total Dissolved Solids	326	mg/L	20.0	08/19/19 16:38	
EPA 9040	pH at 25 Degrees C	8.1	Std. Units	0.10	08/27/19 10:26	H6
EPA 300.0	Chloride	99.2	mg/L	10.0	08/21/19 12:00	
EPA 300.0	Sulfate	22.7	mg/L	3.0	08/20/19 15:04	
40193034004	**MW-04**					
EPA 200.7	Boron	0.096	mg/L	0.058	08/19/19 20:18	
EPA 200.7	Calcium	122	mg/L	0.50	08/19/19 20:18	
EPA 200.7	Iron	1.8	mg/L	0.25	08/19/19 20:18	
SM 2540C	Total Dissolved Solids	1110	mg/L	20.0	08/19/19 17:22	
EPA 9040	pH at 25 Degrees C	7.6	Std. Units	0.10	08/27/19 10:27	H6
EPA 300.0	Chloride	466	mg/L	20.0	08/21/19 12:14	
EPA 300.0	Sulfate	42.3	mg/L	3.0	08/20/19 15:18	
40193034005	**MW-05**					
EPA 200.7	Boron	0.034J	mg/L	0.058	08/19/19 20:20	
EPA 200.7	Calcium	126	mg/L	0.50	08/19/19 20:20	P6
EPA 200.7	Iron	0.077J	mg/L	0.25	08/19/19 20:20	
SM 2540C	Total Dissolved Solids	730	mg/L	20.0	08/19/19 16:39	
EPA 9040	pH at 25 Degrees C	7.6	Std. Units	0.10	08/27/19 10:28	H6
EPA 300.0	Chloride	275	mg/L	20.0	08/21/19 12:28	
EPA 300.0	Sulfate	22.5	mg/L	3.0	08/20/19 15:32	
40193034006	**FIELD BLANK**					
EPA 9040	pH at 25 Degrees C	3.9	Std. Units	0.10	08/27/19 10:37	H6
EPA 300.0	Chloride	0.57J	mg/L	2.0	08/20/19 16:30	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Sample: MW-01 **Lab ID: 40193034001** Collected: 08/13/19 13:13 Received: 08/15/19 10:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.073**	mg/L	0.058	0.017	1	08/16/19 06:23	08/19/19 20:10	7440-42-8	
Calcium	**109**	mg/L	0.50	0.11	1	08/16/19 06:23	08/19/19 20:10	7440-70-2	
Iron	**1.3**	mg/L	0.25	0.074	1	08/16/19 06:23	08/19/19 20:10	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**694**	mg/L	20.0	8.7	1		08/19/19 16:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.9**	Std. Units	0.10	0.010	1		08/27/19 10:22		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**269**	mg/L	20.0	5.0	10		08/21/19 11:05	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		08/20/19 14:09	16984-48-8	M0
Sulfate	**26.7**	mg/L	3.0	1.0	1		08/20/19 14:09	14808-79-8	M0

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Sample: MW-02 **Lab ID: 40193034002** Collected: 08/13/19 13:37 Received: 08/15/19 10:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.063**	mg/L	0.058	0.017	1	08/16/19 06:23	08/19/19 20:13	7440-42-8	
Calcium	**62.6**	mg/L	0.50	0.11	1	08/16/19 06:23	08/19/19 20:13	7440-70-2	
Iron	**0.79**	mg/L	0.25	0.074	1	08/16/19 06:23	08/19/19 20:13	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**336**	mg/L	20.0	8.7	1		08/19/19 16:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.9**	Std. Units	0.10	0.010	1		08/27/19 10:24		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**85.9**	mg/L	10.0	2.5	5		08/21/19 11:46	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		08/20/19 14:50	16984-48-8	
Sulfate	**30.7**	mg/L	3.0	1.0	1		08/20/19 14:50	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Sample: MW-03 **Lab ID: 40193034003** Collected: 08/13/19 14:13 Received: 08/15/19 10:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.036J**	mg/L	0.058	0.017	1	08/16/19 06:23	08/19/19 20:15	7440-42-8	
Calcium	**72.8**	mg/L	0.50	0.11	1	08/16/19 06:23	08/19/19 20:15	7440-70-2	
Iron	**0.72**	mg/L	0.25	0.074	1	08/16/19 06:23	08/19/19 20:15	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**326**	mg/L	20.0	8.7	1		08/19/19 16:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**8.1**	Std. Units	0.10	0.010	1		08/27/19 10:26		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**99.2**	mg/L	10.0	2.5	5		08/21/19 12:00	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		08/20/19 15:04	16984-48-8	
Sulfate	**22.7**	mg/L	3.0	1.0	1		08/20/19 15:04	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Sample: MW-04 **Lab ID: 40193034004** Collected: 08/14/19 08:30 Received: 08/15/19 10:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.096**	mg/L	0.058	0.017	1	08/16/19 06:23	08/19/19 20:18	7440-42-8	
Calcium	**122**	mg/L	0.50	0.11	1	08/16/19 06:23	08/19/19 20:18	7440-70-2	
Iron	**1.8**	mg/L	0.25	0.074	1	08/16/19 06:23	08/19/19 20:18	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**1110**	mg/L	20.0	8.7	1		08/19/19 17:22		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		08/27/19 10:27		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**466**	mg/L	20.0	5.0	10		08/21/19 12:14	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		08/20/19 15:18	16984-48-8	
Sulfate	**42.3**	mg/L	3.0	1.0	1		08/20/19 15:18	14808-79-8	

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ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Sample: MW-05 **Lab ID: 40193034005** Collected: 08/13/19 17:59 Received: 08/15/19 10:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**0.034J**	mg/L	0.058	0.017	1	08/16/19 06:23	08/19/19 20:20	7440-42-8	
Calcium	**126**	mg/L	0.50	0.11	1	08/16/19 06:23	08/19/19 20:20	7440-70-2	P6
Iron	**0.077J**	mg/L	0.25	0.074	1	08/16/19 06:23	08/19/19 20:20	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**730**	mg/L	20.0	8.7	1		08/19/19 16:39		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		08/27/19 10:28		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**275**	mg/L	20.0	5.0	10		08/21/19 12:28	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		08/20/19 15:32	16984-48-8	
Sulfate	**22.5**	mg/L	3.0	1.0	1		08/20/19 15:32	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Sample: FIELD BLANK **Lab ID: 40193034006** Collected: 08/13/19 16:40 Received: 08/15/19 10:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**<0.017**	mg/L	0.058	0.017	1	08/16/19 06:23	08/19/19 20:28	7440-42-8	
Calcium	**<0.11**	mg/L	0.50	0.11	1	08/16/19 06:23	08/19/19 20:28	7440-70-2	
Iron	**<0.074**	mg/L	0.25	0.074	1	08/16/19 06:23	08/19/19 20:28	7439-89-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		08/19/19 16:39		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**3.9**	Std. Units	0.10	0.010	1		08/27/19 10:37		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**0.57J**	mg/L	2.0	0.50	1		08/20/19 16:30	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		08/20/19 16:30	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		08/20/19 16:30	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

QC Batch: 330809 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 MET
Associated Lab Samples: 40193034001, 40193034002, 40193034003, 40193034004, 40193034005, 40193034006

METHOD BLANK: 1919486 Matrix: Water
Associated Lab Samples: 40193034001, 40193034002, 40193034003, 40193034004, 40193034005, 40193034006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	mg/L	<0.017	0.058	0.017	08/19/19 19:41	
Calcium	mg/L	<0.11	0.50	0.11	08/19/19 19:41	
Iron	mg/L	<0.074	0.25	0.074	08/19/19 19:41	

LABORATORY CONTROL SAMPLE: 1919487

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	mg/L	0.5	0.49	98	85-115	
Calcium	mg/L	5	5.1	101	85-115	
Iron	mg/L	5	4.9	98	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1919488 1919489

Parameter	Units	40192955001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	mg/L	0.70	0.5	0.5	1.2	1.2	95	94	70-130	0	20	
Calcium	mg/L	177	5	5	187	187	198	190	70-130	0	20	P6
Iron	mg/L	4.4	5	5	9.3	9.4	98	100	70-130	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1919490 1919491

Parameter	Units	40193034005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	mg/L	0.034J	0.5	0.5	0.52	0.53	98	99	70-130	2	20	
Calcium	mg/L	126	5	5	126	127	12	24	70-130	0	20	P6
Iron	mg/L	0.077J	5	5	4.9	4.9	96	97	70-130	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

QC Batch: 331096 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40193034001, 40193034002, 40193034003, 40193034005, 40193034006

METHOD BLANK: 1921440 Matrix: Water
Associated Lab Samples: 40193034001, 40193034002, 40193034003, 40193034005, 40193034006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	8.7	08/19/19 16:36	

LABORATORY CONTROL SAMPLE: 1921441

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	592	564	95	80-120	

SAMPLE DUPLICATE: 1921442

Parameter	Units	40193022010 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	414	438	6	10	

SAMPLE DUPLICATE: 1921443

Parameter	Units	40193034001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	694	706	2	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

QC Batch: 331097 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40193034004

METHOD BLANK: 1921444 Matrix: Water
Associated Lab Samples: 40193034004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	8.7	08/19/19 17:20	

LABORATORY CONTROL SAMPLE: 1921445

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	592	554	94	80-120	

SAMPLE DUPLICATE: 1921446

Parameter	Units	40193031005 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	278	286	3	10	

SAMPLE DUPLICATE: 1921447

Parameter	Units	40193036001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	772	762	1	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

QC Batch: 331912 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40193034001, 40193034002, 40193034003, 40193034004, 40193034005, 40193034006

SAMPLE DUPLICATE: 1925619

Parameter	Units	40193034001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.9	7.9	0	20	H6

SAMPLE DUPLICATE: 1925620

Parameter	Units	40193613001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.7	7.7	1	20	H6

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REPORT OF LABORATORY ANALYSIS

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(920)469-2436

QUALITY CONTROL DATA

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

QC Batch: 331102 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40193034001, 40193034002, 40193034003, 40193034004, 40193034005, 40193034006

METHOD BLANK: 1921470 Matrix: Water
Associated Lab Samples: 40193034001, 40193034002, 40193034003, 40193034004, 40193034005, 40193034006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	0.50	08/20/19 13:27	
Fluoride	mg/L	<0.10	0.30	0.10	08/20/19 13:27	
Sulfate	mg/L	<1.0	3.0	1.0	08/20/19 13:27	

LABORATORY CONTROL SAMPLE: 1921471

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.6	108	90-110	
Fluoride	mg/L	2	2.1	105	90-110	
Sulfate	mg/L	20	21.5	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1921472 1921473

Parameter	Units	40193034001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	269	200	200	471	474	101	102	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.3	2.3	113	115	90-110	2	15	M0
Sulfate	mg/L	26.7	20	20	48.7	49.1	110	112	90-110	1	15	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1921474 1921475

Parameter	Units	40192887013 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.3J	20	20	23.7	23.8	112	113	90-110	0	15	M0
Fluoride	mg/L	<0.10	2	2	2.4	2.4	117	118	90-110	1	15	M0
Sulfate	mg/L	11.0	20	20	33.7	33.8	114	114	90-110	0	15	M0

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

WORKORDER QUALIFIERS

WO: 40193034

[1]	Revised report to include pH analysis per client request.

ANALYTE QUALIFIERS

H6	Analysis initiated outside of the 15 minute EPA required holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Pace Analytical Services, LLC
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 1903625 MBLP CCR IMPOUNDMENT
Pace Project No.: 40193034

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40193034001	**MW-01**	EPA 200.7	330809	EPA 200.7	331095
40193034002	**MW-02**	EPA 200.7	330809	EPA 200.7	331095
40193034003	**MW-03**	EPA 200.7	330809	EPA 200.7	331095
40193034004	**MW-04**	EPA 200.7	330809	EPA 200.7	331095
40193034005	**MW-05**	EPA 200.7	330809	EPA 200.7	331095
40193034006	**FIELD BLANK**	EPA 200.7	330809	EPA 200.7	331095
40193034001	**MW-01**	SM 2540C	331096		
40193034002	**MW-02**	SM 2540C	331096		
40193034003	**MW-03**	SM 2540C	331096		
40193034004	**MW-04**	SM 2540C	331097		
40193034005	**MW-05**	SM 2540C	331096		
40193034006	**FIELD BLANK**	SM 2540C	331096		
40193034001	**MW-01**	EPA 9040	331912		
40193034002	**MW-02**	EPA 9040	331912		
40193034003	**MW-03**	EPA 9040	331912		
40193034004	**MW-04**	EPA 9040	331912		
40193034005	**MW-05**	EPA 9040	331912		
40193034006	**FIELD BLANK**	EPA 9040	331912		
40193034001	**MW-01**	EPA 300.0	331102		
40193034002	**MW-02**	EPA 300.0	331102		
40193034003	**MW-03**	EPA 300.0	331102		
40193034004	**MW-04**	EPA 300.0	331102		
40193034005	**MW-05**	EPA 300.0	331102		
40193034006	**FIELD BLANK**	EPA 300.0	331102		

(Please Print Clearly)

Company Name:	GEI Consultants
Branch/Location:	Milwaukee, WI
Project Contact:	Trent Kohl
Phone:	(414) 930-7535
Project Number:	1903625
Project Name:	MBLP CCR Impoundment GW
Project State:	MI
Sampled By (Print):	
Sampled By (Sign):	
PO #:	N/A
Regulatory Program:	

Pace Analytical®
www.pacelabs.com

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

COC No. 40197034

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Quote #:	
Mail To Contact:	Trent Kohl
Mail To Company:	GEI Consultants
Mail To Address:	10501 West Research Dr, STE G100 Milwaukee, WI 53226
Invoice To Contact:	SAA
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
- ☐ EPA Level III
- ☐ EPA Level IV

MS/MSD
- ☐ On your sample (billable)
- ☐ NOT needed on your sample

Matrix Codes

A = Air	W = Water
B = Biota	DW = Drinking Water
C = Charcoal	GW = Ground Water
O = Oil	SW = Surface Water
S = Soil	WW = Waste Water
SI = Sludge	WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Boron, Calcium, Iron	TDS	Cl, F, SO4	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)
	FILTERED? (YES/NO)				N	N	N		
	PRESERVATION (CODE)*				D	A	A		
001	MW-01	8/13	1313	GW	X	X	X		
002	MW-02	8/13	1337	GW	X	X	X		
003	MW-03	8/13	1413	GW	X	X	X		
004	MW-04	8/14	8:30	GW	X	X	X		
005	MW-05	8/13	1759	GW	X	X	X		
006	FIELD BLANK	8/13	1640	W	X	X	X		

Profile #

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):

Email #1:	
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Joshua Eckert	8/14/19 10:58 AM		
UPS	8/15/19 1000	Susan Klyke	8/15/19 1000

PACE Project No. 40197034

Receipt Temp = 5 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / ~~Not Present~~ Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: GEI Project # 10193034

All containers needing preservation have been checked and noted below: ☑Yes ☐No ☐N/A Initial when completed: KEV Date/ Time:

Lab Lot# of pH paper: 10US0891 Lab Std #ID of preservation (if pH adjusted):

	Glass							Plastic							Vials						Jars			General								
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	WGFU	WPFU	SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001																															X		2.5 / 5 / 10
002																															X		2.5 / 5 / 10
003																															X		2.5 / 5 / 10
004																															X		2.5 / 5 / 10
005																															X		2.5 / 5 / 10
006																															X		2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																									8/15/19	SV							2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other: _____ Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☑N/A ***If yes look in headspace column**

AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 25Apr2018
	Document No.: F-GB-C-031-Rev.07	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Client Name: GEI

Project #: WO#: 40193034

Courier: ☐ CS Logistics ☐ Fed Ex ☐ Speedee ☑ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #: 1ZW03547019122063 3

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other Melt Water Only 8-15-19 SW

Thermometer Used SR - 9 **Type of Ice:** Wet Blue Dry (None) ☐ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 4.5 /Corr: 5

Temp Blank Present: ☑ yes ☐ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

Person examining contents:
Date: 8-15-19
Initials:

Chain of Custody Present:	☑Yes ☐No ☐N/A	1. CC 8-15-19 SW
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☑No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume: For Analysis: ☑Yes ☐No MS/MSD: ☐Yes ☑No ☐N/A		8.
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: W	☑Yes ☐No ☐N/A	12.
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 8/15/19

Page 2 of 2

Appendix C1- First Semi-Annual Statistical Evaluation

Prediction Limit

Shiras Steam Plant Client: GEI Data: Shiras Database Printed 9/30/2019, 12:09 PM

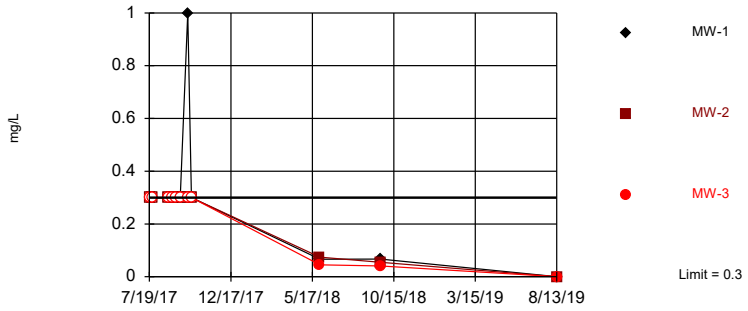
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-1	0.3	n/a	8/13/2019	0	No	22	72.73	n/a	0.003586	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-2	0.3	n/a	8/13/2019	0	No	22	72.73	n/a	0.003586	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-3	0.3	n/a	8/13/2019	0	No	22	72.73	n/a	0.003586	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-1	143	n/a	8/13/2019	109	No	22	0	No	0.002505	Param Inter 1 of 2
Calcium (mg/L)	MW-2	143	n/a	8/13/2019	63	No	22	0	No	0.002505	Param Inter 1 of 2
Calcium (mg/L)	MW-3	143	n/a	8/13/2019	73	No	22	0	No	0.002505	Param Inter 1 of 2
Chloride (mg/L)	MW-1	466	n/a	8/13/2019	269	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Chloride (mg/L)	MW-2	466	n/a	8/13/2019	86	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Chloride (mg/L)	MW-3	466	n/a	8/13/2019	99	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Fluoride (mg/L)	MW-1	0.23	n/a	8/13/2019	0.1ND	No	22	63.64	n/a	0.003586	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-2	0.23	n/a	8/13/2019	0.1ND	No	22	63.64	n/a	0.003586	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-3	0.23	n/a	8/13/2019	0.1ND	No	22	63.64	n/a	0.003586	NP Inter (NDs) 1 of 2
pH (mg/L)	MW-1	8.073	7.056	8/13/2019	7.7	No	22	0	No	0.001253	Param Inter 1 of 2
pH (mg/L)	MW-2	8.073	7.056	8/13/2019	7.9	No	22	0	No	0.001253	Param Inter 1 of 2
pH (mg/L)	**MW-3**	**8.073**	**7.056**	**8/13/2019**	**8.6**	**Yes**	**22**	**0**	**No**	**0.001253**	**Param Inter 1 of 2**
Sulfate (mg/L)	MW-1	53	n/a	8/13/2019	27	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Sulfate (mg/L)	MW-2	53	n/a	8/13/2019	31	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Sulfate (mg/L)	MW-3	53	n/a	8/13/2019	23	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-1	2300	n/a	8/13/2019	694	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-2	2300	n/a	8/13/2019	336	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-3	2300	n/a	8/13/2019	326	No	22	0	n/a	0.003586	NP Inter (normality) 1 of 2

Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 22 background values. 72.73% NDs. Annual per-constituent alpha = 0.02133. Individual comparison alpha = 0.003586 (1 of 2). Comparing 3 points to limit.

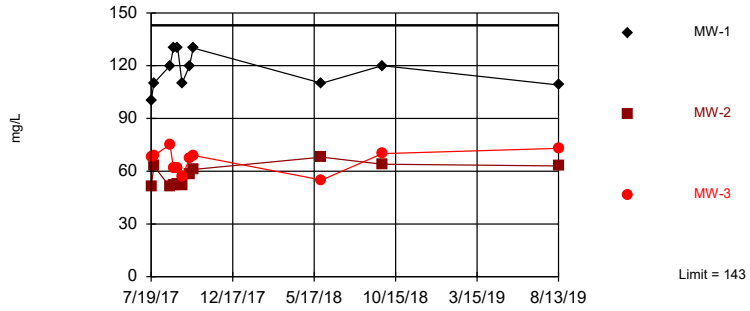
Constituent: Boron Analysis Run 9/30/2019 12:09 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=112.5, Std. Dev.=16.31, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9022, critical = 0.878. Kappa = 1.866 (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.

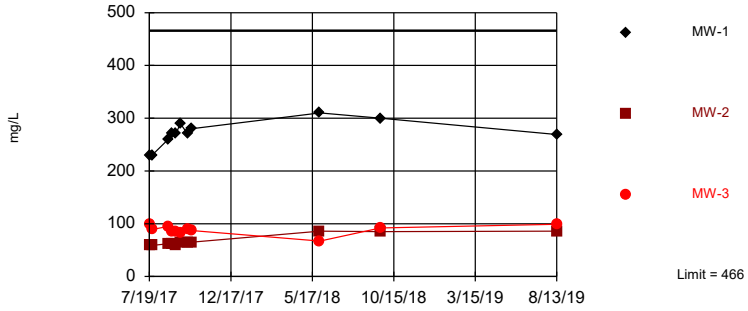
Constituent: Calcium Analysis Run 9/30/2019 12:09 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 22 background values. Annual per-constituent alpha = 0.02133. Individual comparison alpha = 0.003586 (1 of 2). Comparing 3 points to limit.

Constituent: Chloride Analysis Run 9/30/2019 12:09 PM

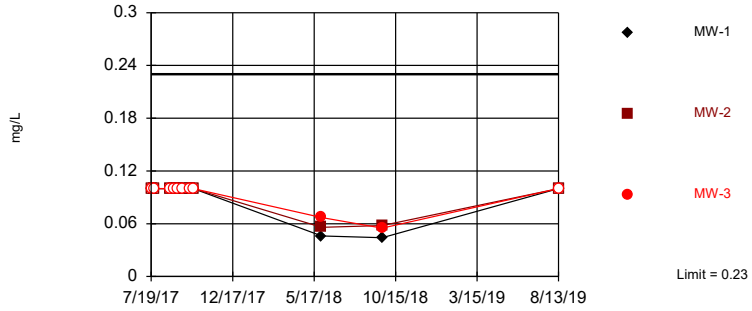
Shiras Steam Plant Client: GEI Data: Shiras Database

Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 22 background values. 63.64% NDs. Annual per-constituent alpha = 0.02133. Individual comparison alpha = 0.003586 (1 of 2). Comparing 3 points to limit.

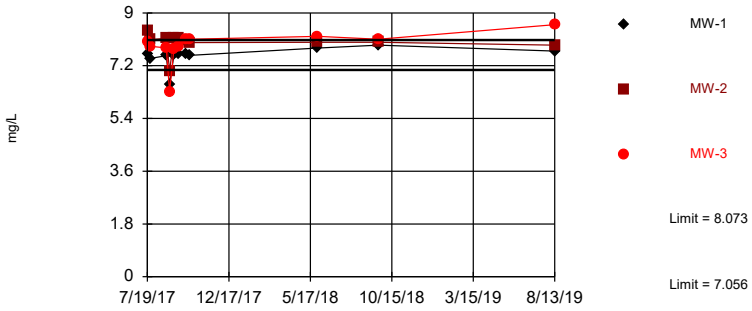
Constituent: Fluoride Analysis Run 9/30/2019 12:09 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Exceeds Limits: MW-3

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=7.565, Std. Dev.=0.2724, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.918, critical = 0.878. Kappa = 1.866 (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.

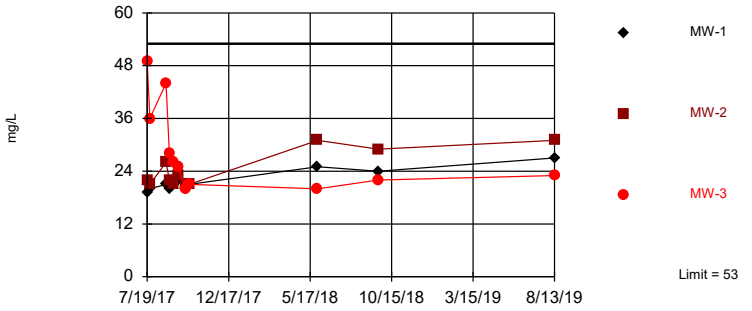
Constituent: pH Analysis Run 9/30/2019 12:09 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 22 background values. Annual per-constituent alpha = 0.02133. Individual comparison alpha = 0.003586 (1 of 2). Comparing 3 points to limit.

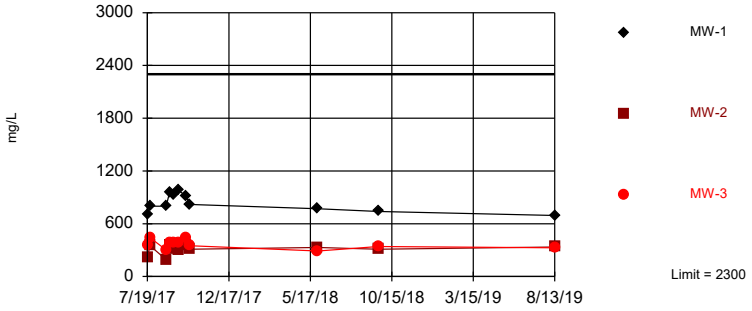
Constituent: Sulfate Analysis Run 9/30/2019 12:09 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 22 background values. Annual per-constituent alpha = 0.02133. Individual comparison alpha = 0.003586 (1 of 2). Comparing 3 points to limit.

Constituent: Total Dissolved Solids Analysis Run 9/30/2019 12:09 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Trend Test - Significant Results

Shiras Steam Plant Client: GEI Data: Shiras Database Printed 1/6/2020, 1:30 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium (mg/L)	**MW-2**	**10.74**	**32**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	**MW-4 (bg)**	**29.51**	**32**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	**MW-2**	**22.43**	**42**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	**MW-4 (bg)**	**219.5**	**51**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	**MW-1**	**3.868**	**37**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	**MW-3**	**-31.17**	**-36**	**-31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**

Trend Test - All Results

Shiras Steam Plant Client: GEI Data: Shiras Database Printed 1/6/2020, 1:30 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-1	0	-20	-31	No	11	63.64	n/a	n/a	0.02	NP
Boron (mg/L)	MW-2	0	-27	-31	No	11	72.73	n/a	n/a	0.02	NP
Boron (mg/L)	MW-3	0	-27	-31	No	11	72.73	n/a	n/a	0.02	NP
Boron (mg/L)	MW-4 (bg)	0	-24	-31	No	11	72.73	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5 (bg)	0	-27	-31	No	11	72.73	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-1	0	2	31	No	11	0	n/a	n/a	0.02	NP
Calcium (mg/L)	**MW-2**	**10.74**	**32**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	MW-3	0.8629	3	31	No	11	0	n/a	n/a	0.02	NP
Calcium (mg/L)	**MW-4 (bg)**	**29.51**	**32**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	MW-5 (bg)	9.288	23	31	No	11	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-1	59.59	31	31	No	11	0	n/a	n/a	0.02	NP
Chloride (mg/L)	**MW-2**	**22.43**	**42**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	MW-3	-10	-6	-31	No	11	0	n/a	n/a	0.02	NP
Chloride (mg/L)	**MW-4 (bg)**	**219.5**	**51**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	MW-5 (bg)	17.06	19	31	No	11	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-1	0	-15	-31	No	11	81.82	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-2	0	-13	-31	No	11	81.82	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-3	0	-15	-31	No	11	81.82	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-4 (bg)	0.02889	17	31	No	11	45.45	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5 (bg)	0	-15	-31	No	11	81.82	n/a	n/a	0.02	NP
pH (mg/L)	MW-1	0.3259	28	31	No	11	0	n/a	n/a	0.02	NP
pH (mg/L)	MW-2	-0.1207	-27	-31	No	11	0	n/a	n/a	0.02	NP
pH (mg/L)	MW-3	0.3922	30	31	No	11	0	n/a	n/a	0.02	NP
pH (mg/L)	MW-4 (bg)	-0.1166	-24	-31	No	11	0	n/a	n/a	0.02	NP
pH (mg/L)	MW-5 (bg)	0.2517	28	31	No	11	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	**MW-1**	**3.868**	**37**	**31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	MW-2	4.351	17	31	No	11	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	**MW-3**	**-31.17**	**-36**	**-31**	**Yes**	**11**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	MW-4 (bg)	9.125	4	31	No	11	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5 (bg)	0	0	31	No	11	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-1	-51.77	-12	-31	No	11	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-2	9.838	9	31	No	11	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-3	-32.72	-19	-31	No	11	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-4 (bg)	220.8	29	31	No	11	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5 (bg)	0	1	31	No	11	0	n/a	n/a	0.02	NP

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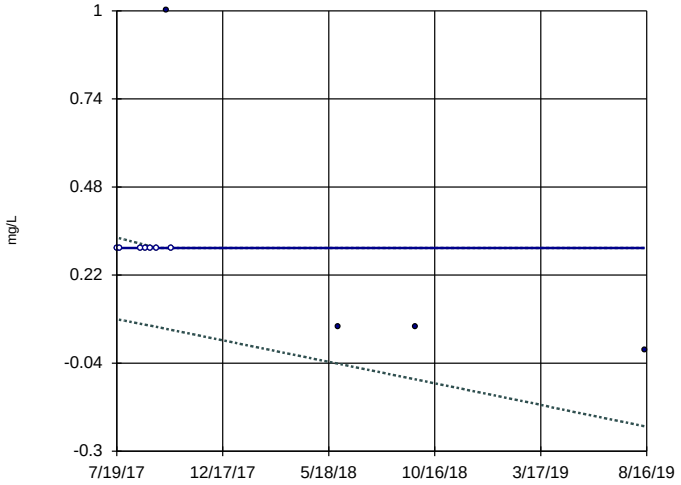
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-1



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = -20
critical = -31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

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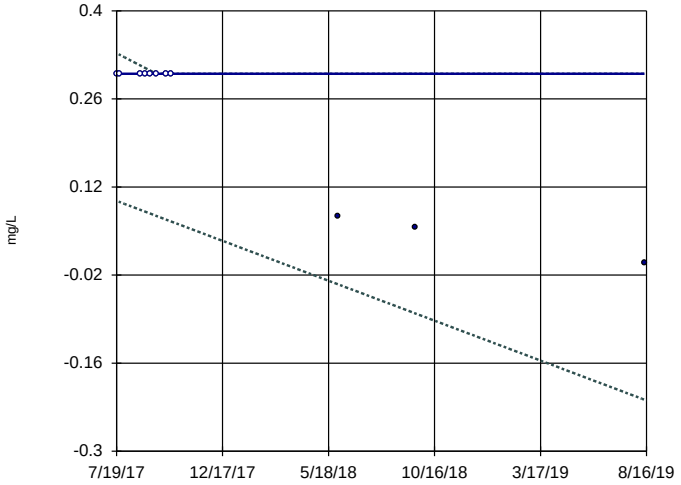
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-2



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = -27
critical = -31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

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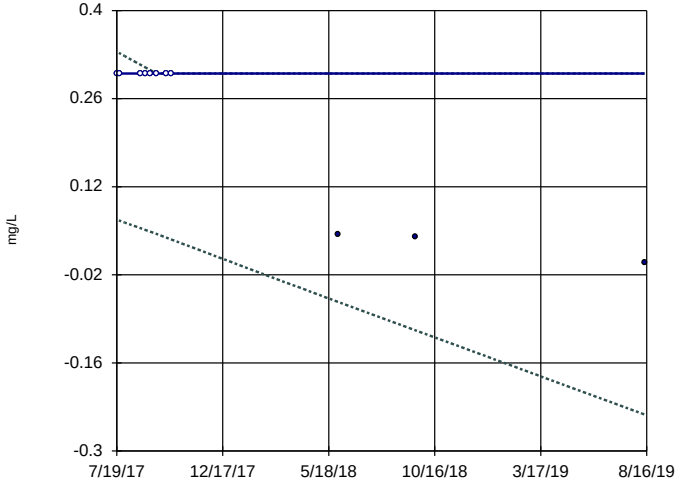
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-3



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = -27
critical = -31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

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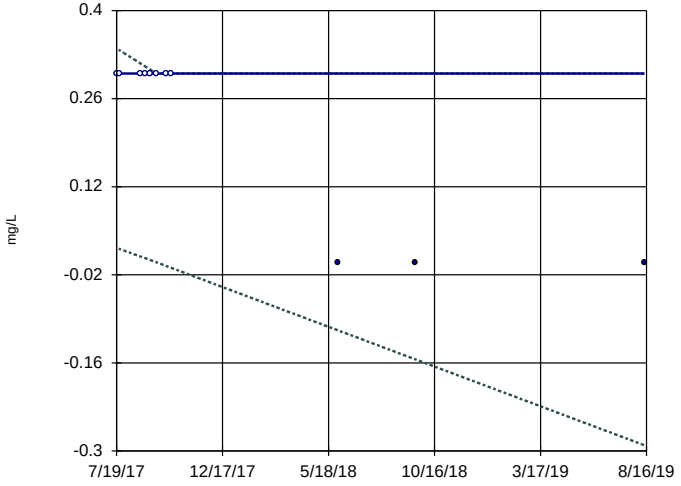
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = -24
critical = -31

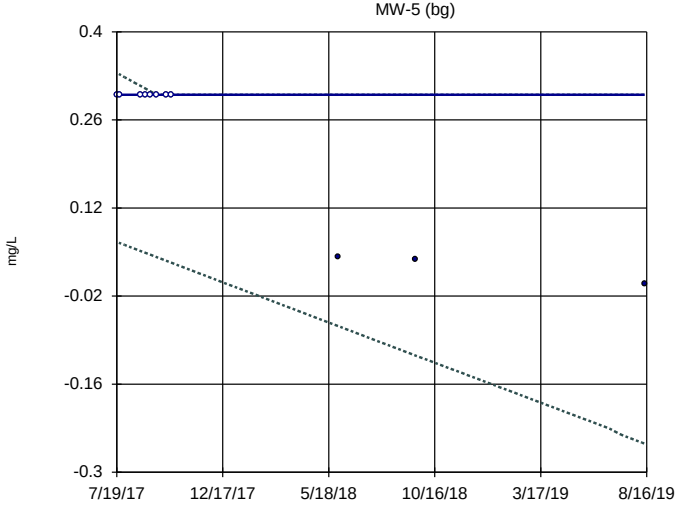
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = -27 critical = -31

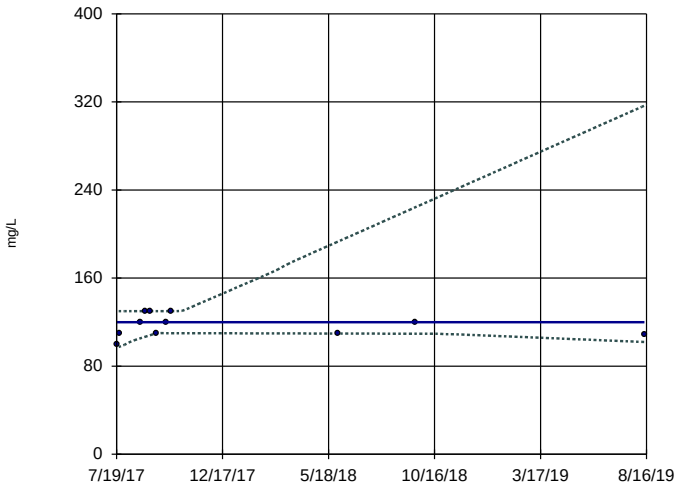
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-1



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = 2 critical = 31

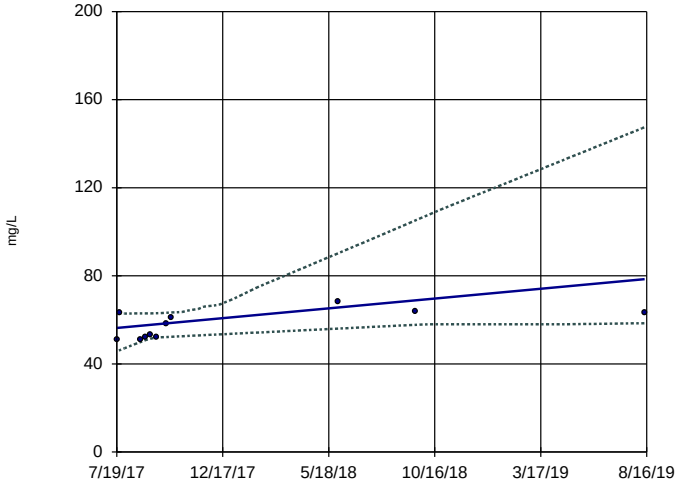
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-2



n = 11

Slope = 10.74 units per year.

Mann-Kendall statistic = 32 critical = 31

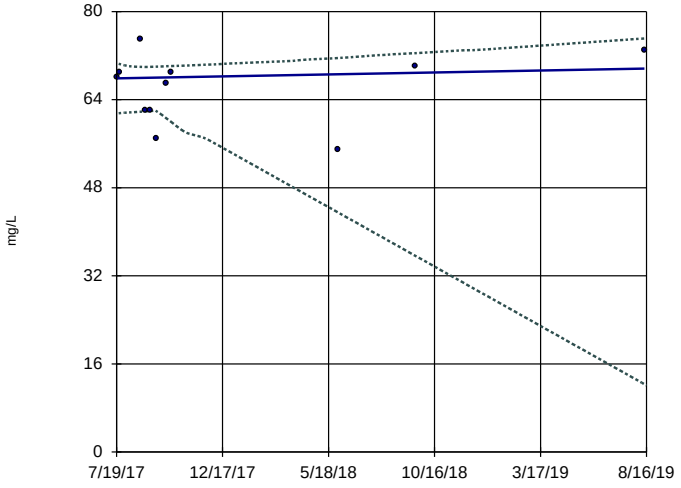
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-3



n = 11

Slope = 0.8629 units per year.

Mann-Kendall statistic = 3 critical = 31

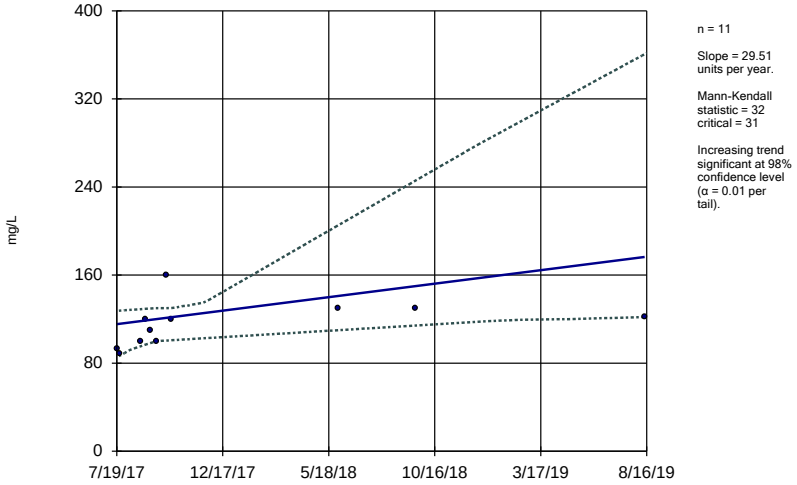
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 1/6/2020 1:28 PM

PShiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 11

Slope = 29.51 units per year.

Mann-Kendall statistic = 32 critical = 31

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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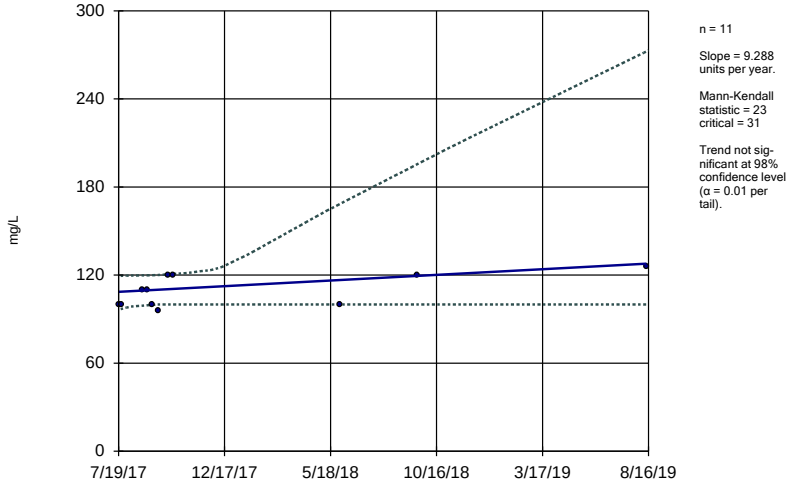
Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 11

Slope = 9.288 units per year.

Mann-Kendall statistic = 23 critical = 31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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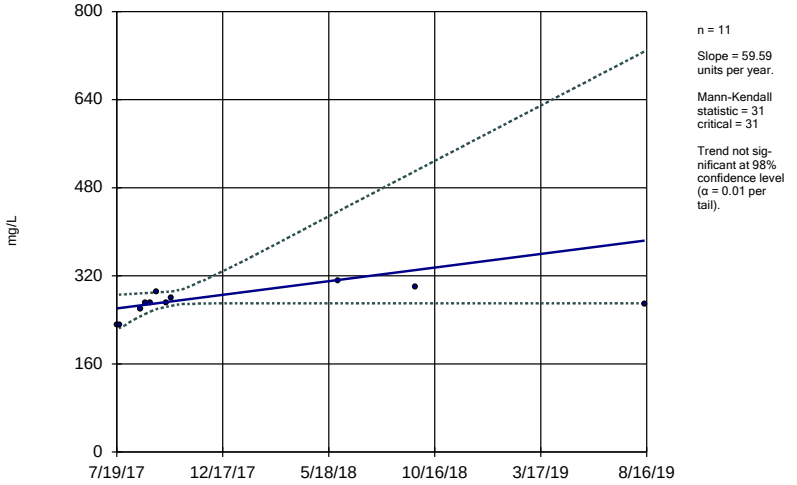
Sen's Slope and 95% Confidence Band

MW-1



n = 11

Slope = 59.59 units per year.

Mann-Kendall statistic = 31 critical = 31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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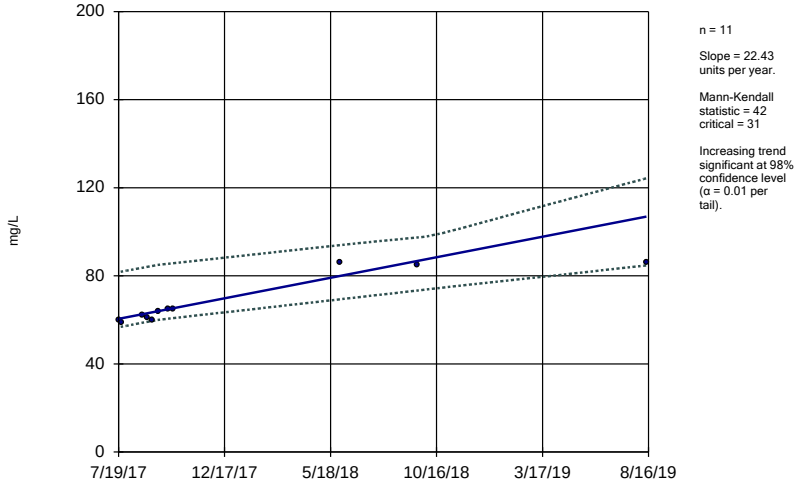
Sen's Slope and 95% Confidence Band

MW-2



n = 11

Slope = 22.43 units per year.

Mann-Kendall statistic = 42 critical = 31

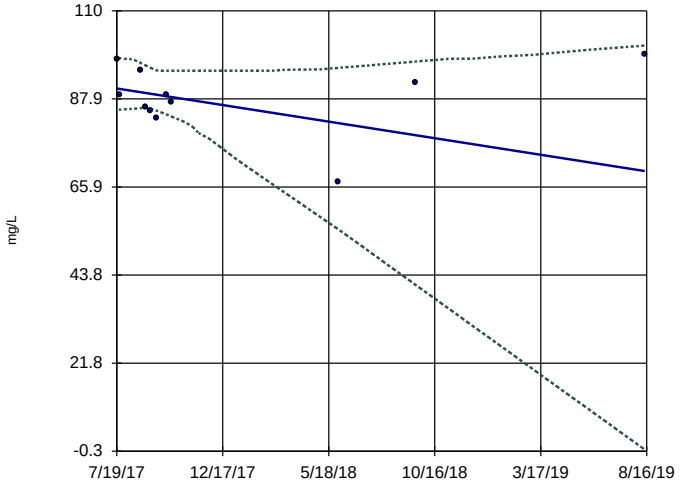
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-3



n = 11

Slope = -10 units per year.

Mann-Kendall statistic = -6 critical = -31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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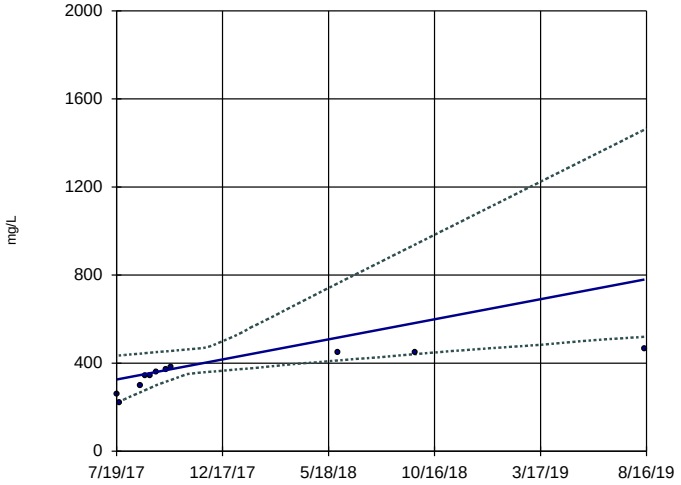
Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 11

Slope = 219.5 units per year.

Mann-Kendall statistic = 51 critical = 31

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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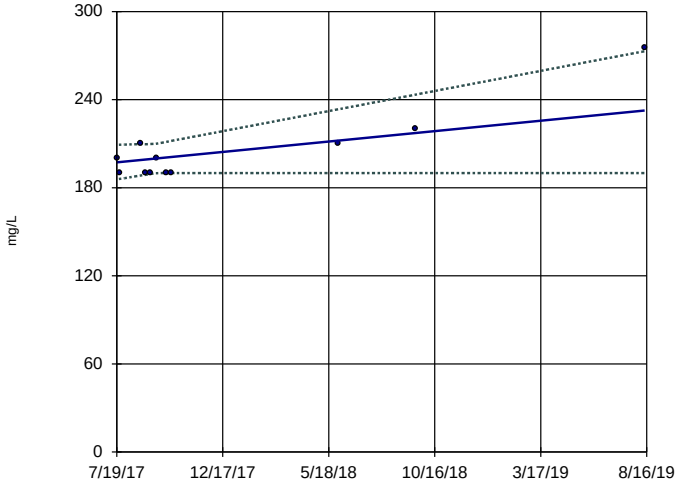
Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 11

Slope = 17.06 units per year.

Mann-Kendall statistic = 19 critical = 31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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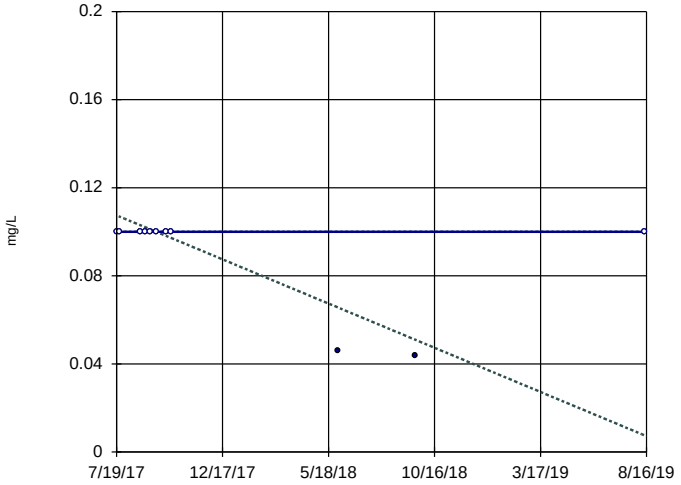
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-1



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = -15 critical = -31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Fluoride Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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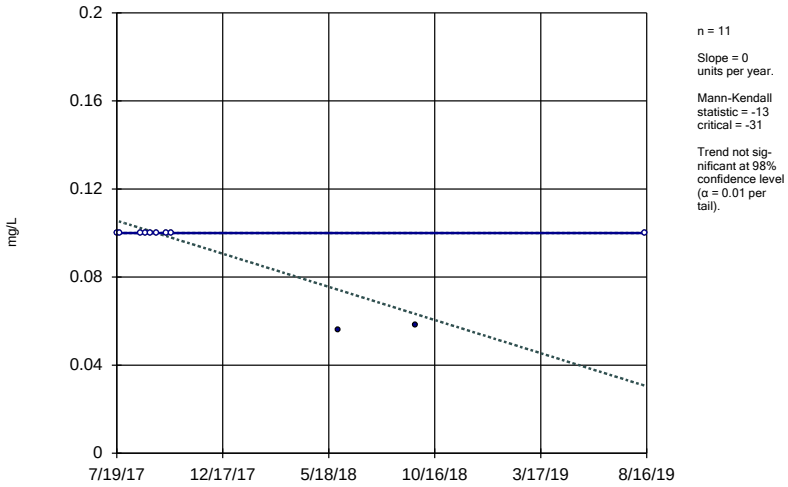
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-2



n = 11

Slope = 0
units per year.

Mann-Kendall
statistic = -13
critical = -31

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

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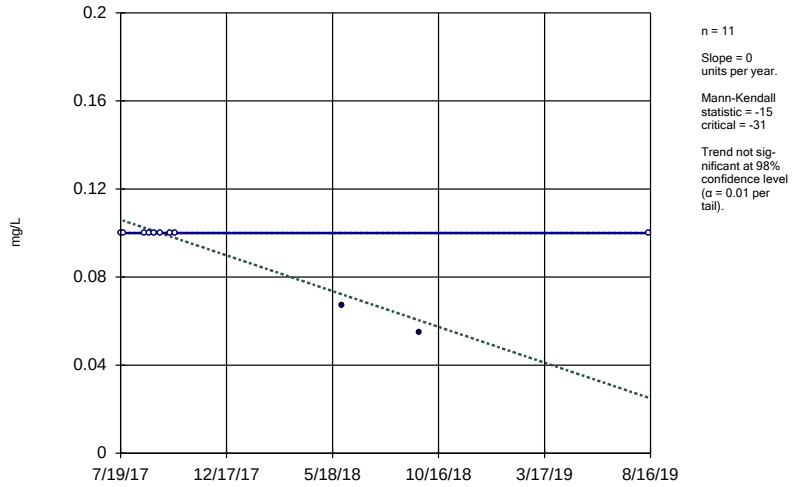
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-3



n = 11

Slope = 0
units per year.

Mann-Kendall
statistic = -15
critical = -31

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

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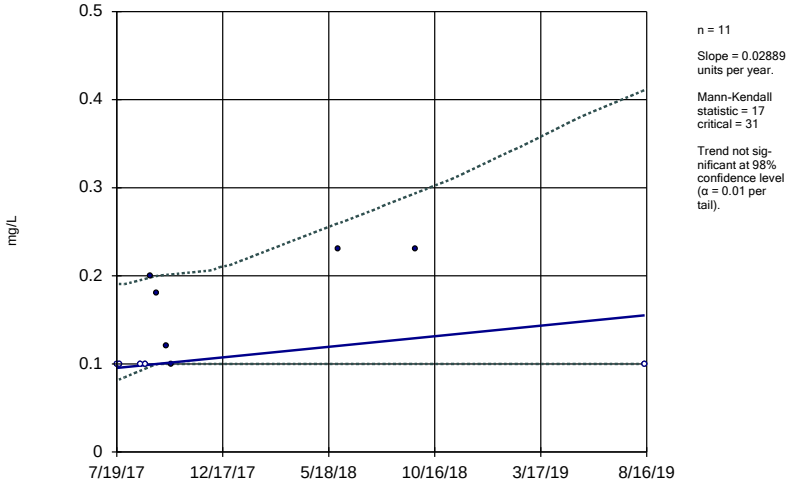
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 11

Slope = 0.02889
units per year.

Mann-Kendall
statistic = 17
critical = 31

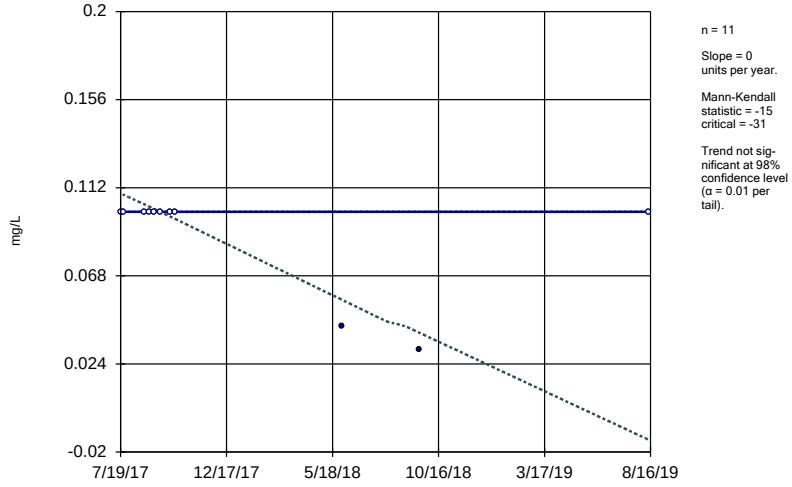
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 11

Slope = 0
units per year.

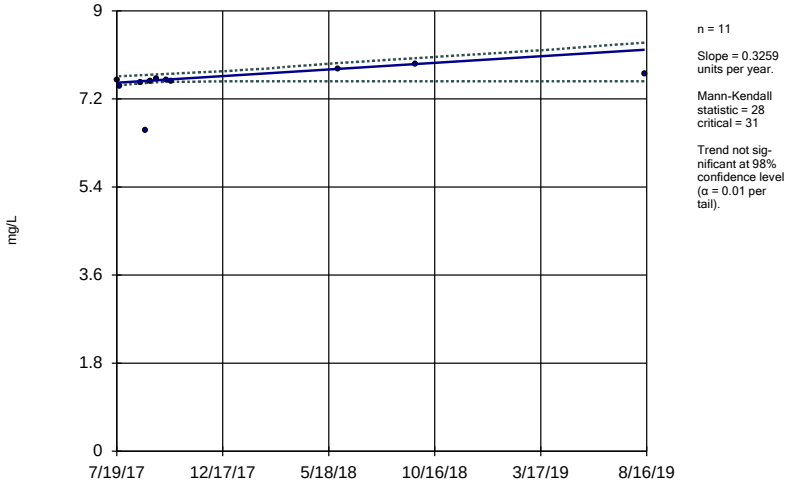
Mann-Kendall
statistic = -15
critical = -31

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 1/6/2020 1:28 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-1



n = 11

Slope = 0.3259 units per year.

Mann-Kendall statistic = 28 critical = 31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: pH Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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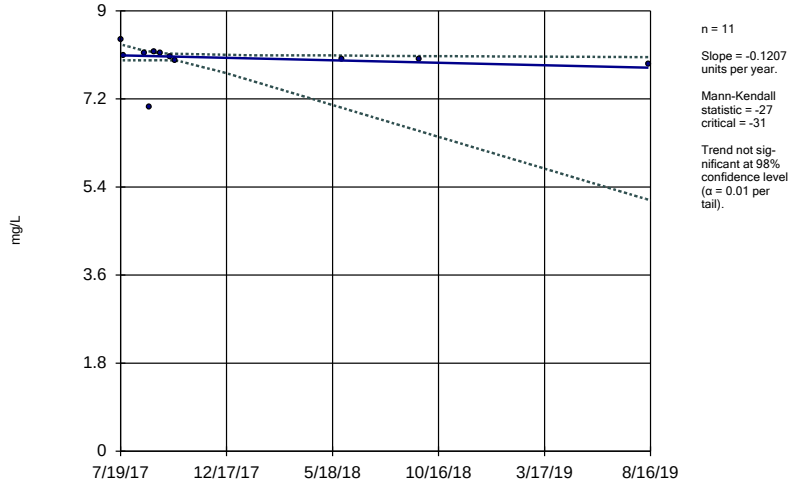
Sen's Slope and 95% Confidence Band

MW-2



n = 11

Slope = -0.1207 units per year.

Mann-Kendall statistic = -27 critical = -31

Trend not significant at 98% confidence level (α = 0.01 per tail).

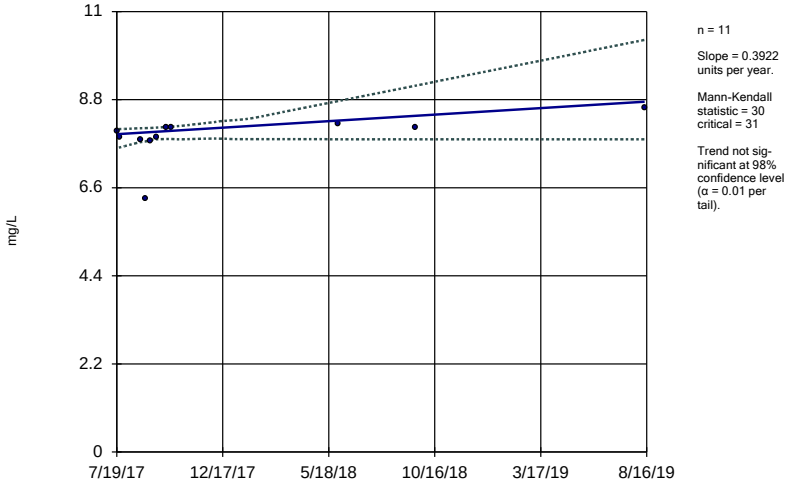
Constituent: pH Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-3



n = 11

Slope = 0.3922 units per year.

Mann-Kendall statistic = 30 critical = 31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: pH Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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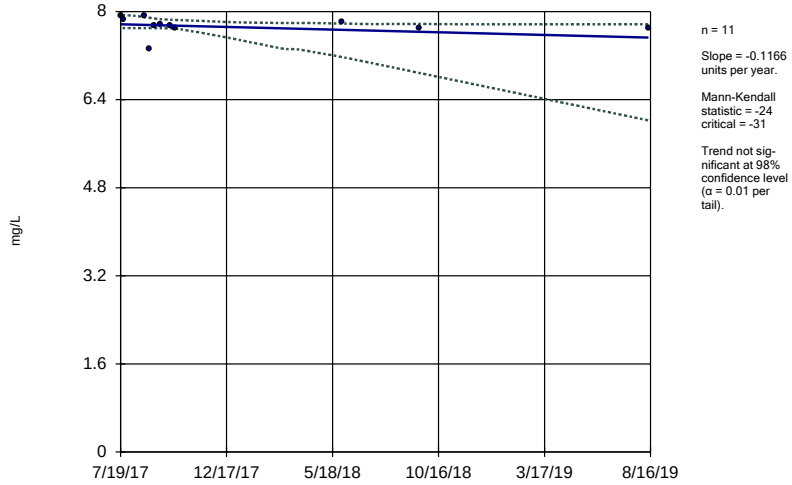
Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 11

Slope = -0.1166 units per year.

Mann-Kendall statistic = -24 critical = -31

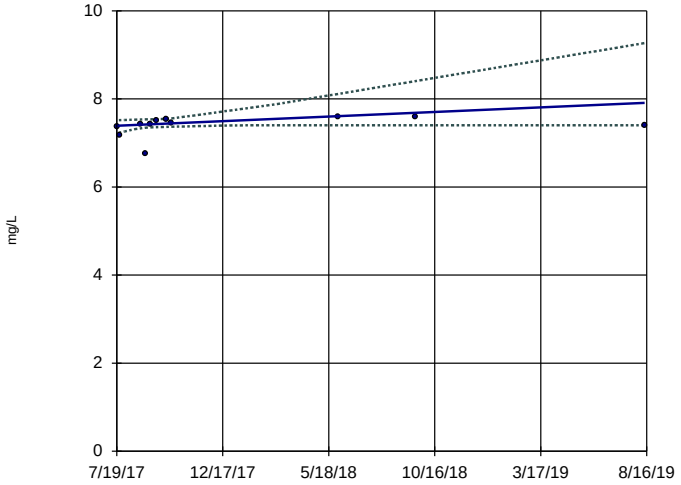
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: pH Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 11

Slope = 0.2517 units per year.

Mann-Kendall statistic = 28 critical = 31

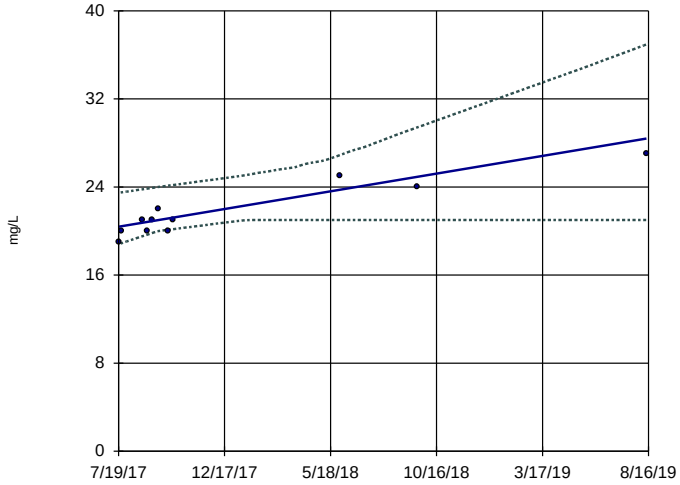
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: pH Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-1



n = 11

Slope = 3.868 units per year.

Mann-Kendall statistic = 37 critical = 31

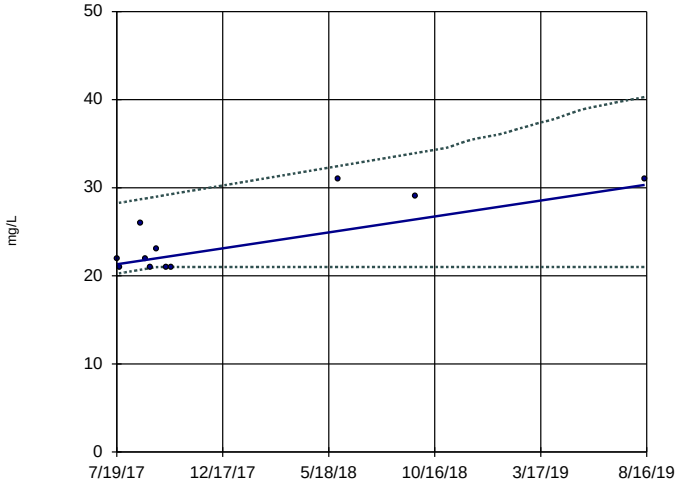
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Sulfate Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-2



n = 11

Slope = 4.351 units per year.

Mann-Kendall statistic = 17 critical = 31

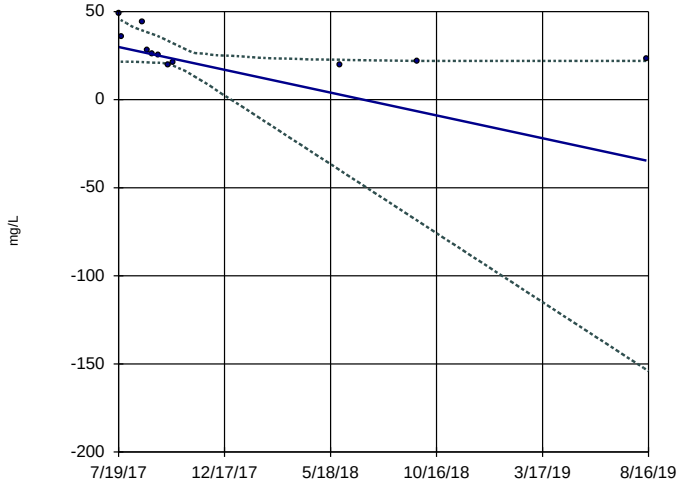
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Sulfate Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-3



n = 11

Slope = -31.17 units per year.

Mann-Kendall statistic = -36 critical = -31

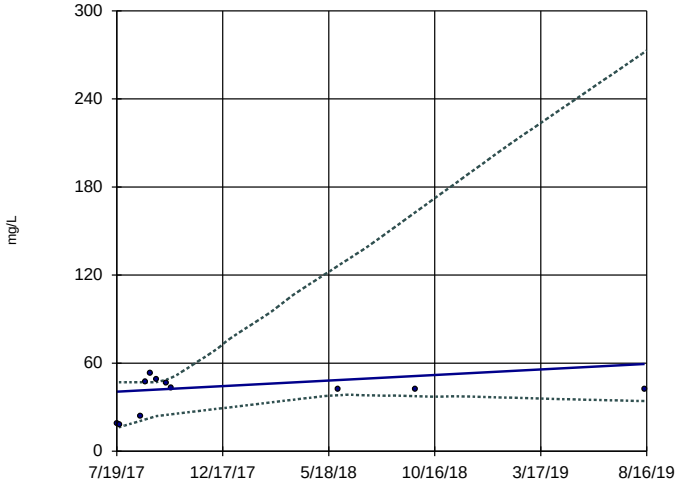
Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Sulfate Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 11

Slope = 9.125 units per year.

Mann-Kendall statistic = 4 critical = 31

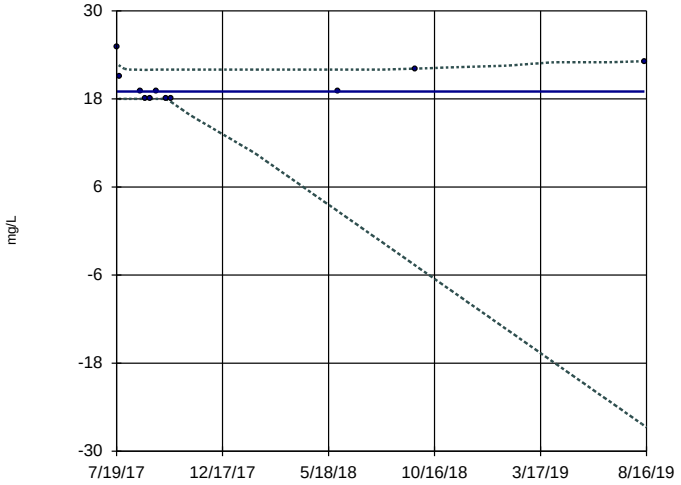
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Sulfate Analysis Run 1/6/2020 1:28 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 31

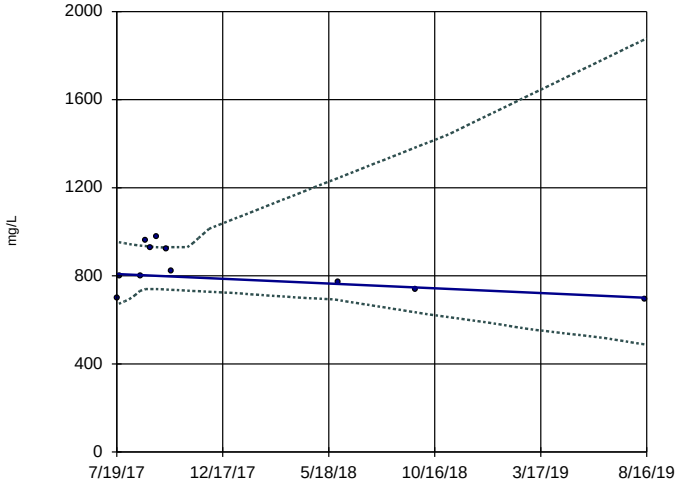
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Sulfate Analysis Run 1/6/2020 1:29 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-1



n = 11

Slope = -51.77 units per year.

Mann-Kendall statistic = -12 critical = -31

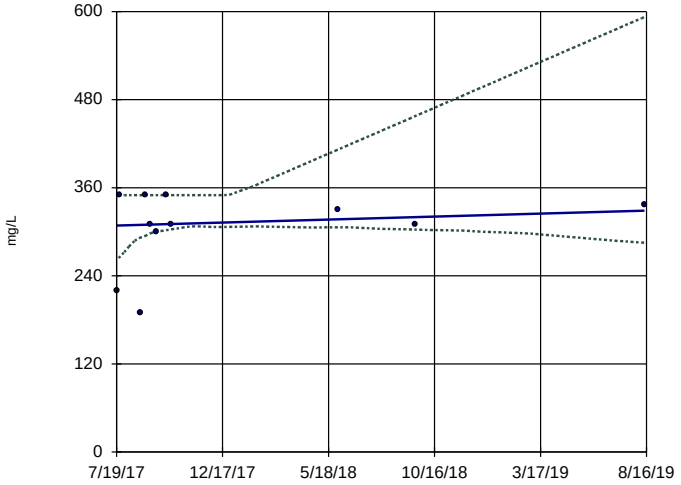
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/6/2020 1:29 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-2



n = 11

Slope = 9.838 units per year.

Mann-Kendall statistic = 9 critical = 31

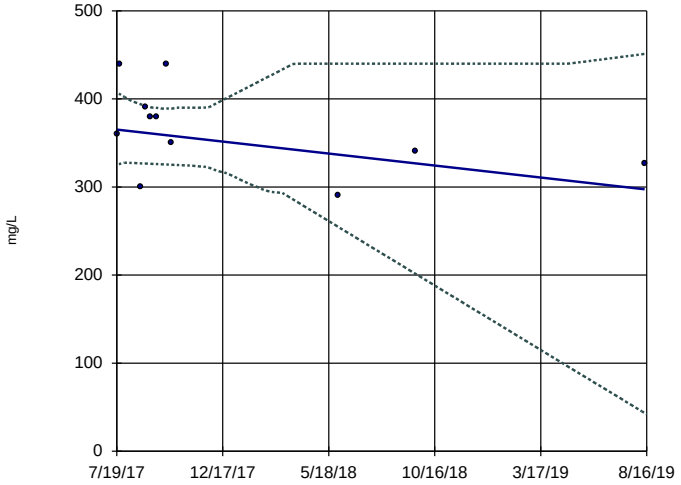
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/6/2020 1:29 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-3



n = 11

Slope = -32.72 units per year.

Mann-Kendall statistic = -19 critical = -31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/6/2020 1:29 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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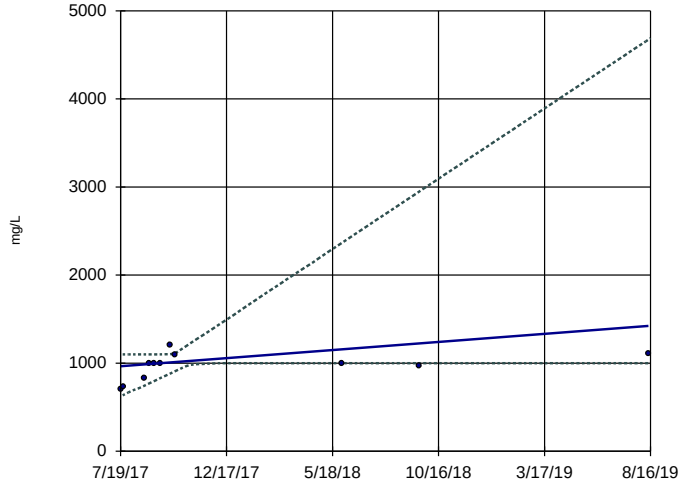
Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 11

Slope = 220.8 units per year.

Mann-Kendall statistic = 29 critical = 31

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/6/2020 1:29 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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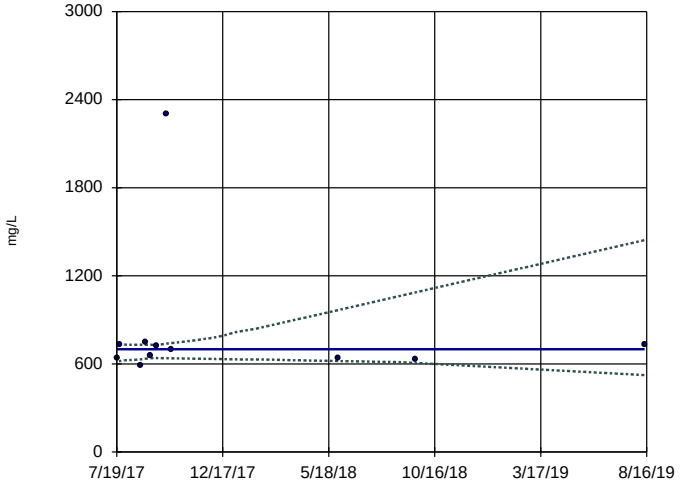
Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = 1 critical = 31

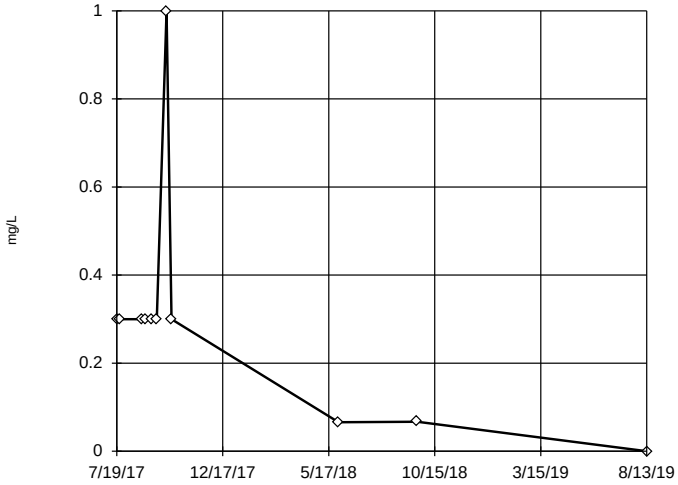
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 1/6/2020 1:29 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-1



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 2, low cutoff = -0.3694, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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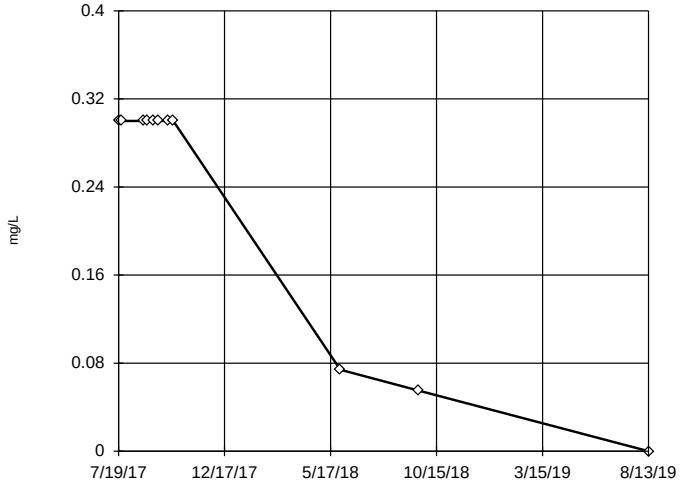
Tukey's Outlier Screening

MW-2



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 1.89, low cutoff = -0.3081, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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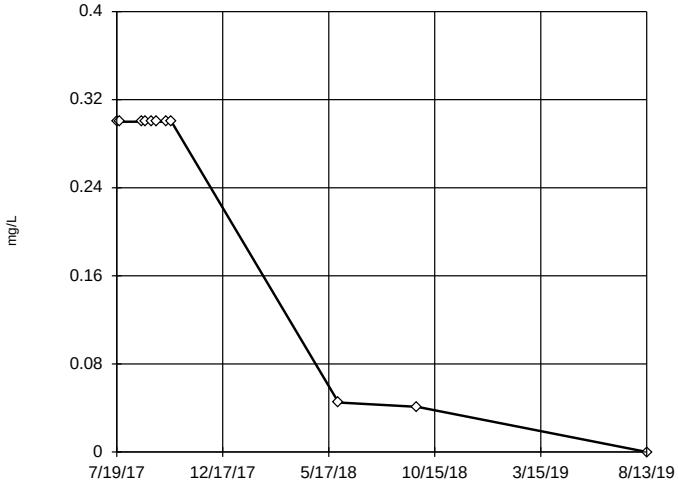
Tukey's Outlier Screening

MW-3



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 2.416, low cutoff = -0.6315, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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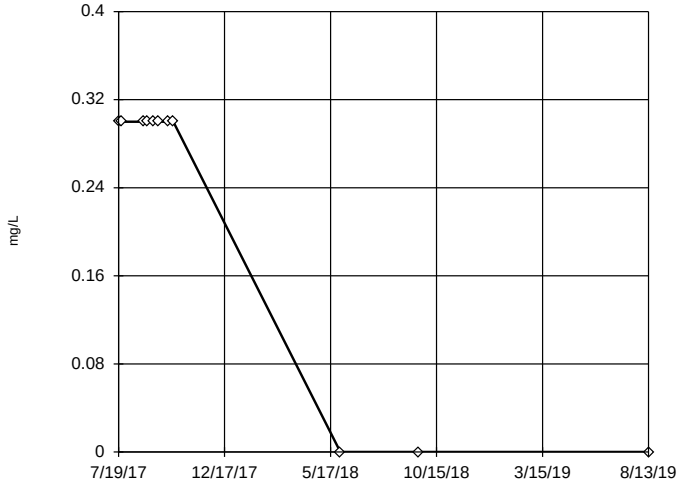
Tukey's Outlier Screening

MW-4 (bg)



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

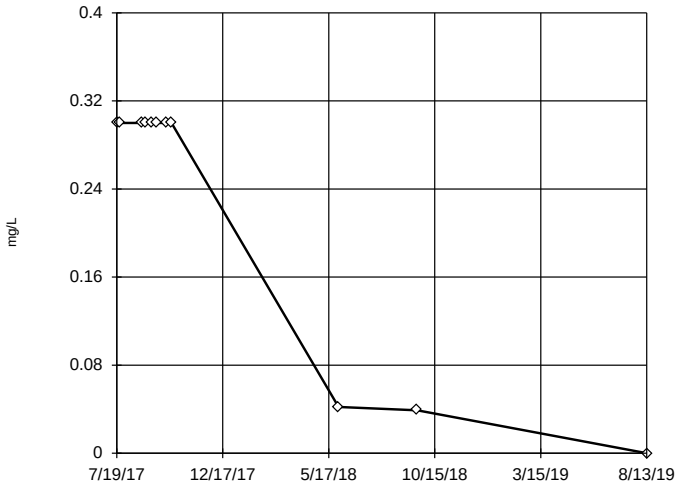
High cutoff = 1.2, low cutoff = -0.9, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-5 (bg)



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 2.484, low cutoff = -0.678, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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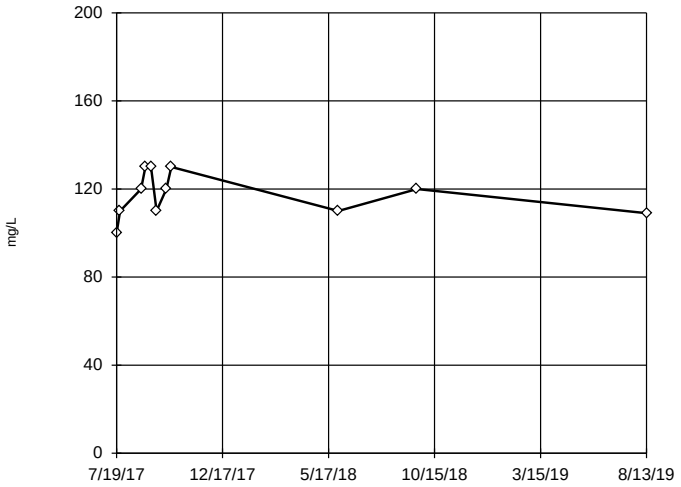
EPA Screening (suspected outliers for Dixon's Test)

MW-1



n = 11

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 117.2, std. dev. 10.17, critical Tn 2.234

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8946
Critical = 0.876
The distribution was found to be normally distrib-uted.

Constituent: Calcium Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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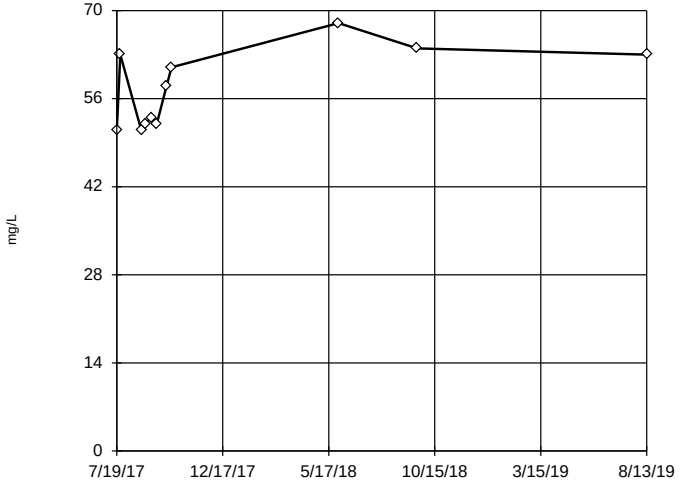
Tukey's Outlier Screening

MW-2



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were cube transform-ed to achieve best W stat-istic (graph shown in original units).

High cutoff = 83.32, low cutoff = -57.26, based on IQR multiplier of 3.

Constituent: Calcium Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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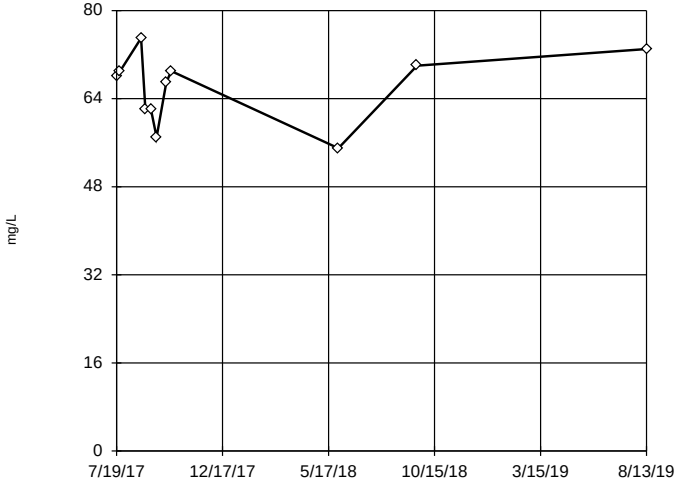
EPA Screening (suspected outliers for Dixon's Test)

MW-3



n = 11

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 66.09, std. dev. 6.348, critical Tn 2.234

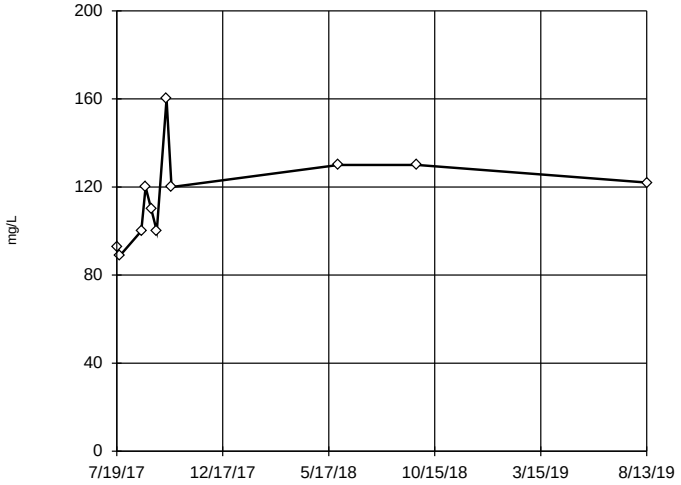
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9392
Critical = 0.876
The distribution was found to be normally distrib-uted.

Constituent: Calcium Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

EPA Screening (suspected outliers for Dixon's Test)

MW-4 (bg)



n = 11

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 115.8, std. dev.
20.5, critical Tn 2.234

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9342
Critical = 0.876
The distribution was found
to be normally distrib-
uted.

Constituent: Calcium Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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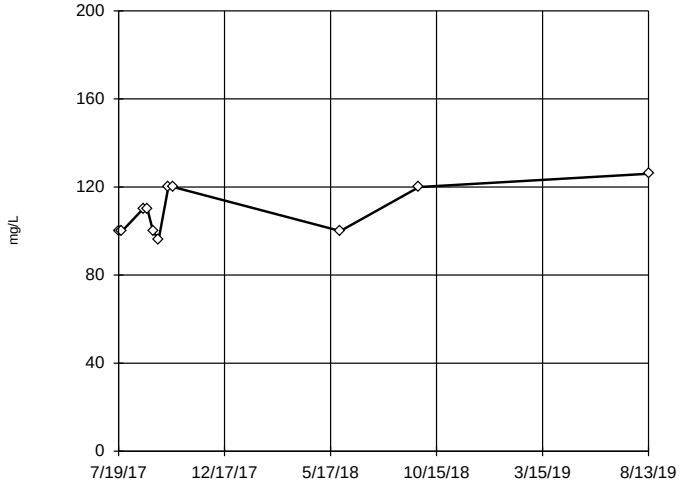
Tukey's Outlier Screening

MW-5 (bg)



n = 11

No outliers found.
Tukey's method used in
lieu of parametric test
because the Shapiro Wilk
normality test failed
at the 0.1 alpha level.

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

High cutoff = 207.4, low
cutoff = 57.87, based
on IQR multiplier of 3.

Constituent: Calcium Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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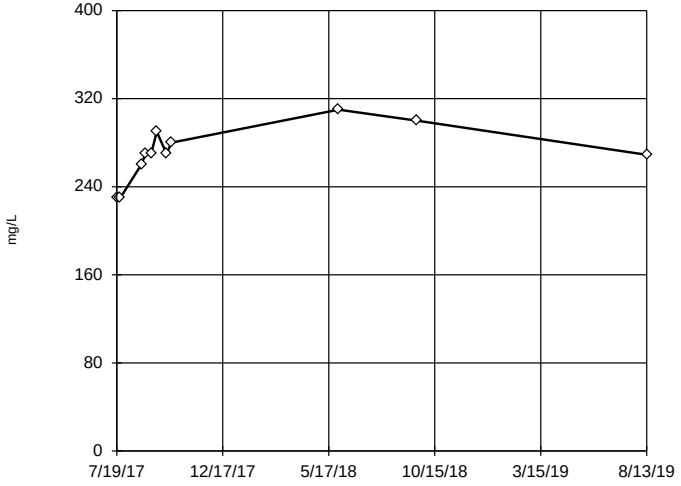
EPA Screening (suspected outliers for Dixon's Test)

MW-1



n = 11

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 270.8, std. dev.
25.09, critical Tn 2.234

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9266
Critical = 0.876
The distribution was found
to be normally distrib-
uted.

Constituent: Chloride Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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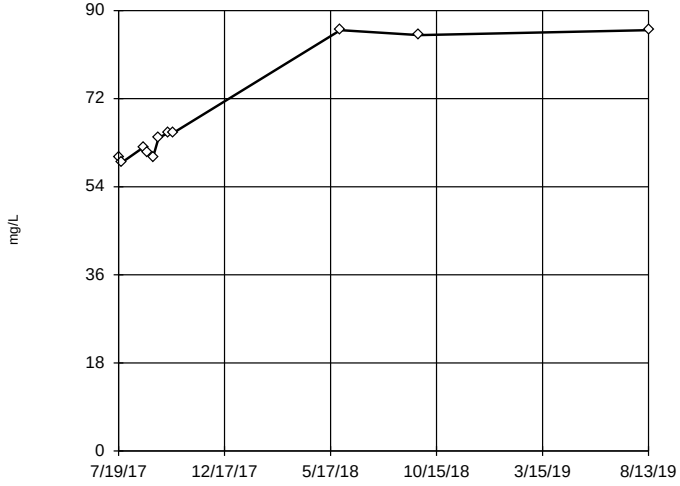
Tukey's Outlier Screening

MW-2



n = 11

No outliers found.
Tukey's method used in
lieu of parametric test
because the Shapiro Wilk
normality test failed
at the 0.1 alpha level.

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

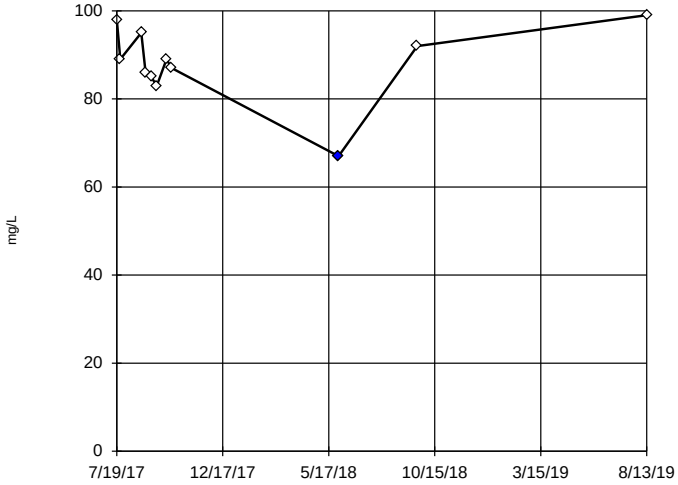
High cutoff = 241.7, low
cutoff = 21.1, based on
IQR multiplier of 3.

Constituent: Chloride Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-3



n = 11

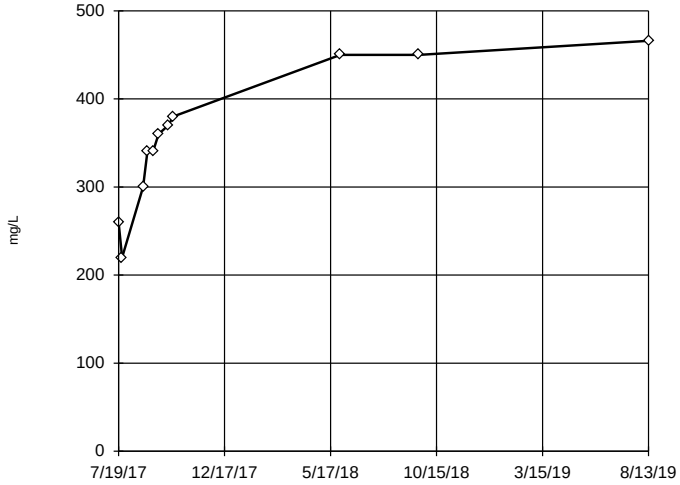
Statistical outlier is drawn as solid.
Testing for 1 low outlier.
Mean = 88.18.
Std. Dev. = 8.761.
67: c = 0.5806
tabl = 0.576.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9339
Critical = 0.869
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Chloride Analysis Run 12/23/2019 1:32 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

EPA Screening (suspected outliers for Dixon's Test)

MW-4 (bg)



n = 11

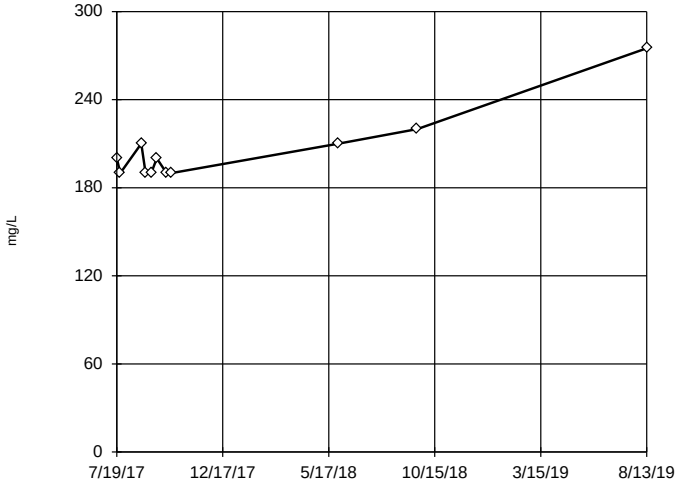
Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 357.8, std. dev. 78.67, critical Tn 2.234

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.95
Critical = 0.876
The distribution was found to be normally distributed.

Constituent: Chloride Analysis Run 12/23/2019 1:32 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-5 (bg)



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

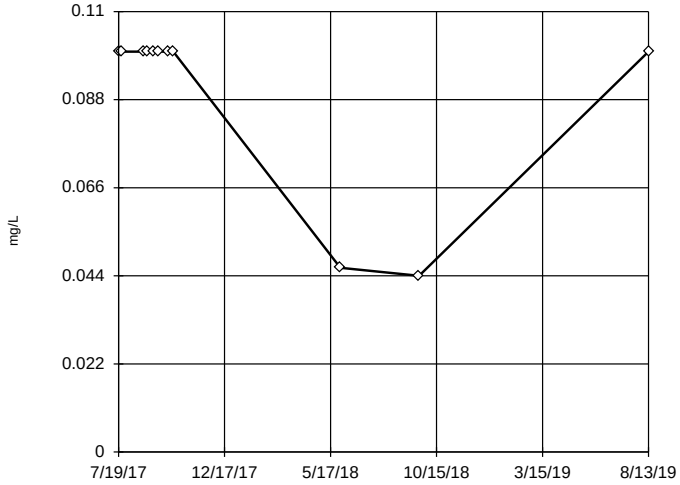
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 283.5, low cutoff = 140.7, based on IQR multiplier of 3.

Constituent: Chloride Analysis Run 12/23/2019 1:32 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-1



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

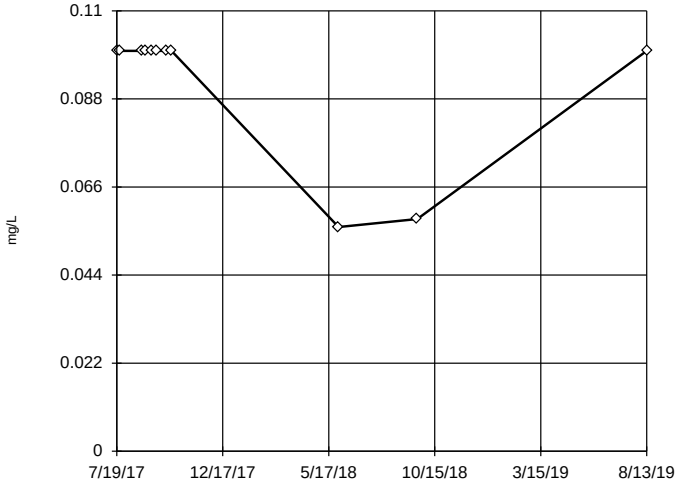
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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

Constituent: Fluoride Analysis Run 12/23/2019 1:32 PM
Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-2



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

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

Constituent: Fluoride Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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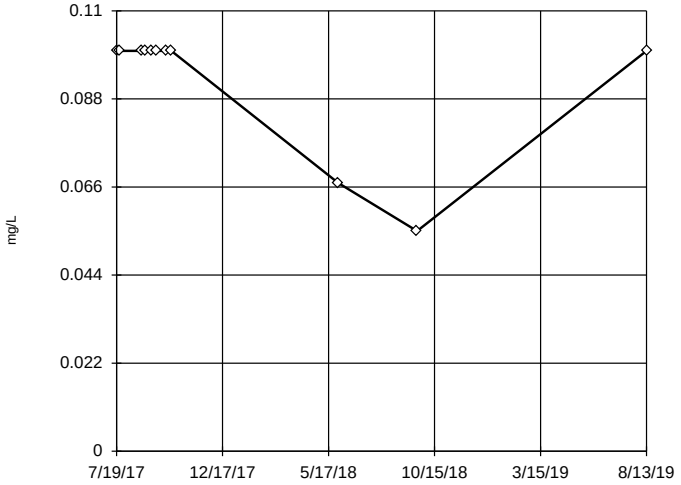
Tukey's Outlier Screening

MW-3



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

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

Constituent: Fluoride Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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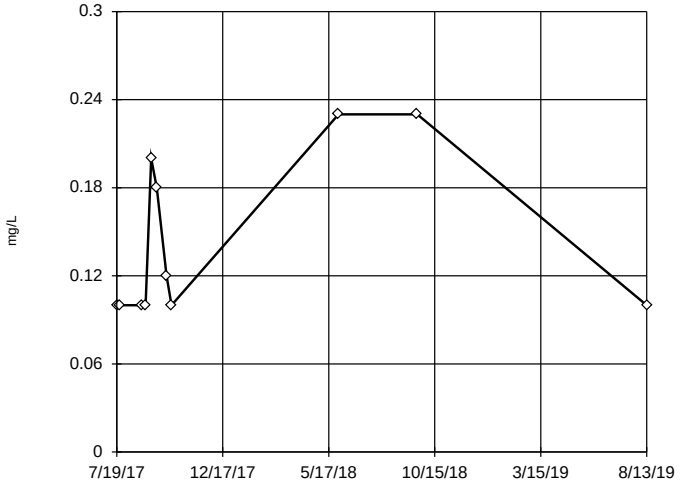
Tukey's Outlier Screening

MW-4 (bg)



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 0.8486, low cutoff = 0.001068, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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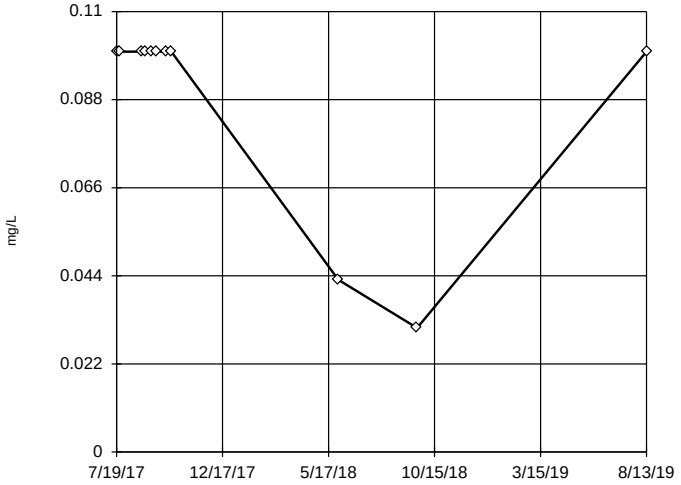
Tukey's Outlier Screening

MW-5 (bg)



n = 11

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

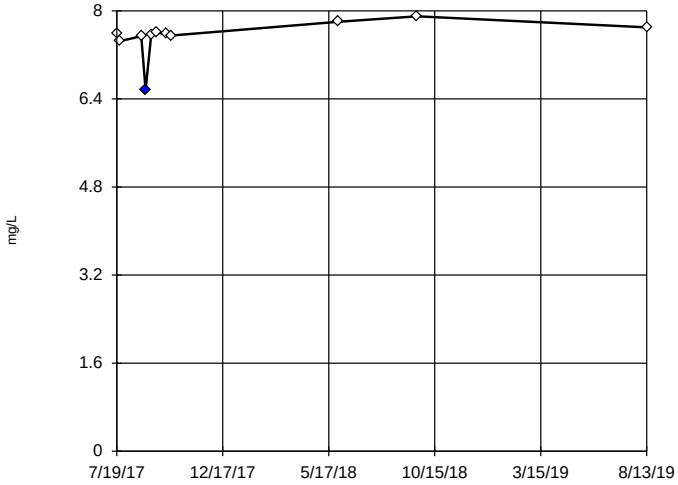
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Fluoride Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-1



n = 11

Statistical outlier is drawn as solid.
Testing for 1 low outlier.
Mean = 7.529.
Std. Dev. = 0.346.
6.56: c = 0.7903
tabl = 0.576.
Alpha = 0.05.

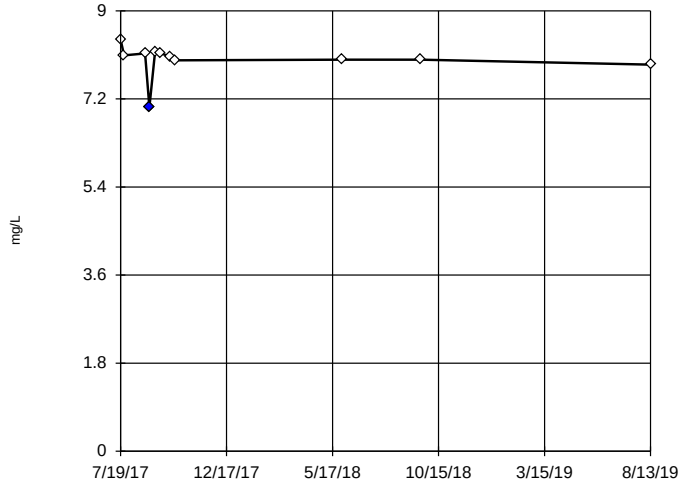
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8831
Critical = 0.869
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: pH Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-2



n = 11

Statistical outlier is drawn as solid.
Testing for 1 high and 1 low outliers.
Mean = 7.991.
Std. Dev. = 0.3446.
8.41: c = 0.549
tabl = 0.576.
7.03: c = 0.8571
tabl = 0.576.
Alpha = 0.05.

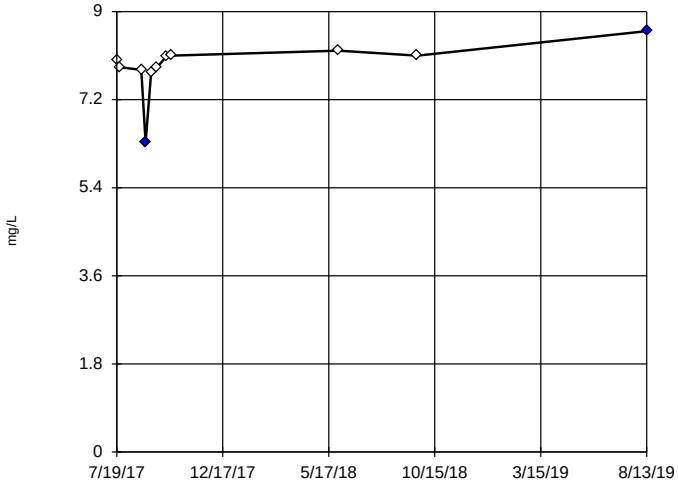
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9206
Critical = 0.859
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: pH Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-3



n = 11

Statistical outliers are drawn as solid.
Testing for 1 high and 1 low outliers.
Mean = 7.882.
Std. Dev. = 0.5682.
8.6: c = 0.6024
tabl = 0.576.
6.32: c = 0.7926
tabl = 0.576.
Alpha = 0.05.

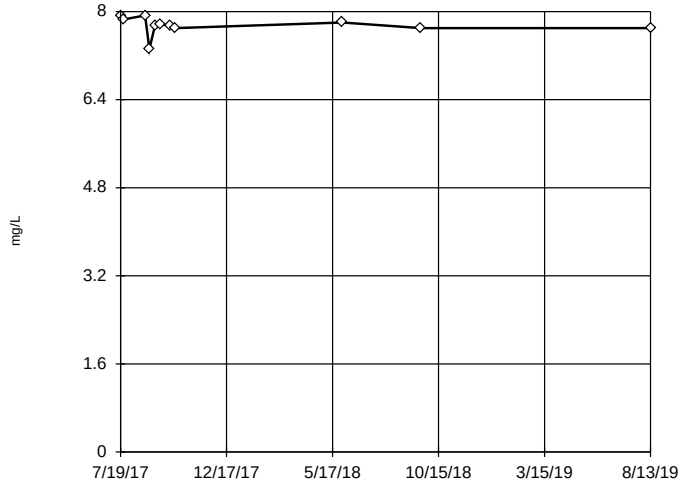
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9034
Critical = 0.859
The distribution, after removal of suspect values, was found to be normally distributed.

Constituent: pH Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-4 (bg)



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

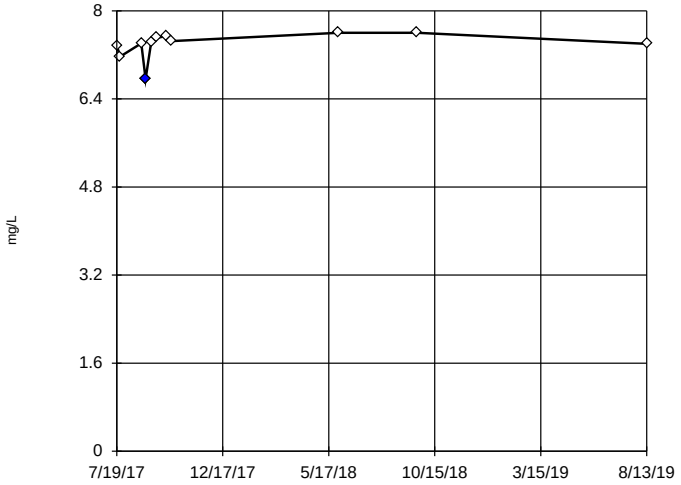
High cutoff = 8.261, low cutoff = 7.083, based on IQR multiplier of 3.

Constituent: pH Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-5 (bg)



n = 11

Statistical outlier is drawn as solid.
Testing for 2 low outliers.
Mean = 7.385.
Std. Dev. = 0.2401.
7.17: c = 0.5349
tabl = 0.576.
Alpha = 0.05.
6.76: c = 0.7143
tabl = 0.576.
Alpha = 0.05.

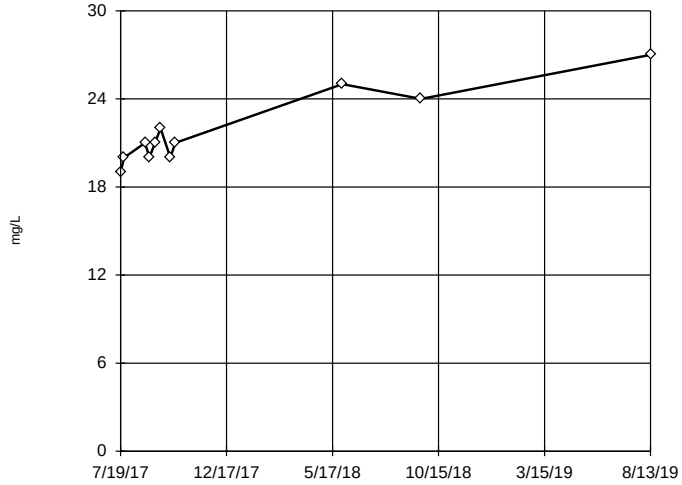
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9213
Critical = 0.869
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: pH Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

EPA Screening (suspected outliers for Dixon's Test)

MW-1



n = 11

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 21.82, std. dev. 2.483, critical Tn 2.234

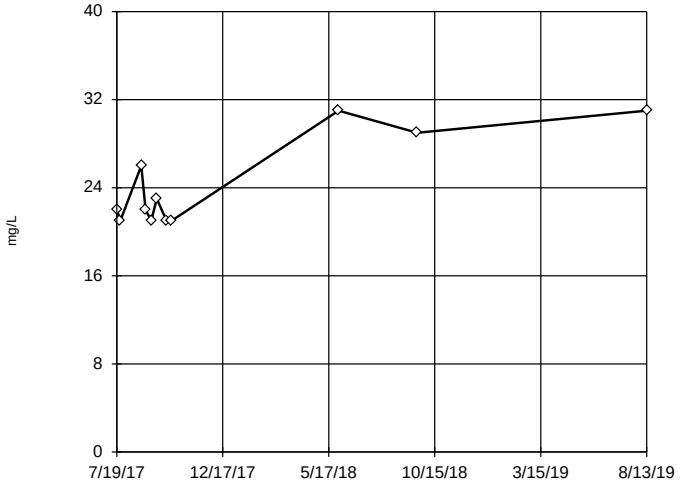
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8911
Critical = 0.876 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Sulfate Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-2



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

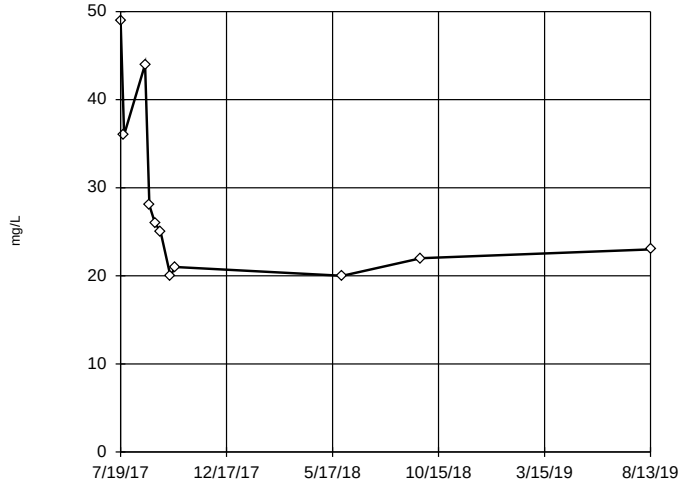
High cutoff = 76.37, low cutoff = 7.974, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-3



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

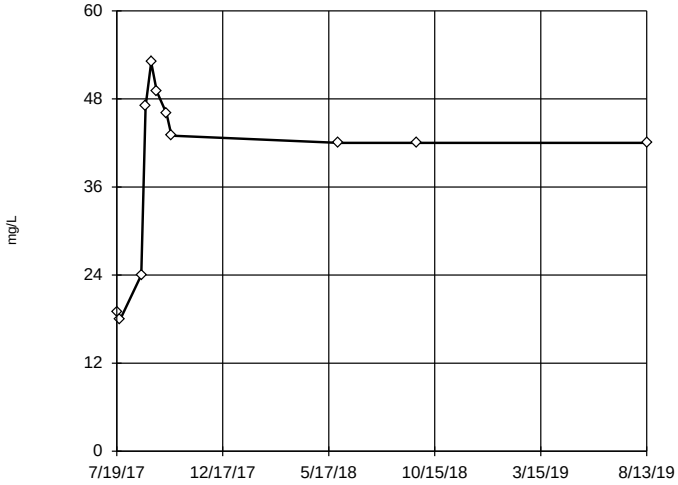
High cutoff = 181.4, low cutoff = 4.168, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-4 (bg)



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were x^4 transformed to achieve best W statistic (graph shown in original units).

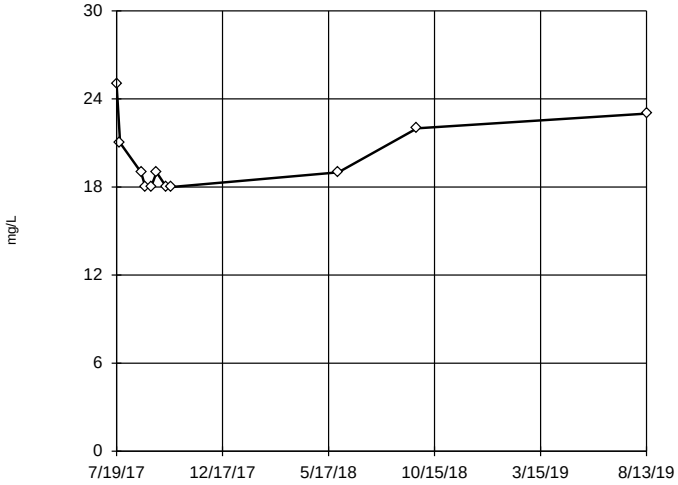
High cutoff = 65.6, low cutoff = -60.4, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-5 (bg)



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

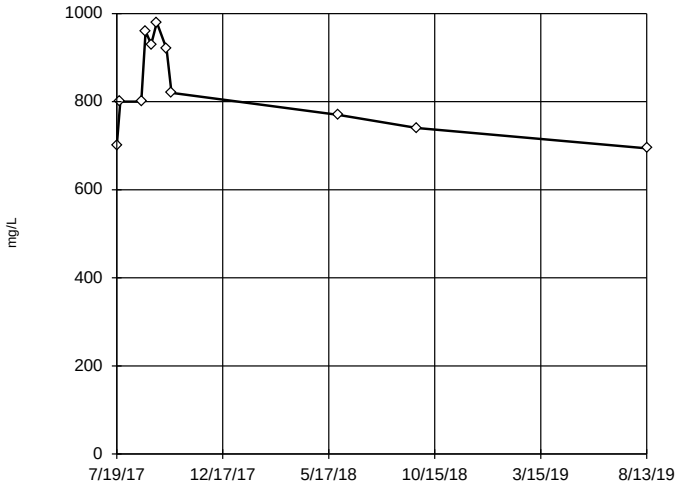
High cutoff = 40.17, low cutoff = 9.859, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

EPA Screening (suspected outliers for Dixon's Test)

MW-1



n = 11

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 828.5, std. dev. 103.2, critical Tn 2.234

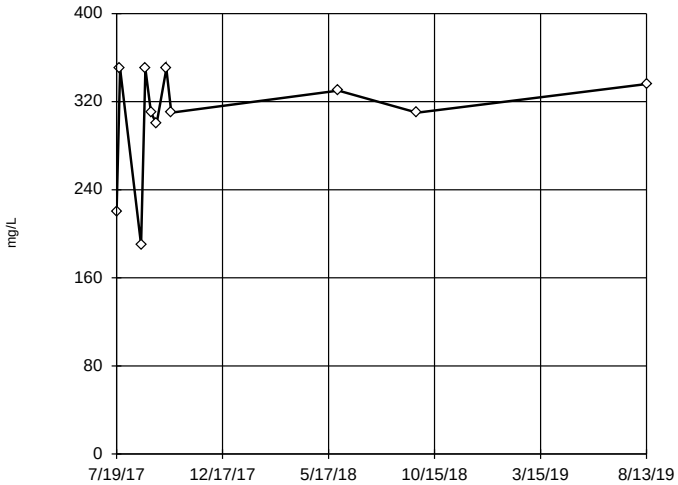
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9151
Critical = 0.876
The distribution was found to be normally distributed.

Constituent: Total Dissolved Solids Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-2



n = 11

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

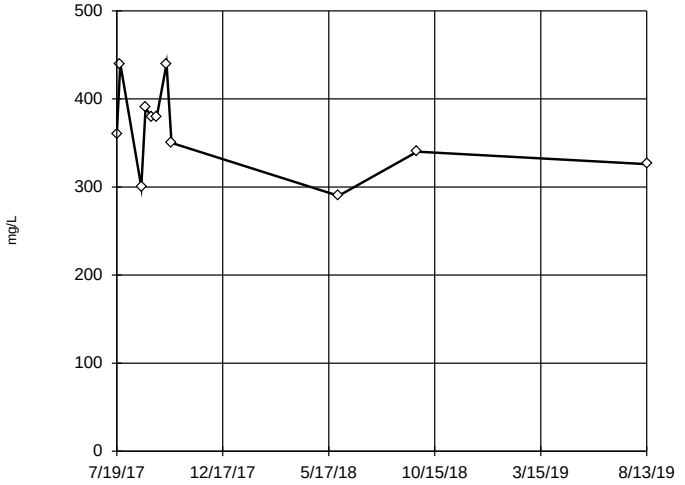
High cutoff = 415.8, low cutoff = -370.8, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

EPA Screening (suspected outliers for Dixon's Test)

MW-3



n = 11

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 363.3, std. dev. 49.54, critical Tn 2.234

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9501
Critical = 0.876
The distribution was found to be normally distrib-uted.

Constituent: Total Dissolved Solids Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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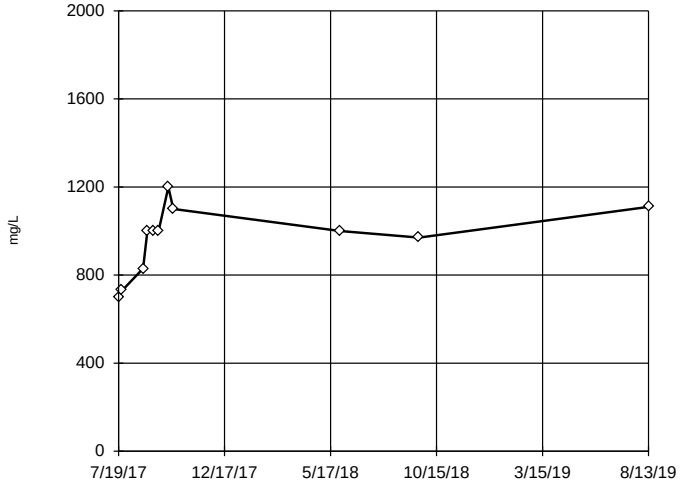
EPA Screening (suspected outliers for Dixon's Test)

MW-4 (bg)



n = 11

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 967.3, std. dev. 155.9, critical Tn 2.234

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9141
Critical = 0.876
The distribution was found to be normally distrib-uted.

Constituent: Total Dissolved Solids Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

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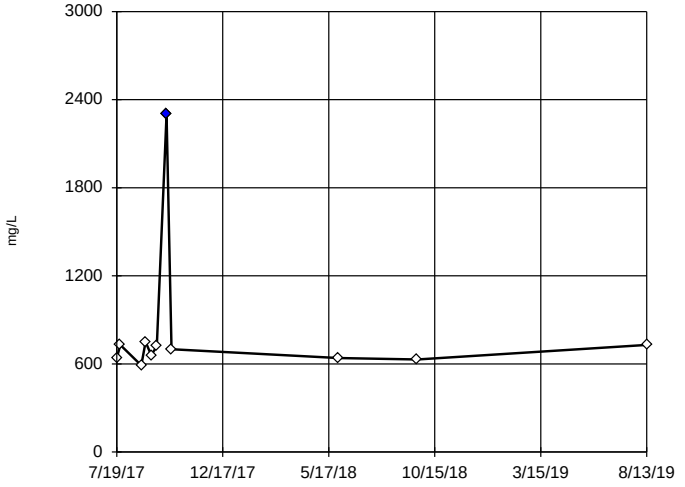
Dixon's Outlier Test

MW-5 (bg)



n = 11

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 826.4.
Std. Dev. = 491.4.
2300: c = 0.9401
tabl = 0.576.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9255
Critical = 0.869
The distribution, after removal of suspect val-ue, was found to be nor-mally distributed.

Constituent: Total Dissolved Solids Analysis Run 12/23/2019 1:32 PM

Shiras Steam Plant Client: GEI Data: Shiras Database

Outlier Analysis

Shiras Steam Plant Client: GEI Data: Shiras Database Printed 12/23/2019, 1:33 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	N	Mean	Std. Dev.	Distrib...	Normality Test
Boron (mg/L)	MW-1	No	n/a	n/a	NP (nrm)	11	0.2939	0.2624	unknown	ShapiroWilk
Boron (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	11	0.2299	0.1213	unknown	ShapiroWilk
Boron (mg/L)	MW-3	No	n/a	n/a	NP (nrm)	11	0.226	0.1272	unknown	ShapiroWilk
Boron (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	11	0.2182	0.1401	unknown	ShapiroWilk
Boron (mg/L)	MW-5 (bg)	No	n/a	n/a	NP (nrm)	11	0.2255	0.1279	unknown	ShapiroWilk
Calcium (mg/L)	MW-1	No	n/a	n/a	EPA 1989	11	117.2	10.17	normal	ShapiroWilk
Calcium (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	11	57.82	6.242	unknown	ShapiroWilk
Calcium (mg/L)	MW-3	No	n/a	n/a	EPA 1989	11	66.09	6.348	normal	ShapiroWilk
Calcium (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	11	115.8	20.5	normal	ShapiroWilk
Calcium (mg/L)	MW-5 (bg)	No	n/a	n/a	NP (nrm)	11	109.3	10.71	unknown	ShapiroWilk
Chloride (mg/L)	MW-1	No	n/a	n/a	EPA 1989	11	270.8	25.09	normal	ShapiroWilk
Chloride (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	11	68.45	11.24	unknown	ShapiroWilk
Chloride (mg/L)	**MW-3**	**Yes**	**67**	**5/31/2018**	**Dixon`s**	**11**	**88.18**	**8.761**	**normal**	**ShapiroWilk**
Chloride (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	11	357.8	78.67	normal	ShapiroWilk
Chloride (mg/L)	MW-5 (bg)	No	n/a	n/a	NP (nrm)	11	205.9	25.18	unknown	ShapiroWilk
Fluoride (mg/L)	MW-1	n/a	n/a	n/a	NP (nrm)	11	0.09	0.02225	unknown	ShapiroWilk
Fluoride (mg/L)	MW-2	n/a	n/a	n/a	NP (nrm)	11	0.09218	0.0174	unknown	ShapiroWilk
Fluoride (mg/L)	MW-3	n/a	n/a	n/a	NP (nrm)	11	0.09291	0.016	unknown	ShapiroWilk
Fluoride (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	11	0.1418	0.056	unknown	ShapiroWilk
Fluoride (mg/L)	MW-5 (bg)	n/a	n/a	n/a	NP (nrm)	11	0.08855	0.02563	unknown	ShapiroWilk
pH (mg/L)	**MW-1**	**Yes**	**6.56**	**8/29/2017**	**Dixon`s**	**11**	**7.529**	**0.346**	**normal**	**ShapiroWilk**
pH (mg/L)	**MW-2**	**Yes**	**7.03**	**8/29/2017**	**Dixon`s**	**11**	**7.991**	**0.3446**	**normal**	**ShapiroWilk**
pH (mg/L)	**MW-3**	**Yes**	**8.6,6.32**	**8/13/2019,8/29/2017**	**Dixon`s**	**11**	**7.882**	**0.5682**	**normal**	**ShapiroWilk**
pH (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	11	7.745	0.1639	unknown	ShapiroWilk
pH (mg/L)	**MW-5 (bg)**	**Yes**	**6.76**	**8/29/2017**	**Dixon`s**	**11**	**7.385**	**0.2401**	**normal**	**ShapiroWilk**
Sulfate (mg/L)	MW-1	No	n/a	n/a	EPA 1989	11	21.82	2.483	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	11	24.36	4.13	unknown	ShapiroWilk
Sulfate (mg/L)	MW-3	No	n/a	n/a	NP (nrm)	11	28.55	10.04	unknown	ShapiroWilk
Sulfate (mg/L)	MW-4 (bg)	No	n/a	n/a	NP (nrm)	11	38.64	12.31	unknown	ShapiroWilk
Sulfate (mg/L)	MW-5 (bg)	No	n/a	n/a	NP (nrm)	11	20	2.408	unknown	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-1	No	n/a	n/a	EPA 1989	11	828.5	103.2	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-2	No	n/a	n/a	NP (nrm)	11	305.1	53.11	unknown	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-3	No	n/a	n/a	EPA 1989	11	363.3	49.54	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-4 (bg)	No	n/a	n/a	EPA 1989	11	967.3	155.9	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	**MW-5 (bg)**	**Yes**	**2300**	**9/28/2017**	**Dixon`s**	**11**	**826.4**	**491.4**	**normal**	**ShapiroWilk**

Appendix C2- Second Semi-Annual Statistical Evaluation

Interwell Upper Prediction Limit Summary

Shiras Client: GEI Data: Shiras Database Printed 11/6/2019, 3:12 PM

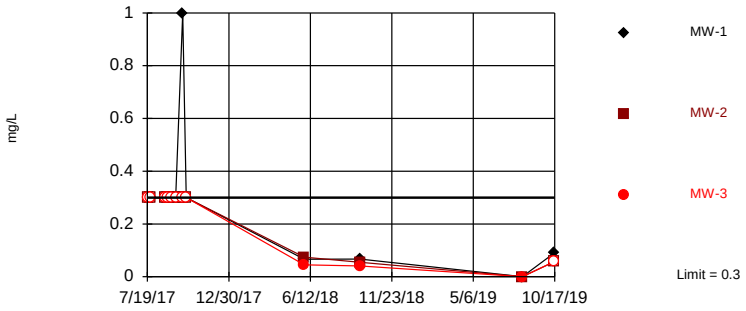
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-1	0.3	n/a	10/17/2019	0.091	No	24	70.83	n/a	0.003036	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-2	0.3	n/a	10/17/2019	0.058ND	No	24	70.83	n/a	0.003036	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-3	0.3	n/a	10/17/2019	0.058ND	No	24	70.83	n/a	0.003036	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-1	145.1	n/a	10/17/2019	109	No	24	0	No	0.002505	Param Inter 1 of 2
Calcium (mg/L)	MW-2	145.1	n/a	10/17/2019	55.8	No	24	0	No	0.002505	Param Inter 1 of 2
Calcium (mg/L)	MW-3	145.1	n/a	10/17/2019	64.9	No	24	0	No	0.002505	Param Inter 1 of 2
Chloride (mg/L)	MW-1	466	n/a	10/17/2019	247	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Chloride (mg/L)	MW-2	466	n/a	10/17/2019	55.2	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Chloride (mg/L)	MW-3	466	n/a	10/17/2019	78.3	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Fluoride (mg/L)	MW-1	0.3	n/a	10/17/2019	0.1ND	No	24	66.67	n/a	0.003036	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-2	0.3	n/a	10/17/2019	0.1ND	No	24	66.67	n/a	0.003036	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-3	0.3	n/a	10/17/2019	0.1ND	No	24	66.67	n/a	0.003036	NP Inter (NDs) 1 of 2
Iron (mg/L)	MW-1	4.941	n/a	10/17/2019	0.12ND	No	4	25	No	0.002505	Param Inter 1 of 2
Iron (mg/L)	MW-2	4.941	n/a	10/17/2019	0.12ND	No	4	25	No	0.002505	Param Inter 1 of 2
Iron (mg/L)	MW-3	4.941	n/a	10/17/2019	0.12ND	No	4	25	No	0.002505	Param Inter 1 of 2
pH (mg/L)	MW-1	8.055	7.089	10/17/2019	7.8	No	24	0	No	0.001253	Param Inter 1 of 2
pH (mg/L)	MW-2	8.055	7.089	10/17/2019	8	No	24	0	No	0.001253	Param Inter 1 of 2
pH (mg/L)	MW-3	8.055	7.089	10/17/2019	8	No	24	0	No	0.001253	Param Inter 1 of 2
Sulfate (mg/L)	MW-1	53	n/a	10/17/2019	27	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Sulfate (mg/L)	MW-2	53	n/a	10/17/2019	21.1	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Sulfate (mg/L)	MW-3	53	n/a	10/17/2019	19.2	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-1	2300	n/a	10/17/2019	616	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-2	2300	n/a	10/17/2019	238	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-3	2300	n/a	10/17/2019	278	No	24	0	n/a	0.003036	NP Inter (normality) 1 of 2

Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 24 background values. 70.83% NDs. Annual per-constituent alpha = 0.01808. Individual comparison alpha = 0.003036 (1 of 2). Comparing 3 points to limit.

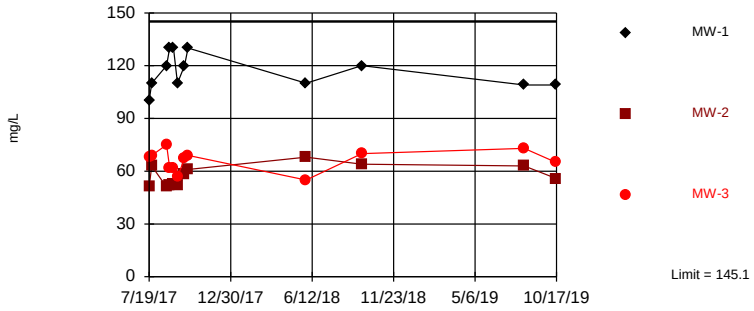
Constituent: Boron Analysis Run 11/6/2019 3:11 PM

Shiras Client: GEI Data: Shiras Database

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=114.3, Std. Dev.=16.74, n=24. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9299, critical = 0.884. Kappa = 1.845 (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.

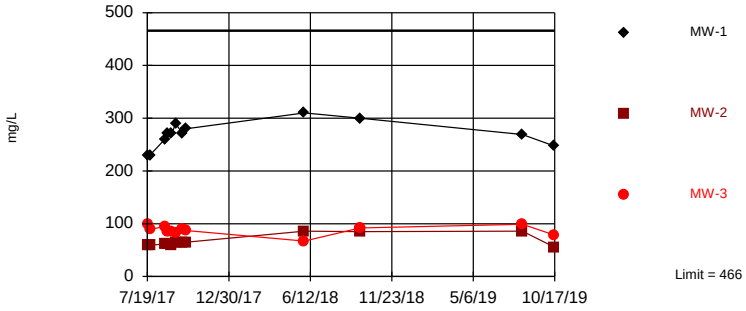
Constituent: Calcium Analysis Run 11/6/2019 3:11 PM

Shiras Client: GEI Data: Shiras Database

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 24 background values. Annual per-constituent alpha = 0.01808. Individual comparison alpha = 0.003036 (1 of 2). Comparing 3 points to limit.

Constituent: Chloride Analysis Run 11/6/2019 3:11 PM

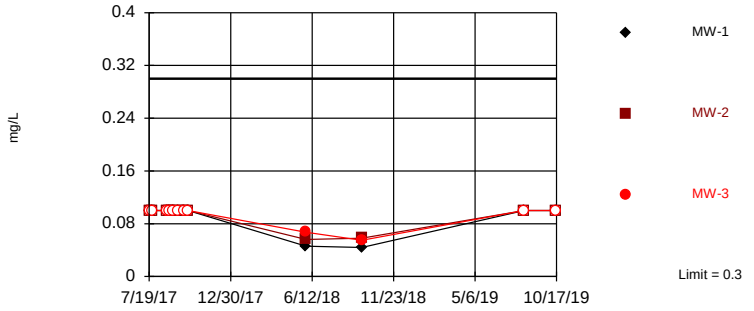
Shiras Client: GEI Data: Shiras Database

Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 24 background values. 66.67% NDs. Annual per-constituent alpha = 0.01808. Individual comparison alpha = 0.003036 (1 of 2). Comparing 3 points to limit.

Constituent: Fluoride Analysis Run 11/6/2019 3:11 PM

Shiras Client: GEI Data: Shiras Database

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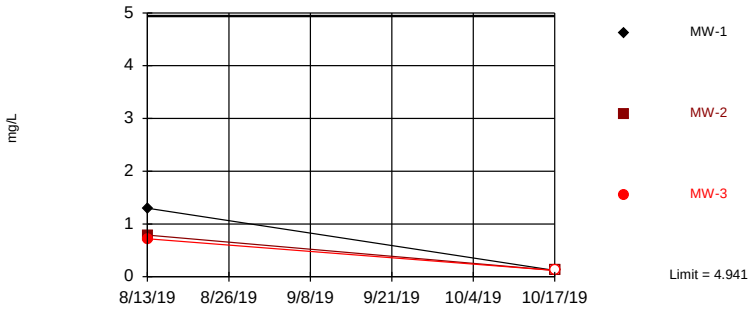
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary (after Aitchison`s Adjustment): Mean=0.8943, Std. Dev.=0.9895, n=4, 25% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.767, critical = 0.687. Kappa = 4.09 (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: Iron Analysis Run 11/6/2019 3:11 PM

Shiras Client: GEI Data: Shiras Database

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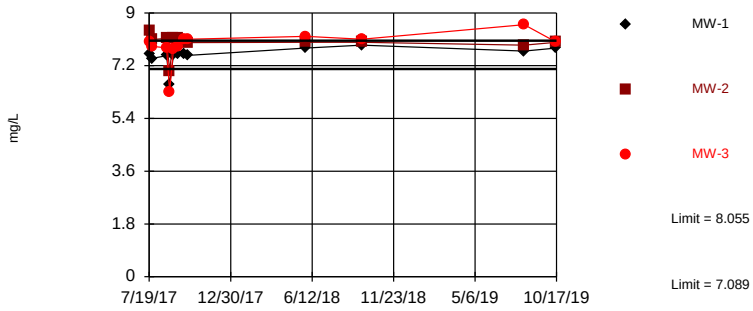
Within Limits

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=7.572, Std. Dev.=0.2618, n=24. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9112, critical = 0.884. Kappa = 1.845 (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: pH Analysis Run 11/6/2019 3:11 PM

Shiras Client: GEI Data: Shiras Database

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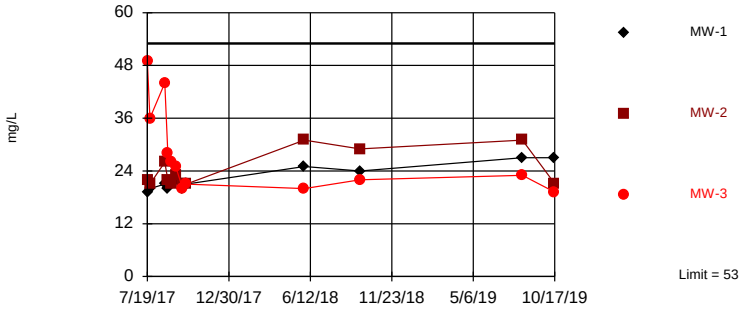
Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 24 background values. Annual per-constituent alpha = 0.01808. Individual comparison alpha = 0.003036 (1 of 2). Comparing 3 points to limit.

Constituent: Sulfate Analysis Run 11/6/2019 3:11 PM

Shiras Client: GEI Data: Shiras Database

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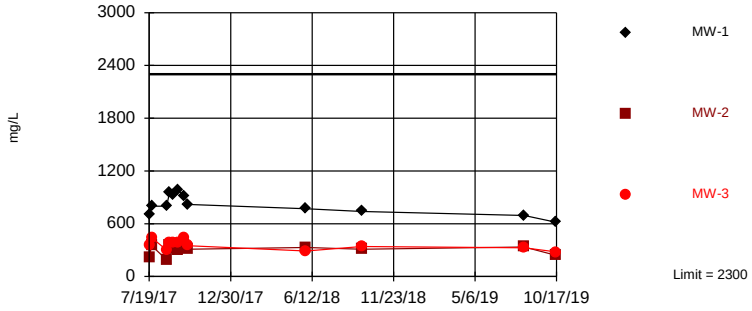
Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 24 background values. Annual per-constituent alpha = 0.01808. Individual comparison alpha = 0.003036 (1 of 2). Comparing 3 points to limit.

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:11 PM

Shiras Client: GEI Data: Shiras Database

Trend Test - Significant Results

Shiras Client: GEI Data: Shiras Database Printed 11/6/2019, 3:14 PM

Constituent	Well	Slope*	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium (mg/L)	**MW-4 (bg)**	**16.33**	**37**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	**MW-4 (bg)**	**142.7**	**56**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
pH (mg/L)	**MW-1**	**0.2635**	**36**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
pH (mg/L)	**MW-5 (bg)**	**0.2174**	**37**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	**MW-1**	**3.431**	**47**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	**MW-3**	**-12.92**	**-47**	**-35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**

* A negative slope indicates a decreasing concentration trend. A positive slope indicates an increasing concentration trend.

Trend Test - All Results

Shiras Client: GEI Data: Shiras Database Printed 11/6/2019, 3:14 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-1	-0.08391	-25	-35	No	12	58.33	n/a	n/a	0.02	NP
Boron (mg/L)	MW-2	-0.06172	-34	-35	No	12	75	n/a	n/a	0.02	NP
Boron (mg/L)	MW-3	-0.04159	-32	-35	No	12	75	n/a	n/a	0.02	NP
Boron (mg/L)	MW-4 (bg)	0	-29	-35	No	12	66.67	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5 (bg)	-0.03923	-32	-35	No	12	75	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-1	0	-6	-35	No	12	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-2	5.976	31	35	No	12	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-3	0	0	35	No	12	0	n/a	n/a	0.02	NP
Calcium (mg/L)	**MW-4 (bg)**	**16.33**	**37**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	MW-5 (bg)	13.05	34	35	No	12	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-1	29.78	24	35	No	12	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-2	20.55	31	35	No	12	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-3	-5.166	-15	-35	No	12	0	n/a	n/a	0.02	NP
Chloride (mg/L)	**MW-4 (bg)**	**142.7**	**56**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	MW-5 (bg)	26.94	28	35	No	12	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-1	0	-13	-35	No	12	83.33	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-2	0	-11	-35	No	12	83.33	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-3	0	-13	-35	No	12	83.33	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-4 (bg)	0.06141	28	35	No	12	50	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5 (bg)	0	-13	-35	No	12	83.33	n/a	n/a	0.02	NP
Iron (mg/L)	MW-1	-6.626	NaN	NaN	No	2	50	n/a	n/a	NaN	NP
Iron (mg/L)	MW-2	-3.762	NaN	NaN	No	2	50	n/a	n/a	NaN	NP
Iron (mg/L)	MW-3	-3.369	NaN	NaN	No	2	50	n/a	n/a	NaN	NP
Iron (mg/L)	MW-4 (bg)	-0.5703	NaN	NaN	No	2	0	n/a	n/a	NaN	NP
Iron (mg/L)	MW-5 (bg)	-0.2395	NaN	NaN	No	2	50	n/a	n/a	NaN	NP
pH (mg/L)	**MW-1**	**0.2635**	**36**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
pH (mg/L)	MW-2	-0.1081	-30	-35	No	12	0	n/a	n/a	0.02	NP
pH (mg/L)	MW-3	0.2811	30	35	No	12	0	n/a	n/a	0.02	NP
pH (mg/L)	MW-4 (bg)	-0.07522	-30	-35	No	12	0	n/a	n/a	0.02	NP
pH (mg/L)	**MW-5 (bg)**	**0.2174**	**37**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	**MW-1**	**3.431**	**47**	**35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	MW-2	0.04896	14	35	No	12	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	**MW-3**	**-12.92**	**-47**	**-35**	**Yes**	**12**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	MW-4 (bg)	0	-1	-35	No	12	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5 (bg)	0	3	35	No	12	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-1	-72.31	-23	-35	No	12	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-2	0	2	35	No	12	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-3	-38.94	-30	-35	No	12	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-4 (bg)	136	26	35	No	12	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5 (bg)	14.79	8	35	No	12	0	n/a	n/a	0.02	NP

***** A negative slope indicates a decreasing concentration trend. A positive slope indicates an increasing concentration trend.

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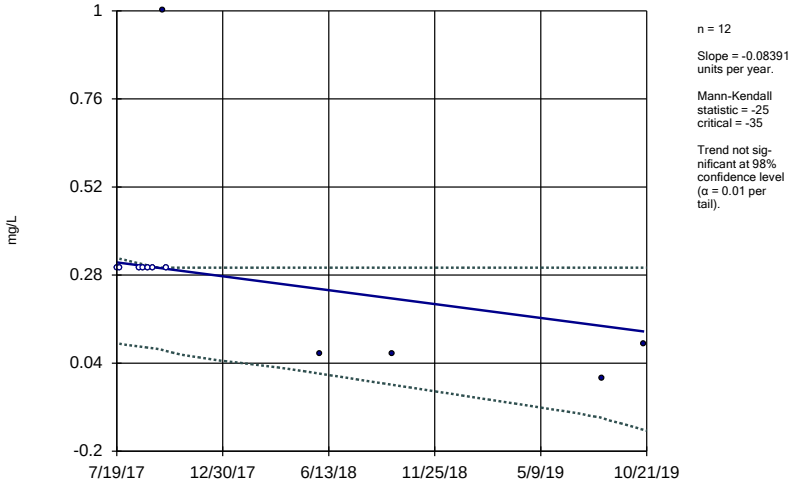
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-1



n = 12

Slope = -0.08391 units per year.

Mann-Kendall statistic = -25
critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

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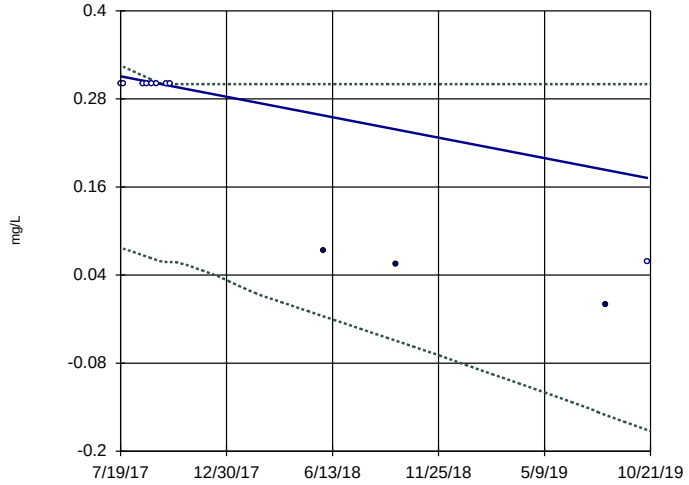
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-2



n = 12

Slope = -0.06172 units per year.

Mann-Kendall statistic = -34
critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

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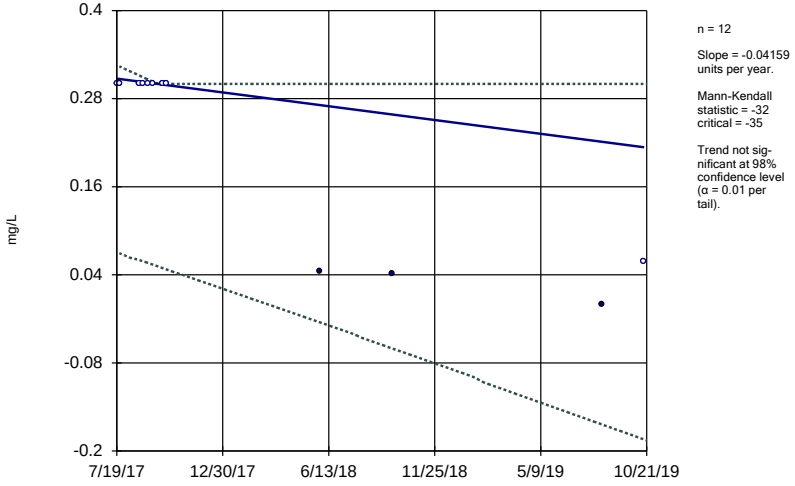
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-3



n = 12

Slope = -0.04159 units per year.

Mann-Kendall statistic = -32
critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

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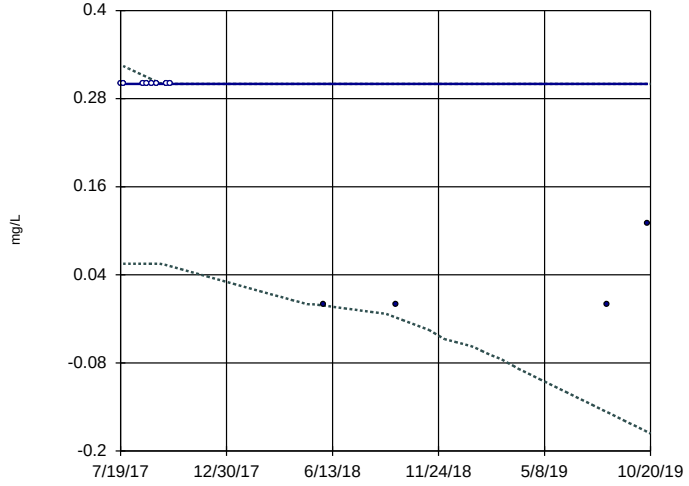
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 12

Slope = 0 units per year.

Mann-Kendall statistic = -29
critical = -35

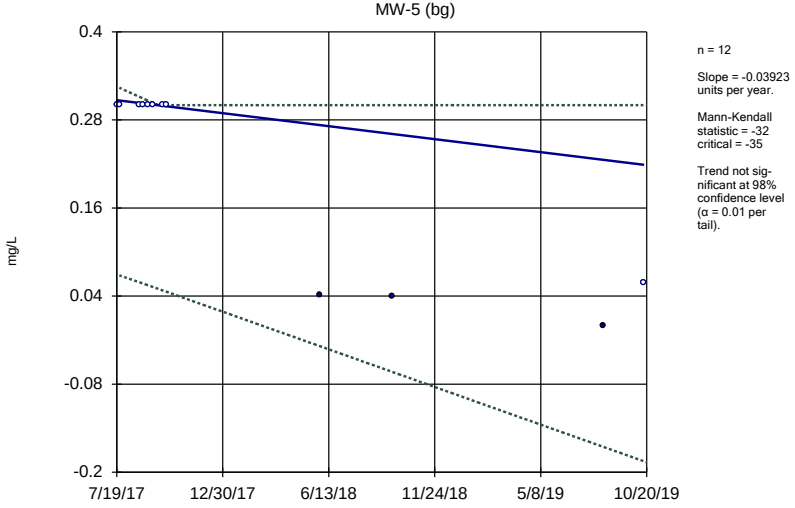
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 12

Slope = -0.03923 units per year.

Mann-Kendall statistic = -32
critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Boron Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

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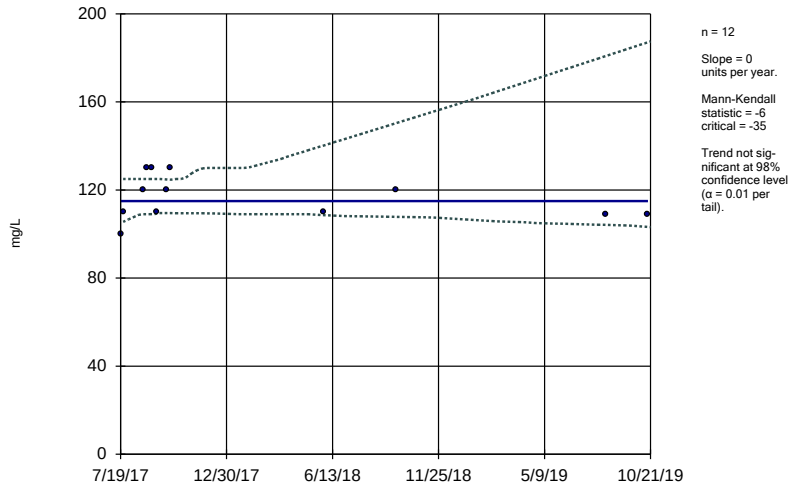
Sen's Slope and 95% Confidence Band

MW-1



n = 12

Slope = 0 units per year.

Mann-Kendall statistic = -6
critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

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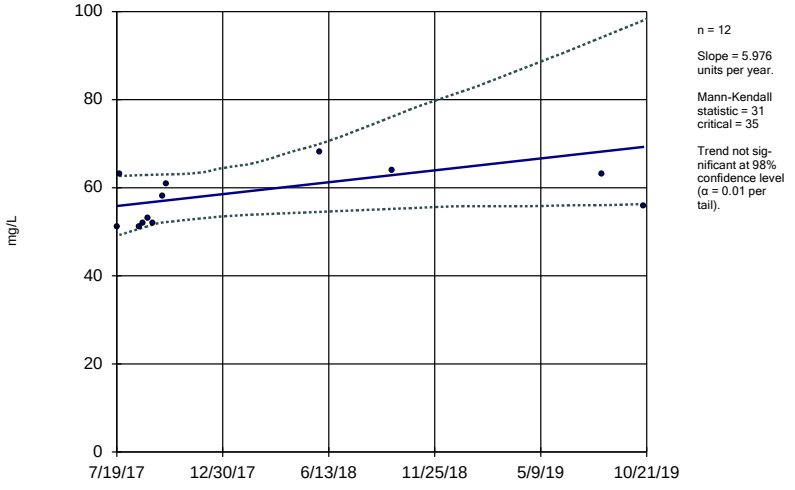
Sen's Slope and 95% Confidence Band

MW-2



n = 12

Slope = 5.976 units per year.

Mann-Kendall statistic = 31
critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

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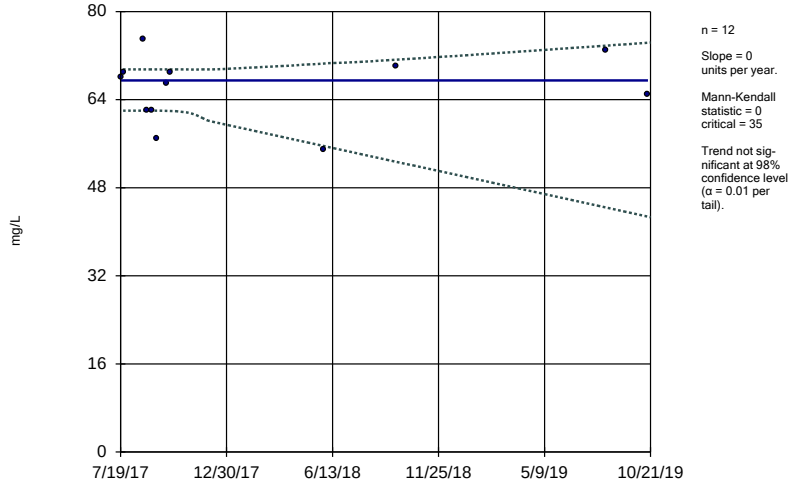
Sen's Slope and 95% Confidence Band

MW-3



n = 12

Slope = 0 units per year.

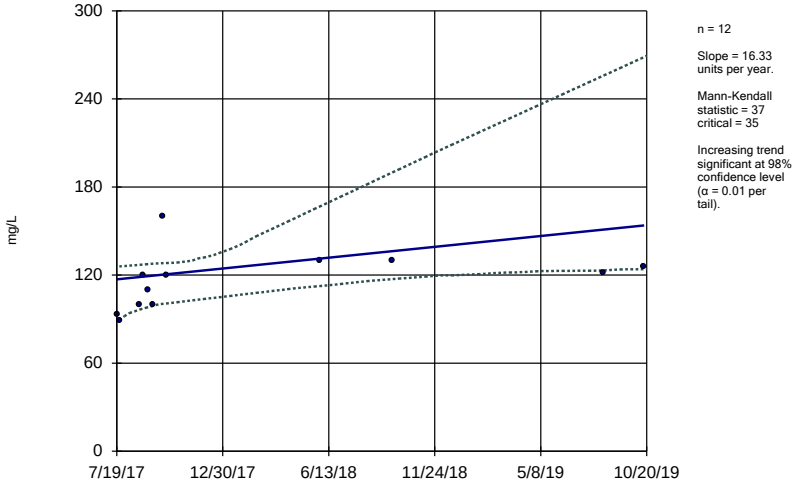
Mann-Kendall statistic = 0
critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 12

Slope = 16.33 units per year.

Mann-Kendall statistic = 37 critical = 35

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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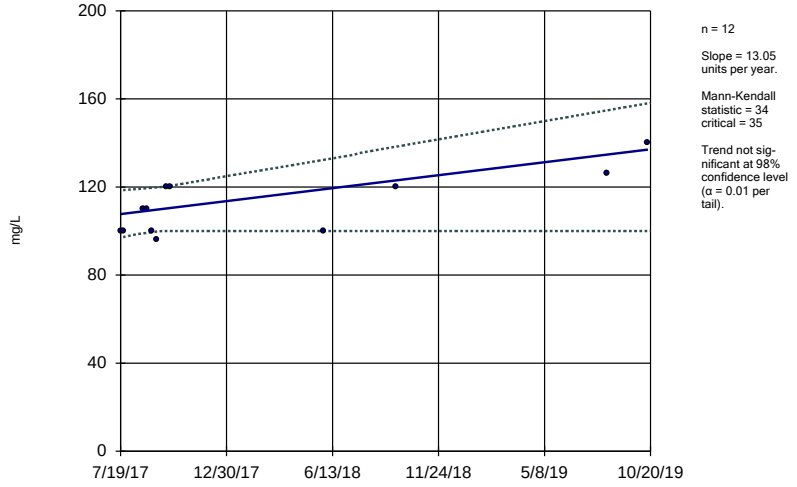
Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 12

Slope = 13.05 units per year.

Mann-Kendall statistic = 34 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Calcium Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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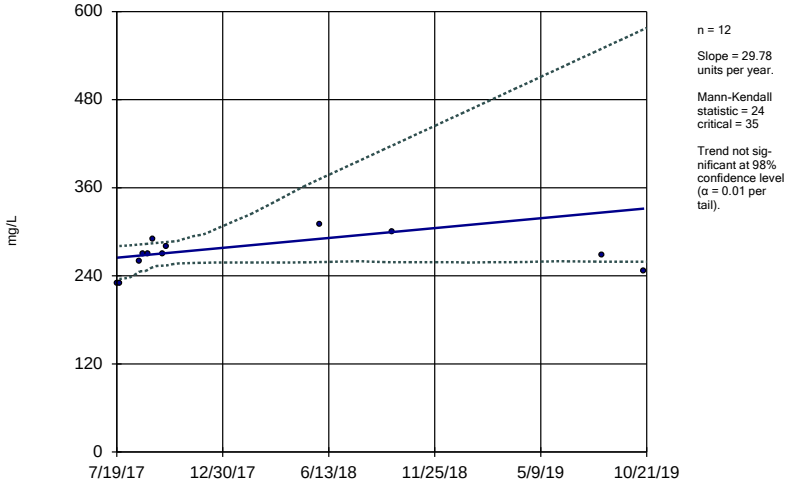
Sen's Slope and 95% Confidence Band

MW-1



n = 12

Slope = 29.78 units per year.

Mann-Kendall statistic = 24 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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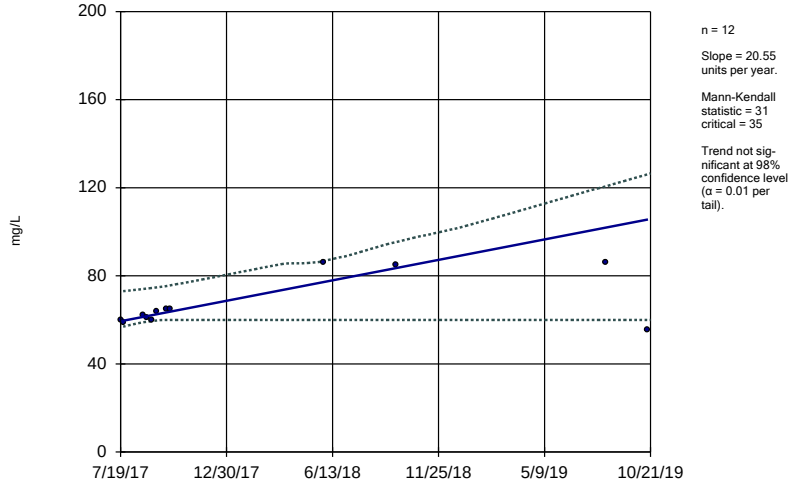
Sen's Slope and 95% Confidence Band

MW-2



n = 12

Slope = 20.55 units per year.

Mann-Kendall statistic = 31 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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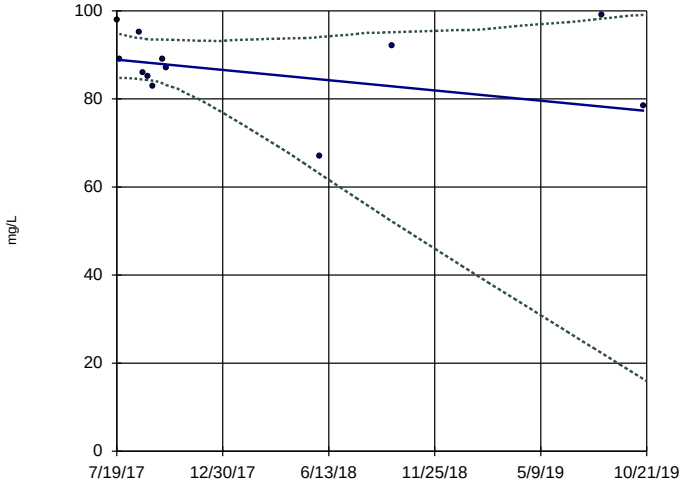
Sen's Slope and 95% Confidence Band

MW-3



n = 12

Slope = -5.166 units per year.

Mann-Kendall statistic = -15 critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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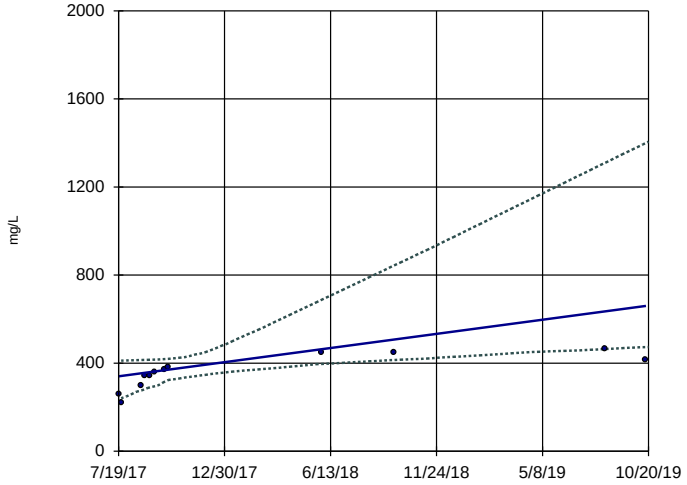
Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 12

Slope = 142.7 units per year.

Mann-Kendall statistic = 56 critical = 35

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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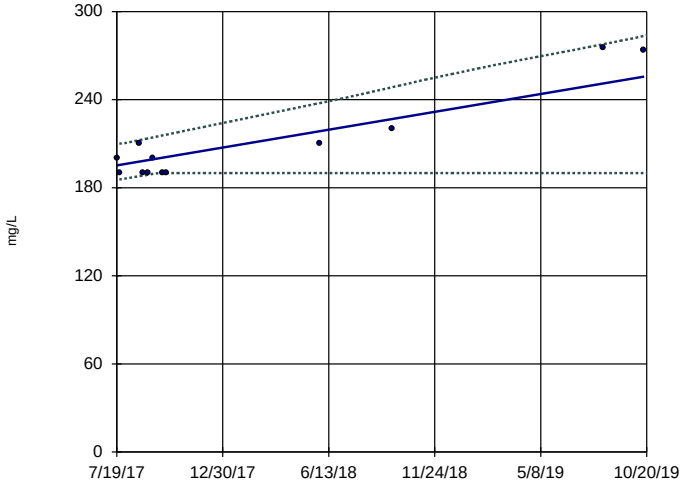
Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 12

Slope = 26.94 units per year.

Mann-Kendall statistic = 28 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Chloride Analysis Run 11/6/2019 3:13 PM

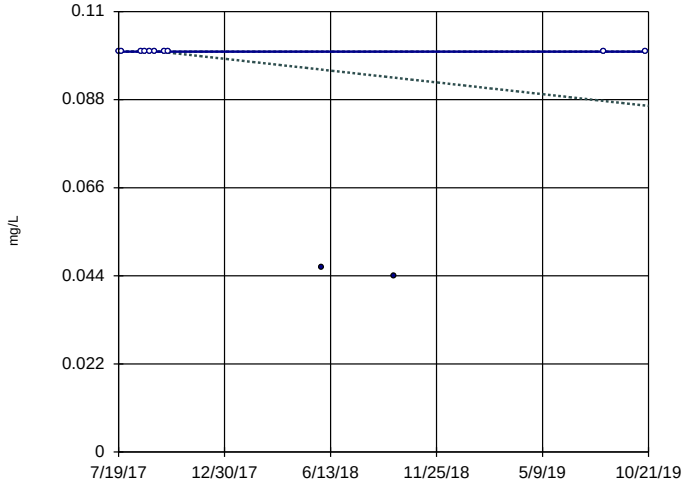
Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-1



n = 12

Slope = 0 units per year.

Mann-Kendall statistic = -13 critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

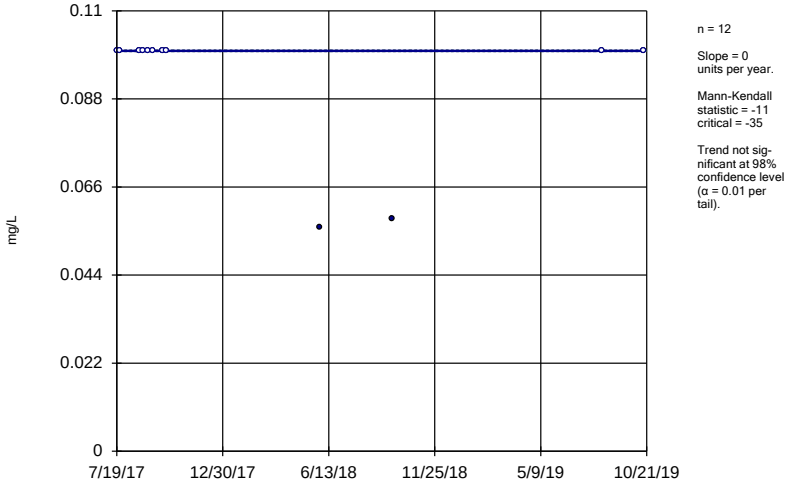
Constituent: Fluoride Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-2



n = 12

Slope = 0
units per year.

Mann-Kendall
statistic = -11
critical = -35

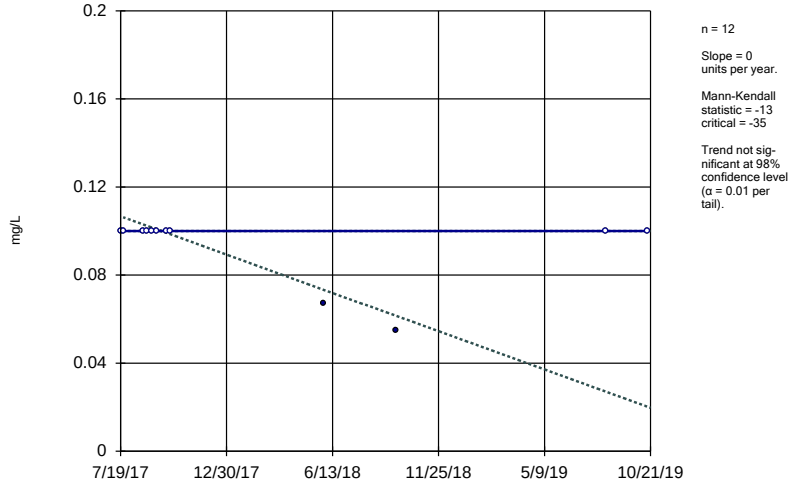
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-3



n = 12

Slope = 0
units per year.

Mann-Kendall
statistic = -13
critical = -35

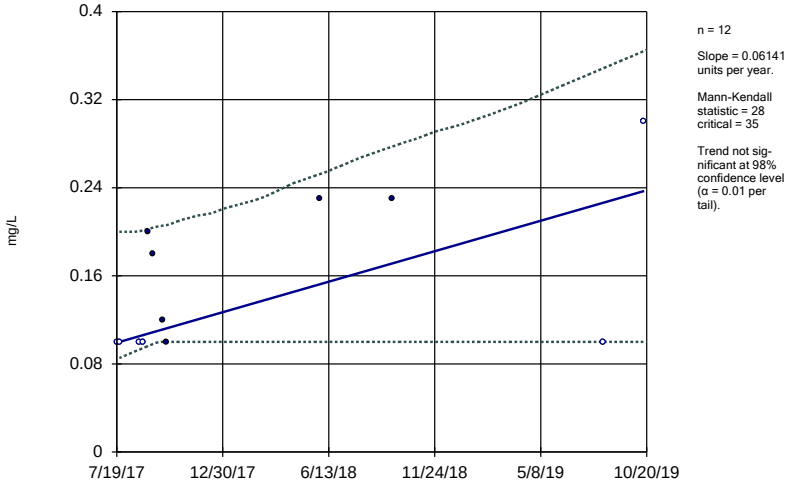
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 12

Slope = 0.06141
units per year.

Mann-Kendall
statistic = 28
critical = 35

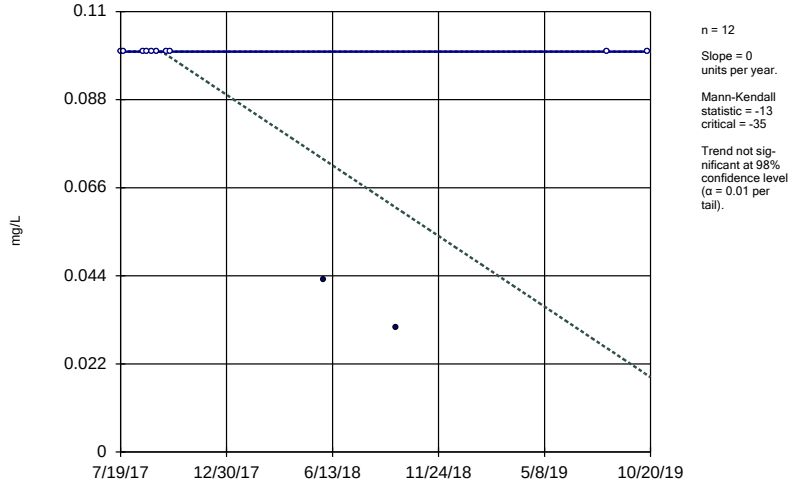
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 12

Slope = 0
units per year.

Mann-Kendall
statistic = -13
critical = -35

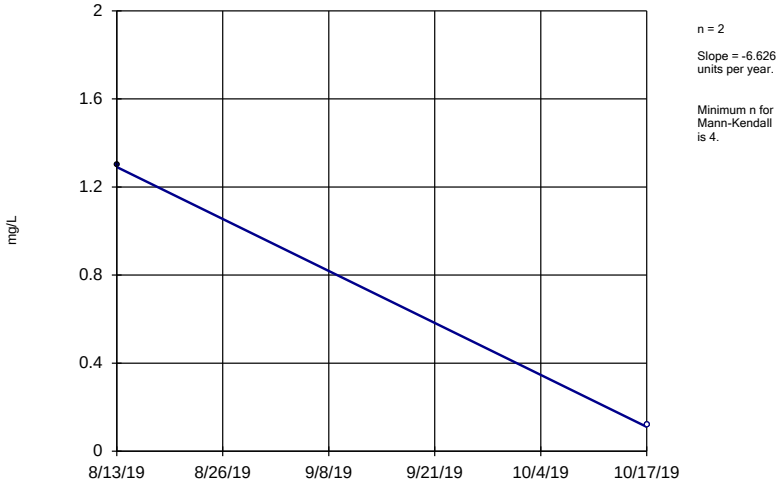
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Constituent: Fluoride Analysis Run 11/6/2019 3:13 PM
Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-1



n = 2

Slope = -6.626 units per year.

Minimum n for Mann-Kendall is 4.

Constituent: Iron Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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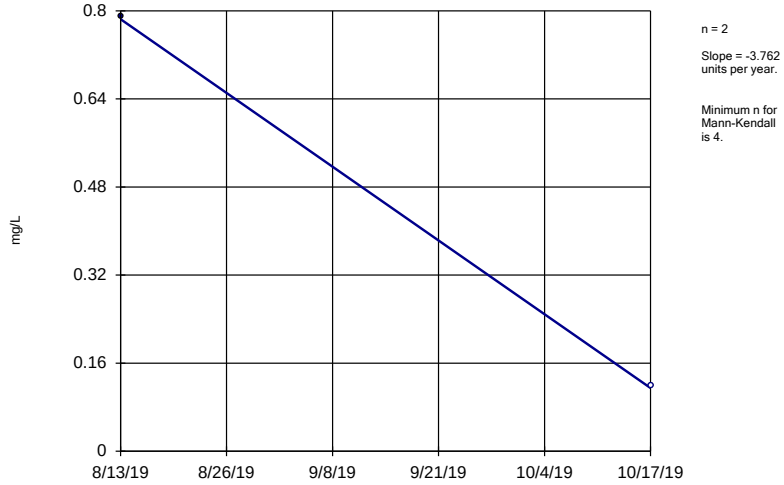
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-2



n = 2

Slope = -3.762 units per year.

Minimum n for Mann-Kendall is 4.

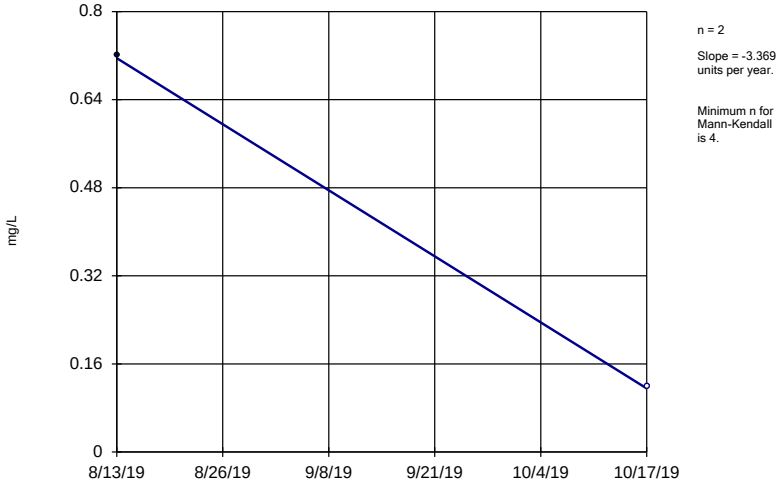
Constituent: Iron Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG
Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-3



n = 2

Slope = -3.369 units per year.

Minimum n for Mann-Kendall is 4.

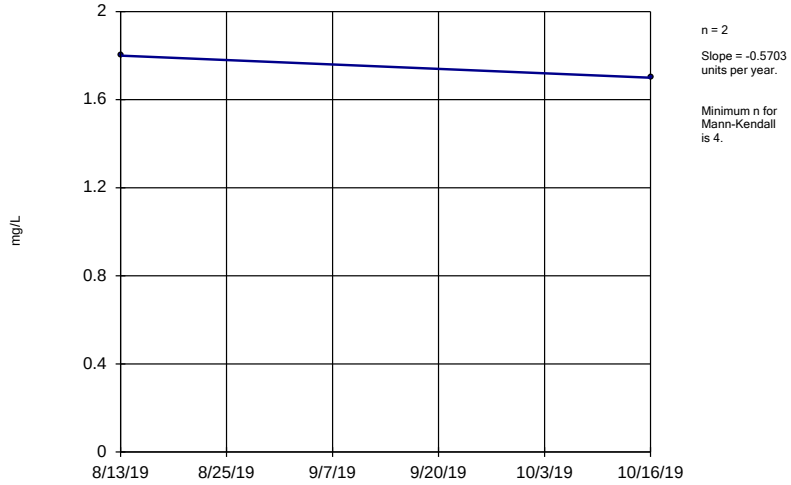
Constituent: Iron Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope Estimator

MW-4 (bg)



n = 2

Slope = -0.5703 units per year.

Minimum n for Mann-Kendall is 4.

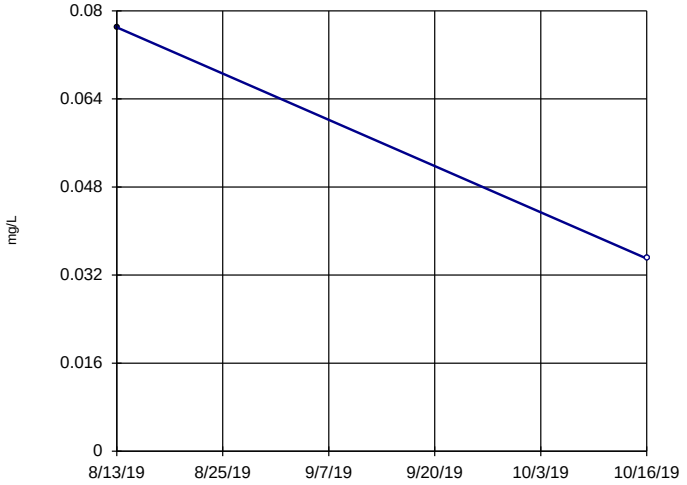
Constituent: Iron Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Hollow symbols indicate censored values.

Sen's Slope Estimator

MW-5 (bg)



n = 2

Slope = -0.2395 units per year.

Minimum n for Mann-Kendall is 4.

Constituent: Iron Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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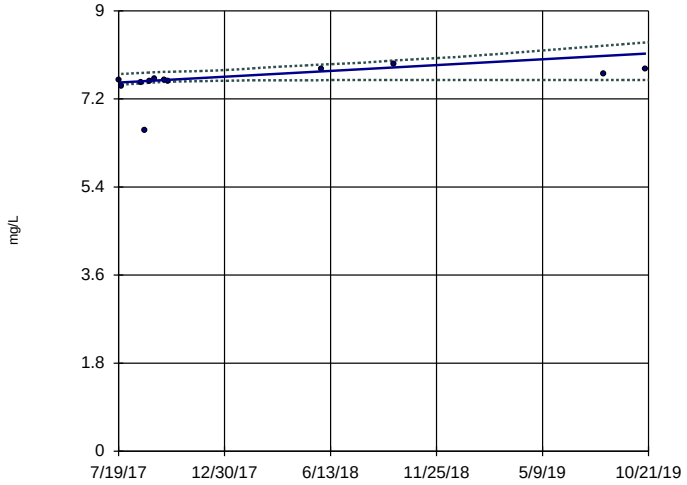
Sen's Slope and 95% Confidence Band

MW-1



n = 12

Slope = 0.2635 units per year.

Mann-Kendall statistic = 36 critical = 35

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

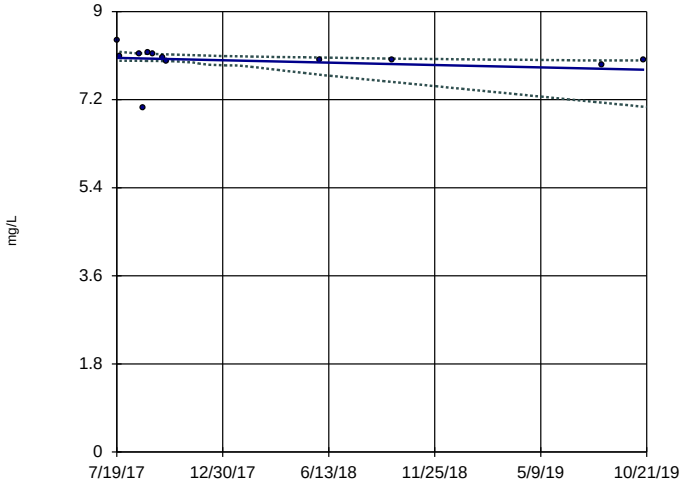
Constituent: pH Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-2



n = 12

Slope = -0.1081 units per year.

Mann-Kendall statistic = -30 critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

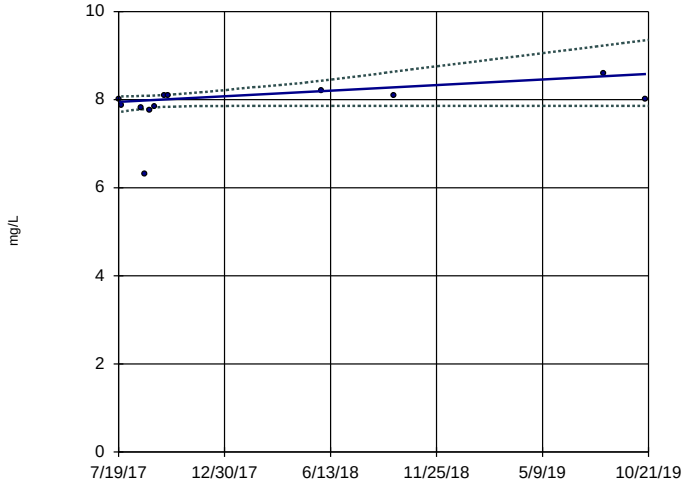
Constituent: pH Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-3



n = 12

Slope = 0.2811 units per year.

Mann-Kendall statistic = 30 critical = 35

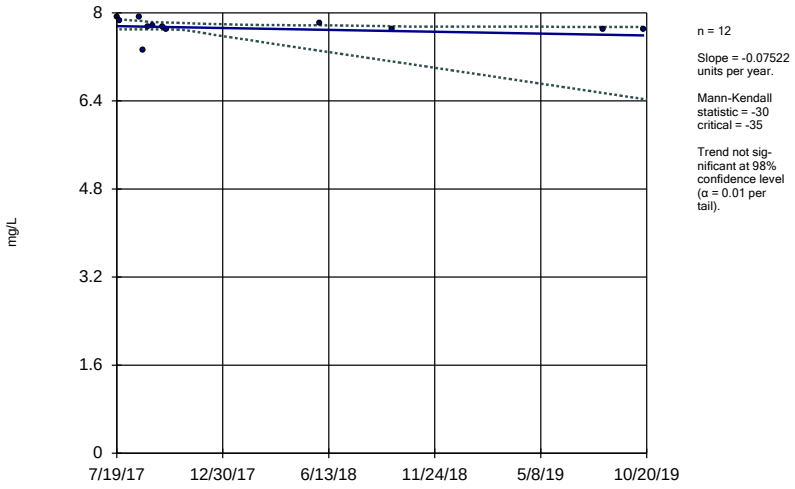
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: pH Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 12

Slope = -0.07522 units per year.

Mann-Kendall statistic = -30
critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

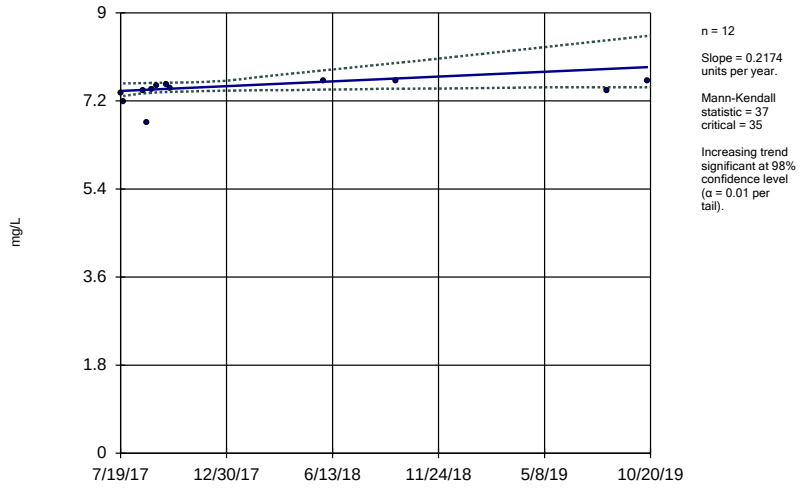
Constituent: pH Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 12

Slope = 0.2174 units per year.

Mann-Kendall statistic = 37
critical = 35

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

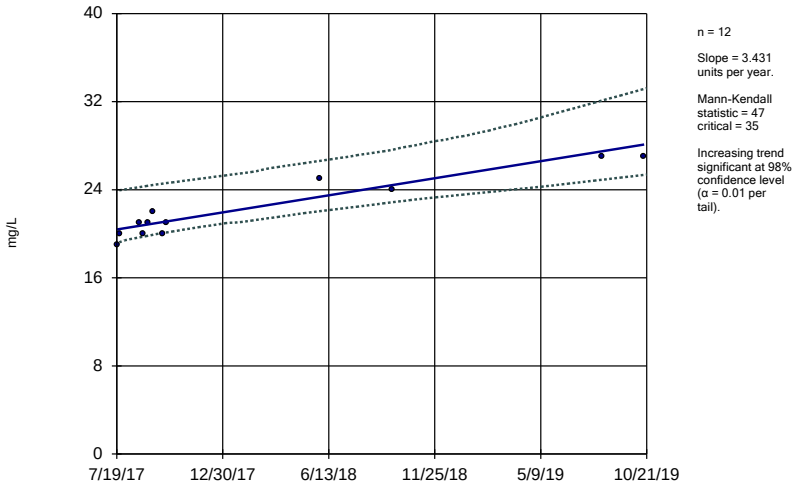
Constituent: pH Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-1



n = 12

Slope = 3.431 units per year.

Mann-Kendall statistic = 47
critical = 35

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

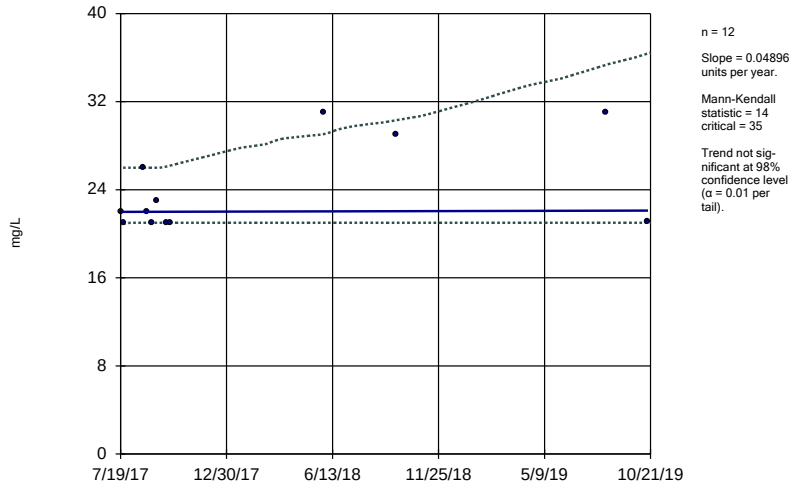
Constituent: Sulfate Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-2



n = 12

Slope = 0.04896 units per year.

Mann-Kendall statistic = 14
critical = 35

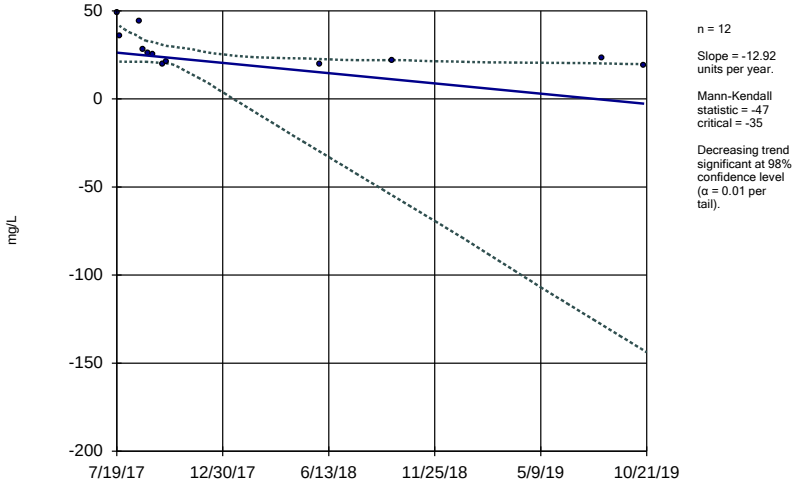
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Sulfate Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-3



n = 12

Slope = -12.92 units per year.

Mann-Kendall statistic = -47 critical = -35

Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Constituent: Sulfate Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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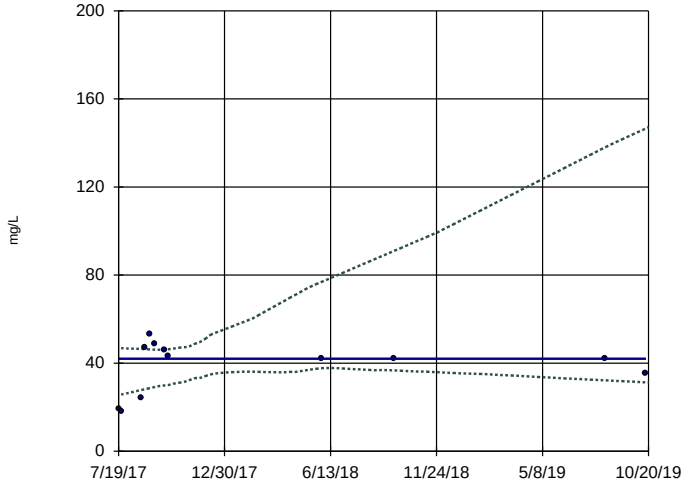
Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 12

Slope = 0 units per year.

Mann-Kendall statistic = -1 critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

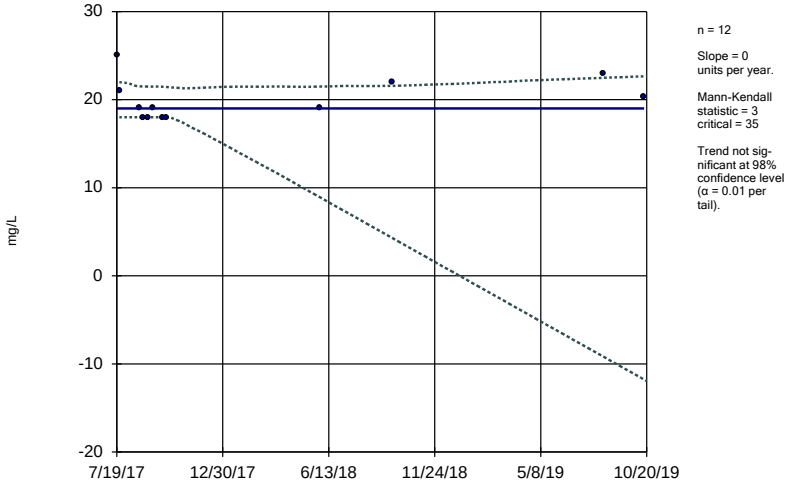
Constituent: Sulfate Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 12

Slope = 0 units per year.

Mann-Kendall statistic = 3 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

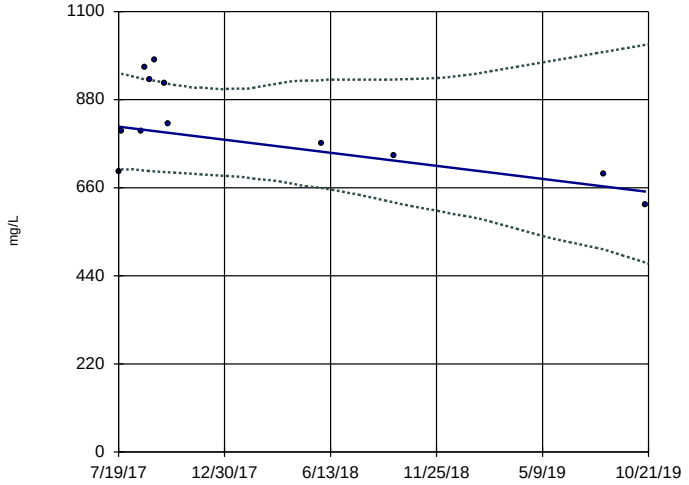
Constituent: Sulfate Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-1



n = 12

Slope = -72.31 units per year.

Mann-Kendall statistic = -23 critical = -35

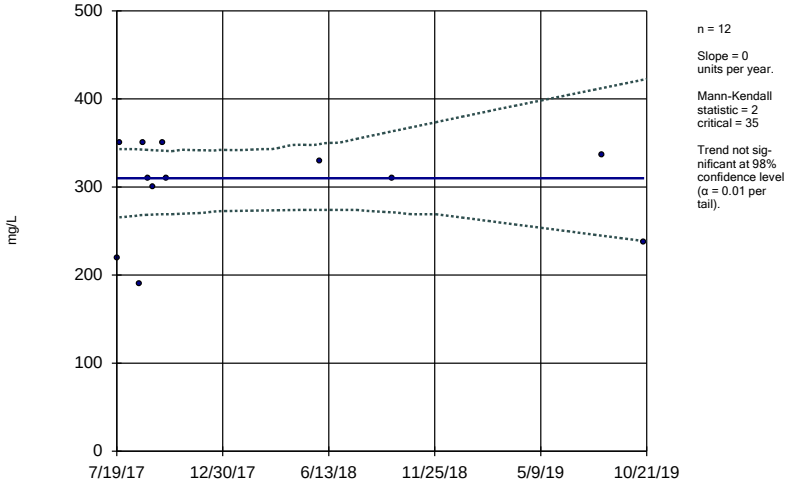
Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sen's Slope and 95% Confidence Band

MW-2



n = 12

Slope = 0 units per year.

Mann-Kendall statistic = 2 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

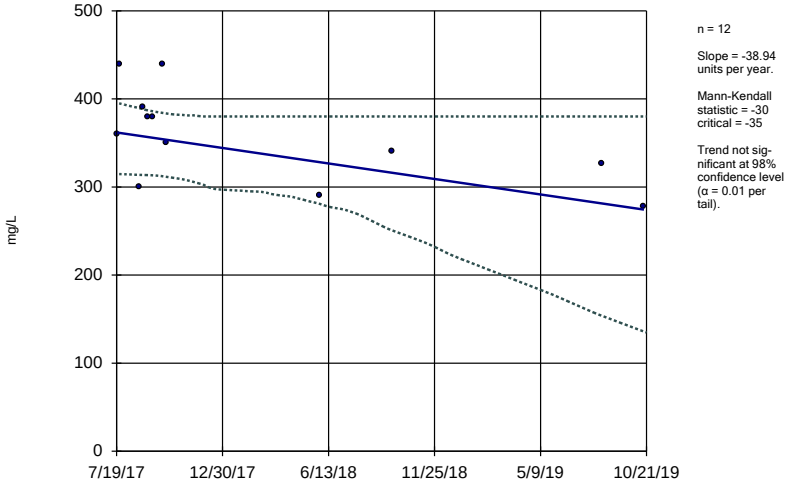
Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-3



n = 12

Slope = -38.94 units per year.

Mann-Kendall statistic = -30 critical = -35

Trend not significant at 98% confidence level (α = 0.01 per tail).

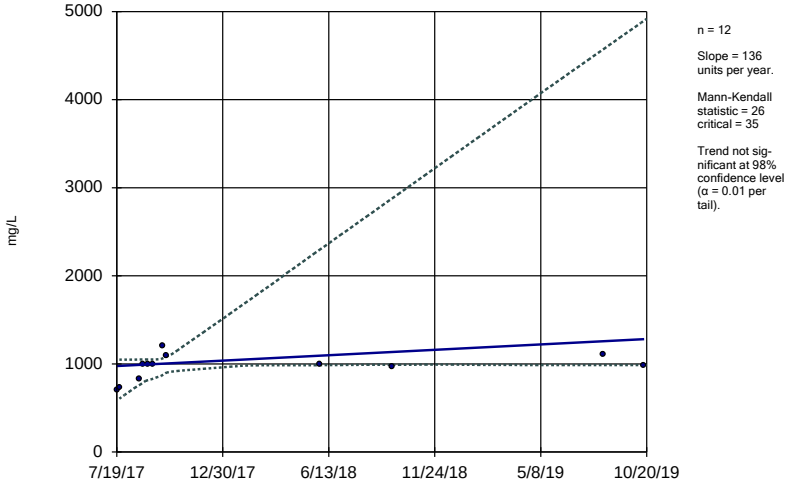
Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

Sanitas™ v.9.6.23 Software licensed to GEI Consultants, Inc. P.C. UG

Sen's Slope and 95% Confidence Band

MW-4 (bg)



n = 12

Slope = 136 units per year.

Mann-Kendall statistic = 26 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

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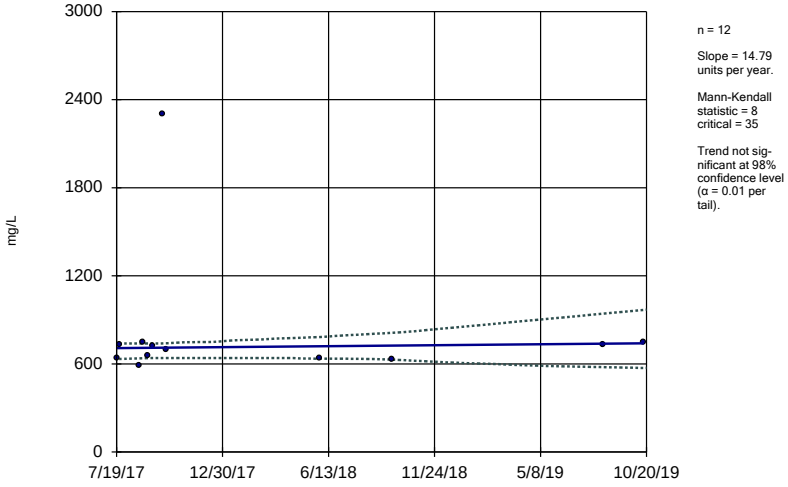
Sen's Slope and 95% Confidence Band

MW-5 (bg)



n = 12

Slope = 14.79 units per year.

Mann-Kendall statistic = 8 critical = 35

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:13 PM

Shiras Client: GEI Data: Shiras Database

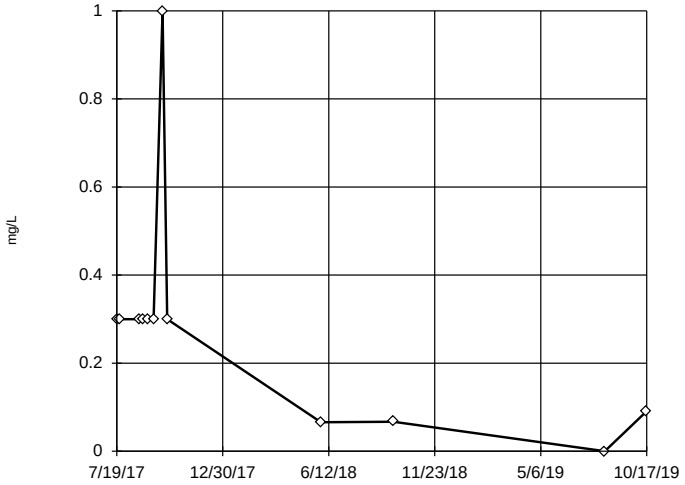
Outlier Analysis Summary

Shiras Client: GEI Data: Shiras Database Printed 11/6/2019, 3:10 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	N	Mean	Std. Dev.	Distrib...	Normality Test
pH (mg/L)	**MW-1**	**Yes**	**6.56**	**8/29/2017**	**Dixon`s**	**12**	**7.552**	**0.3391**	**normal**	**ShapiroWilk**
pH (mg/L)	**MW-2**	**Yes**	**8.41,7.03**	**7/19/2017,8/29/2017**	**Dixon`s**	**12**	**7.992**	**0.3286**	**normal**	**ShapiroWilk**
pH (mg/L)	**MW-3**	**Yes**	**8.6,6.32**	**8/13/2019,8/29/2017**	**Dixon`s**	**12**	**7.892**	**0.5428**	**normal**	**ShapiroWilk**
pH (mg/L)	**MW-5 (bg)**	**Yes**	**6.76**	**8/29/2017**	**Dixon`s**	**12**	**7.403**	**0.2373**	**normal**	**ShapiroWilk**
Total Dissolved Solids (mg/L)	**MW-5 (bg)**	**Yes**	**2300**	**9/28/2017**	**Dixon`s**	**12**	**819.8**	**469.1**	**normal**	**ShapiroWilk**

Tukey's Outlier Screening

MW-1



n = 12

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

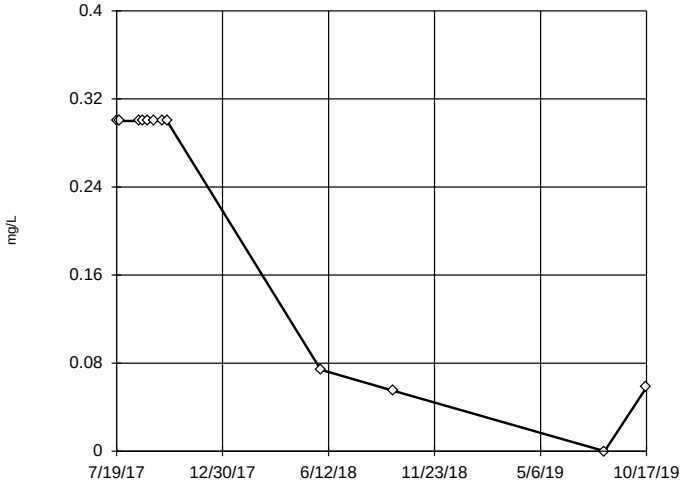
High cutoff = 1.823, low cutoff = -0.2726, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-2



n = 12

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

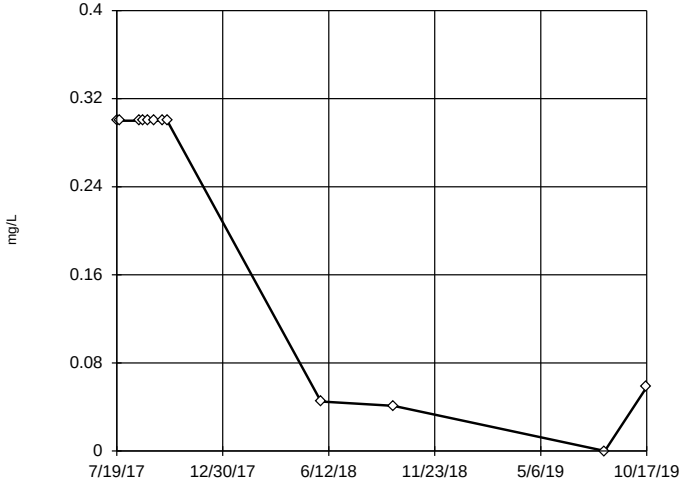
High cutoff = 2.021, low cutoff = -0.3812, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-3



n = 12

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

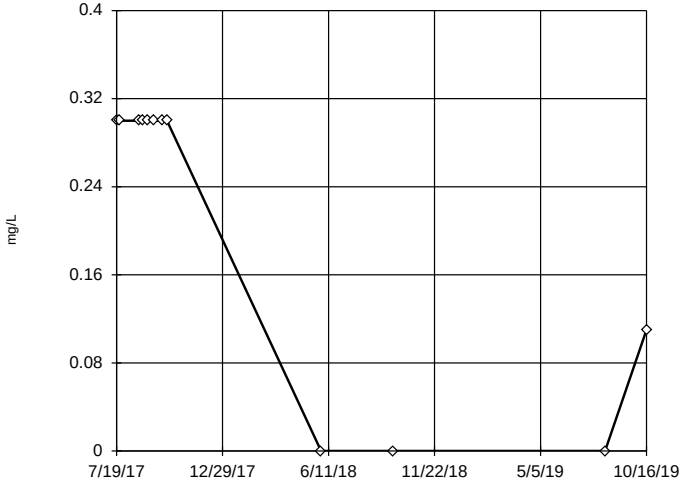
High cutoff = 2.284, low cutoff = -0.5435, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-4 (bg)



n = 12

No outliers found. Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

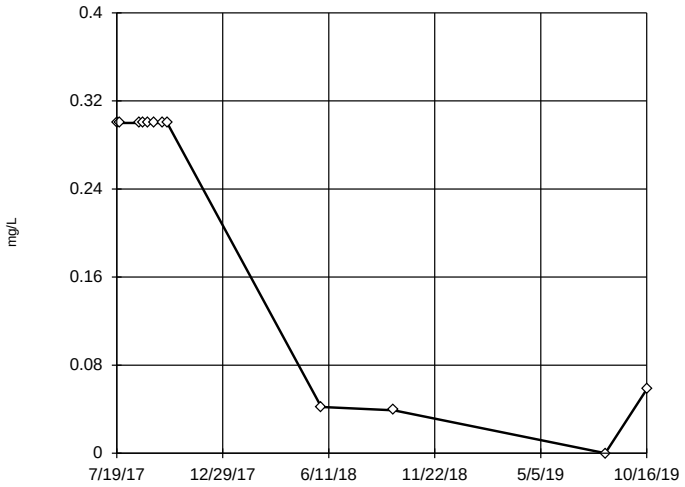
High cutoff = 1.035, low cutoff = -0.68, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-5 (bg)



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 2.317, low cutoff = -0.5649, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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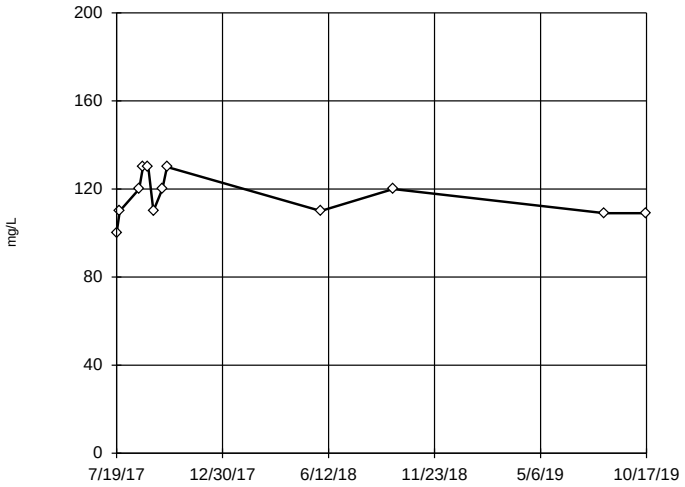
EPA Screening (suspected outliers for Dixon's Test)

MW-1



n = 12

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 116.5, std. dev. 9.977, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.886
Critical = 0.883
The distribution was found to be normally distrib-uted.

Constituent: Calcium Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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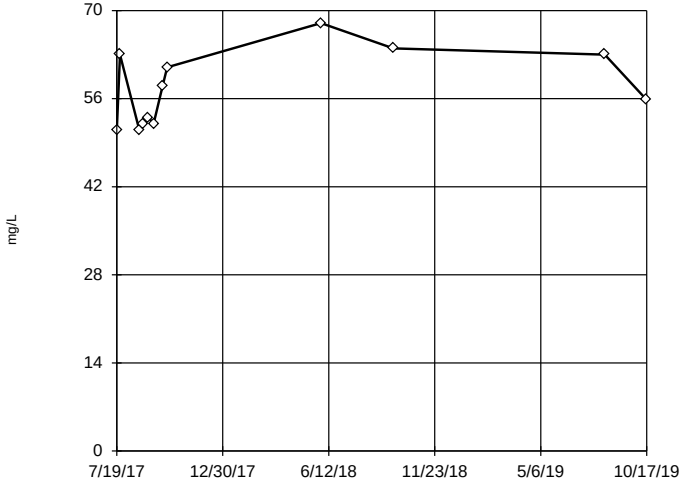
EPA Screening (suspected outliers for Dixon's Test)

MW-2



n = 12

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 57.65, std. dev. 5.98, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8947
Critical = 0.883
The distribution was found to be normally distrib-uted.

Constituent: Calcium Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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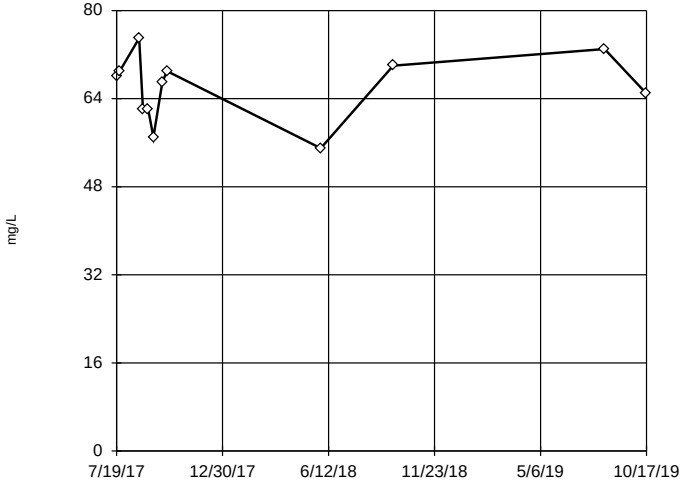
EPA Screening (suspected outliers for Dixon's Test)

MW-3



n = 12

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 65.99, std. dev. 6.062, critical Tn 2.285

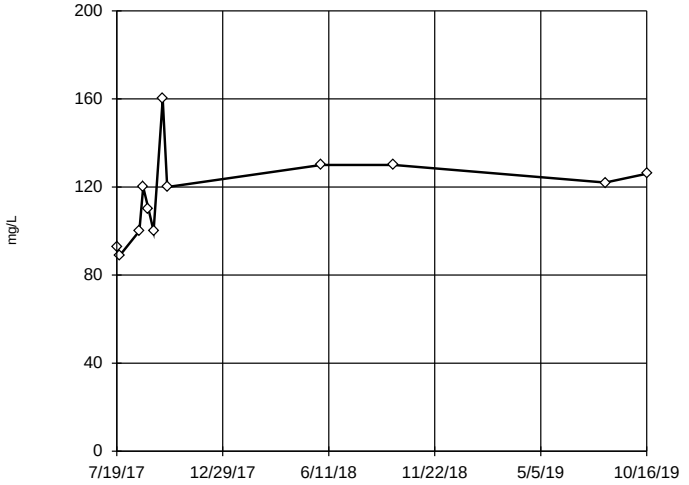
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9568
Critical = 0.883
The distribution was found to be normally distrib-uted.

Constituent: Calcium Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

EPA Screening (suspected outliers for Dixon's Test)

MW-4 (bg)



n = 12

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 116.7, std. dev.
19.76, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9369
Critical = 0.883
The distribution was found
to be normally distrib-
uted.

Constituent: Calcium Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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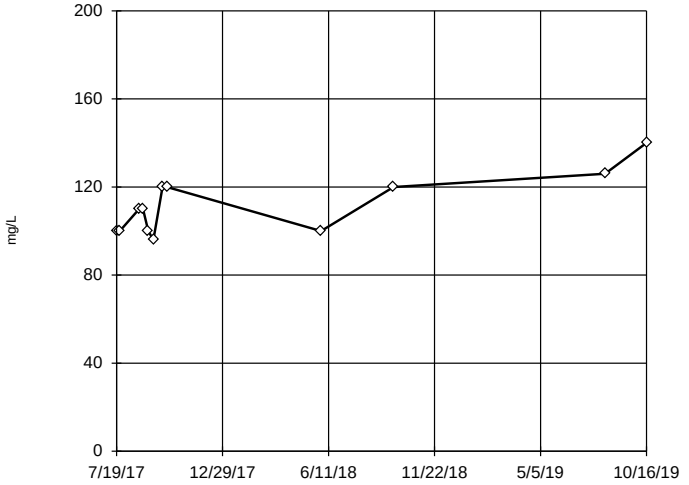
EPA Screening (suspected outliers for Dixon's Test)

MW-5 (bg)



n = 12

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 111.8, std. dev.
13.52, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8956
Critical = 0.883
The distribution was found
to be normally distrib-
uted.

Constituent: Calcium Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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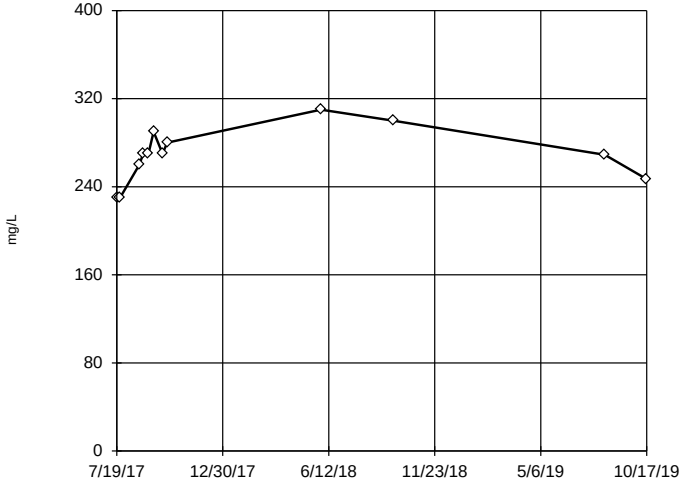
EPA Screening (suspected outliers for Dixon's Test)

MW-1



n = 12

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 268.8, std. dev.
24.89, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9494
Critical = 0.883
The distribution was found
to be normally distrib-
uted.

Constituent: Chloride Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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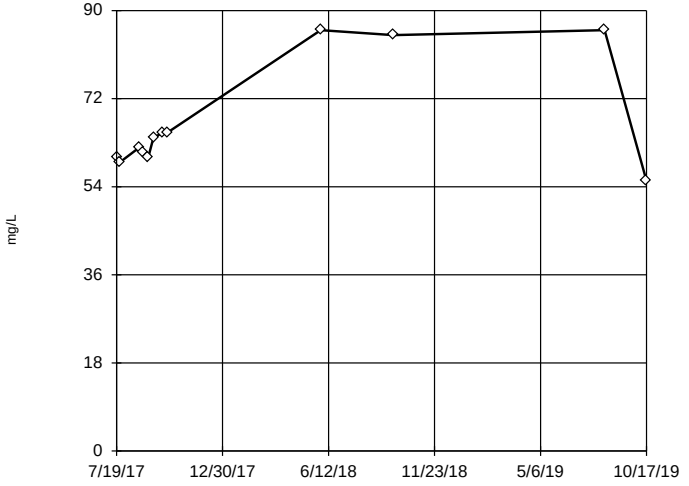
Tukey's Outlier Screening

MW-2



n = 12

No outliers found.
Tukey's method used in
lieu of parametric test
because the Shapiro Wilk
normality test failed
at the 0.1 alpha level.

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

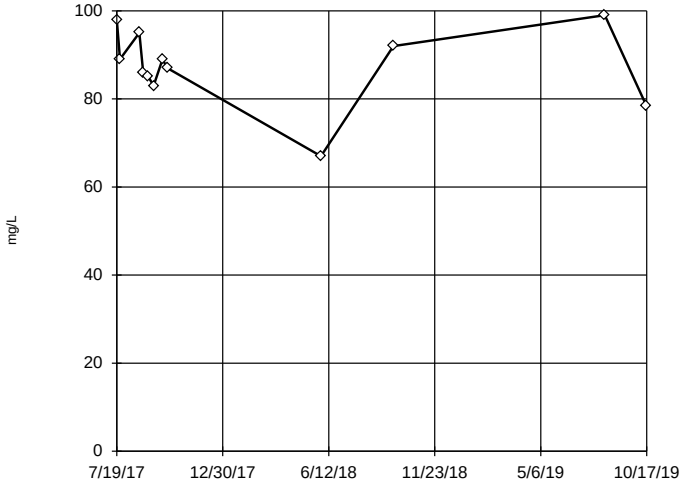
High cutoff = 141.3, low
cutoff = 31.56, based
on IQR multiplier of 3.

Constituent: Chloride Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-3



n = 12

No statistical outliers.
Testing for 1 low outlier.
Mean = 87.36.
Std. Dev. = 8.827.
67: c = 0.5161
tabl = 0.546.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9702
Critical = 0.876
The distribution was found to be normally distrib-uted.

Constituent: Chloride Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

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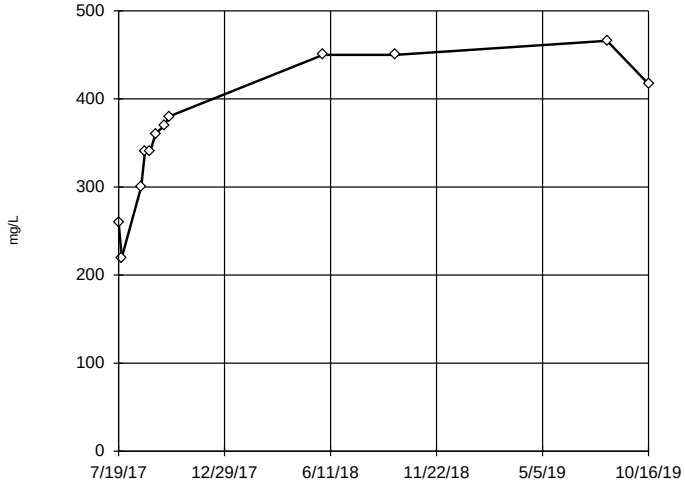
EPA Screening (suspected outliers for Dixon's Test)

MW-4 (bg)



n = 12

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 362.8, std. dev. 76.93, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9545
Critical = 0.883
The distribution was found to be normally distrib-uted.

Constituent: Chloride Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

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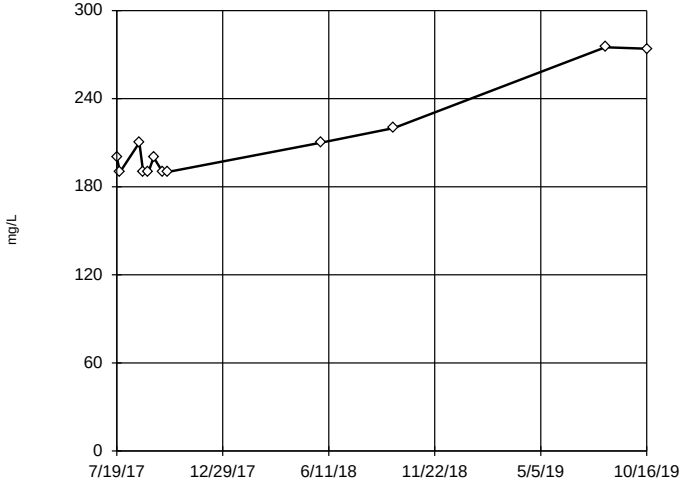
Tukey's Outlier Screening

MW-5 (bg)



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 311.2, low cutoff = 131.2, based on IQR multiplier of 3.

Constituent: Chloride Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

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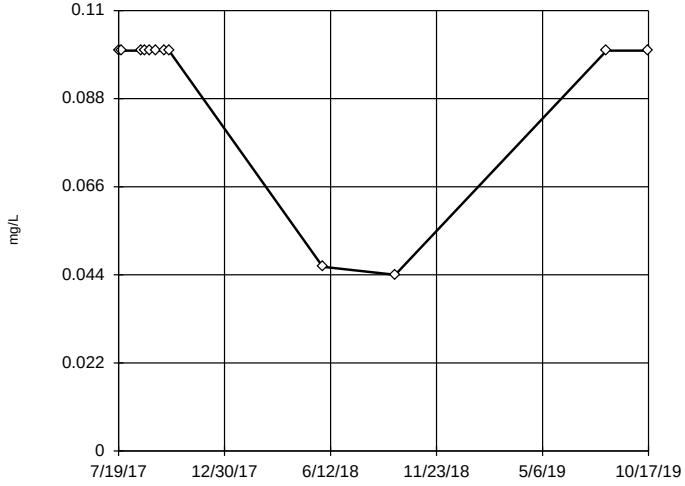
Tukey's Outlier Screening

MW-1



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

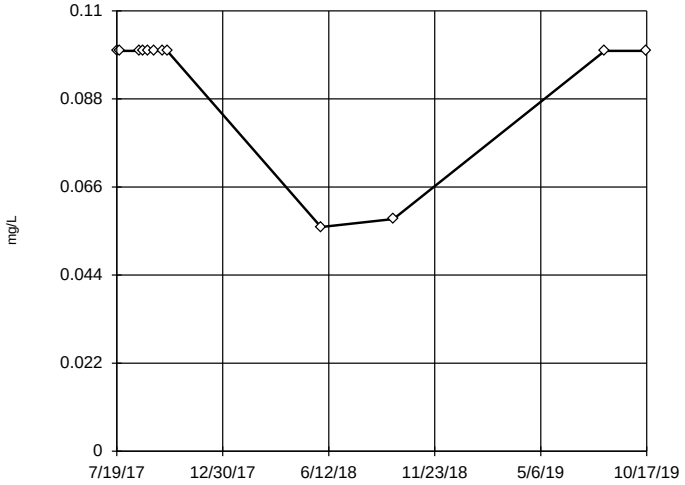
Data were natural log transformed to achieve best W statistic (graph shown in original units).

The results were invalid-ated, because the lower and upper quartiles are equal.

Constituent: Fluoride Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-2



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

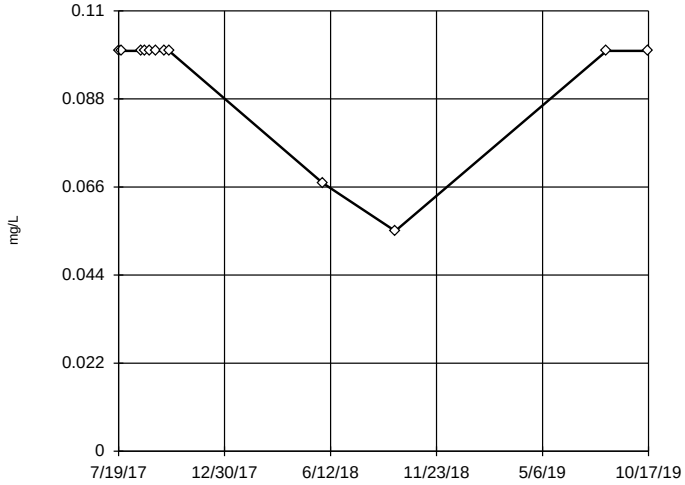
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Fluoride Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-3



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

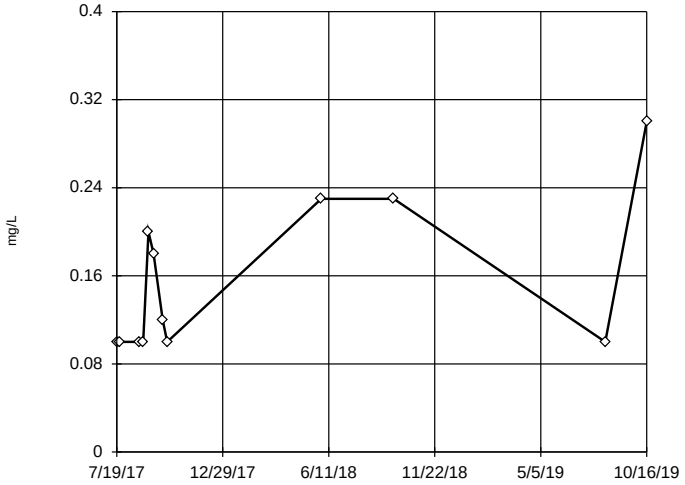
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Fluoride Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-4 (bg)



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

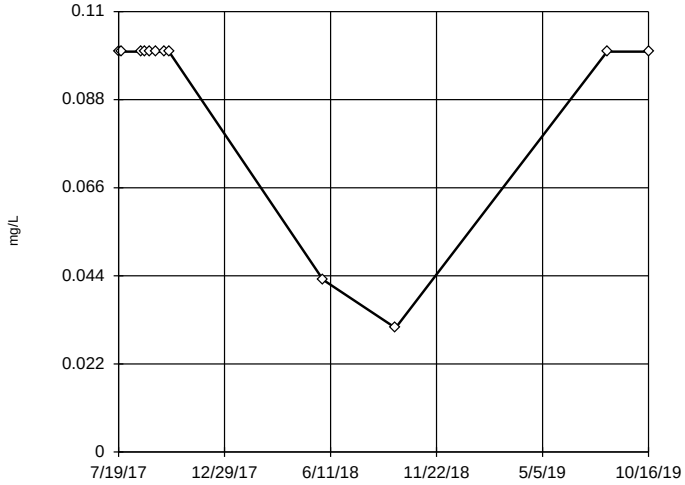
High cutoff = 0.8189, low cutoff = -0.0157, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-5 (bg)



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

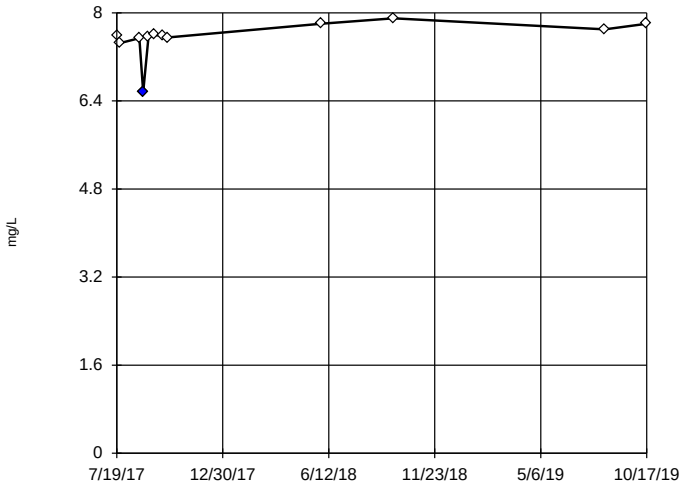
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Fluoride Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-1



n = 12

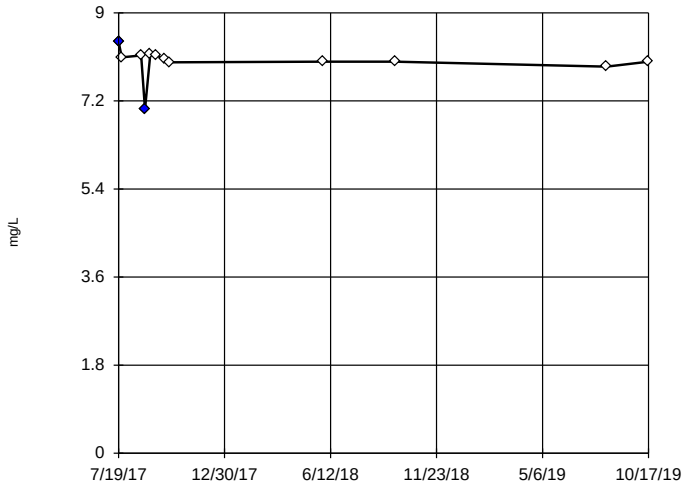
Statistical outlier is drawn as solid.
Testing for 1 low outlier.
Mean = 7.552.
Std. Dev. = 0.3391.
6.56: c = 0.7903
tabl = 0.546.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.903
Critical = 0.876
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: pH Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-2



n = 12

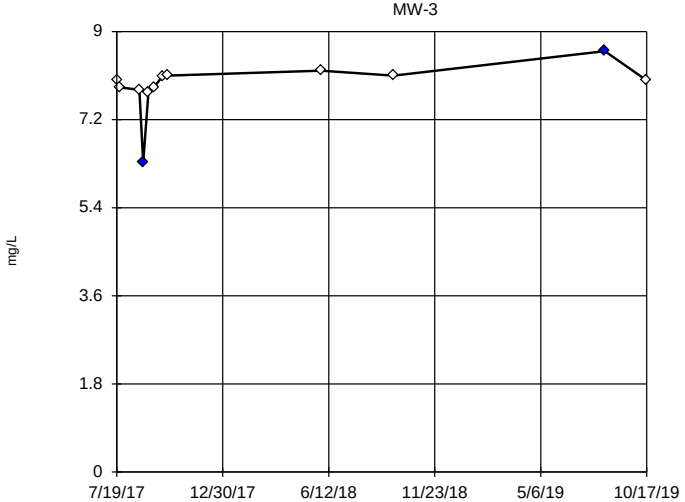
Statistical outliers are drawn as solid.
Testing for 1 high and 1 low outliers.
Mean = 7.992.
Std. Dev. = 0.3286.
8.41: c = 0.549
tabl = 0.546.
7.03: c = 0.8571
tabl = 0.546.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9177
Critical = 0.869
The distribution, after removal of suspect values, was found to be normally distributed.

Constituent: pH Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-3



n = 12

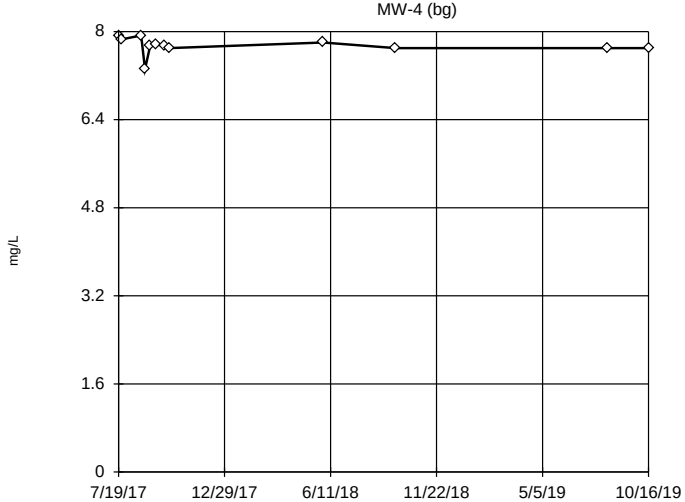
Statistical outliers are drawn as solid.
Testing for 1 high and 1 low outliers.
Mean = 7.892.
Std. Dev. = 0.5428.
8.6: c = 0.6024
tabl = 0.546.
6.32: c = 0.7926
tabl = 0.546.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9245
Critical = 0.869
The distribution, after removal of suspect values, was found to be normally distributed.

Constituent: pH Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-4 (bg)



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

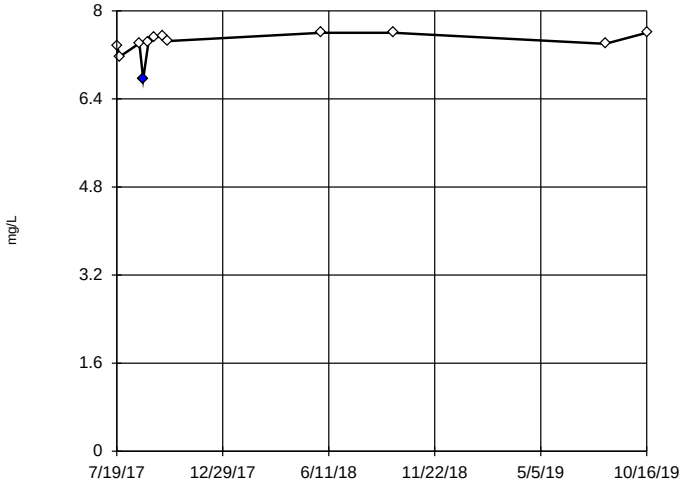
Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 8.167, low cutoff = 7.225, based on IQR multiplier of 3.

Constituent: pH Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Dixon's Outlier Test

MW-5 (bg)



n = 12

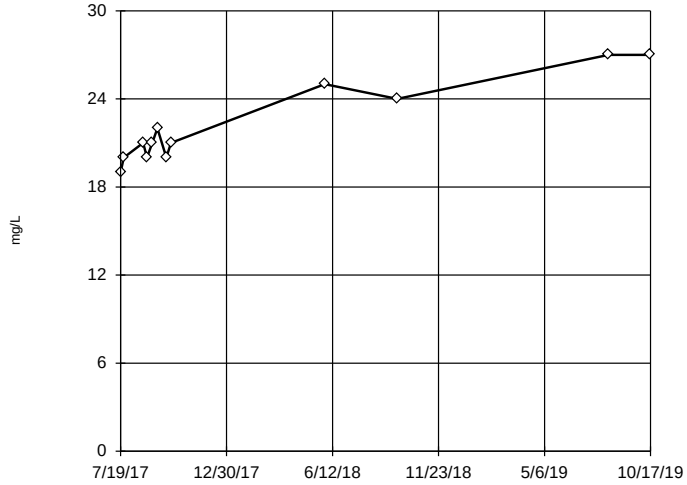
Statistical outlier is drawn as solid.
Testing for 2 low outliers.
Mean = 7.403.
Std. Dev. = 0.2373.
7.17: c = 0.5349
tabl = 0.546.
Alpha = 0.05.
6.76: c = 0.7143
tabl = 0.546.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8994
Critical = 0.876
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: pH Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-1



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

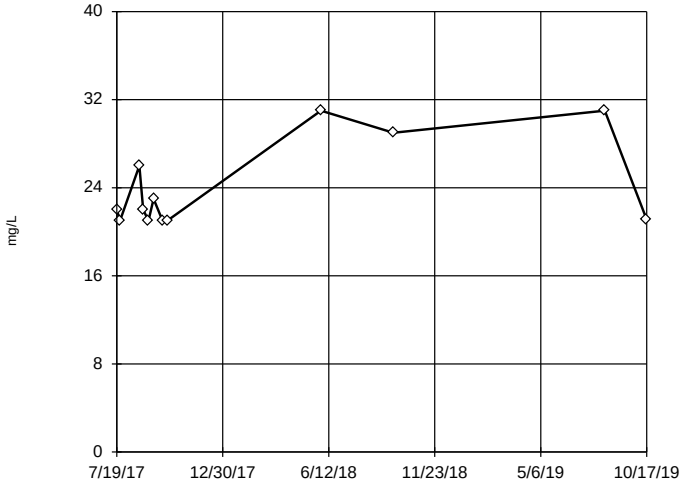
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 45, low cutoff = 10.89, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-2



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

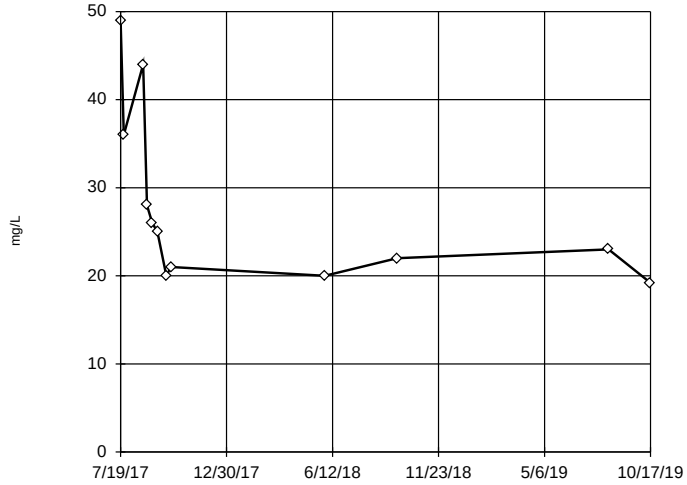
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 61.39, low cutoff = 9.393, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-3



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

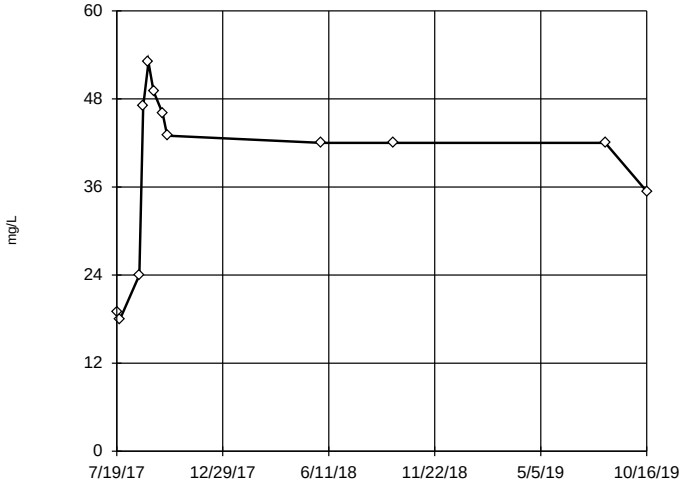
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 118, low cutoff = 5.512, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 11/6/2019 3:08 PM
Shiras Client: GEI Data: Shiras Database

Tukey's Outlier Screening

MW-4 (bg)



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were x^4 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 63.11, low cutoff = -56.56, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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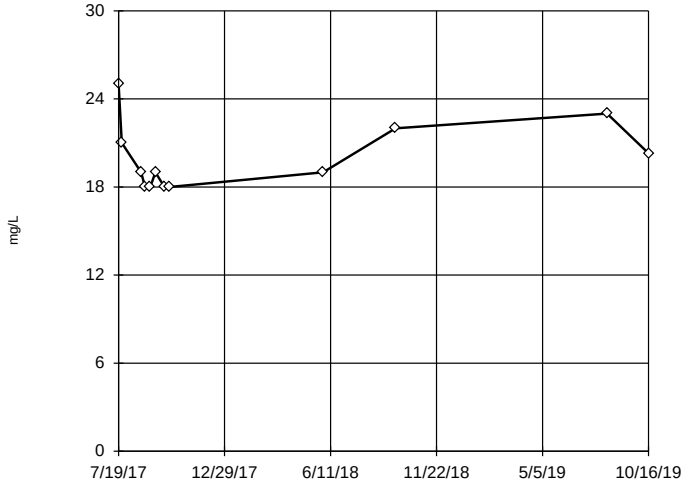
Tukey's Outlier Screening

MW-5 (bg)



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

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

High cutoff = 36.6, low cutoff = 10.57, based on IQR multiplier of 3.

Constituent: Sulfate Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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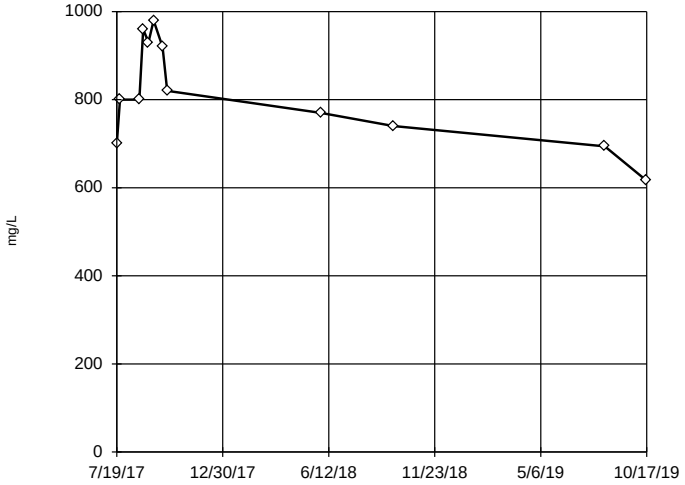
EPA Screening (suspected outliers for Dixon's Test)

MW-1



n = 12

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 810.8, std. dev. 115.9, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9503
Critical = 0.883
The distribution was found to be normally distributed.

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

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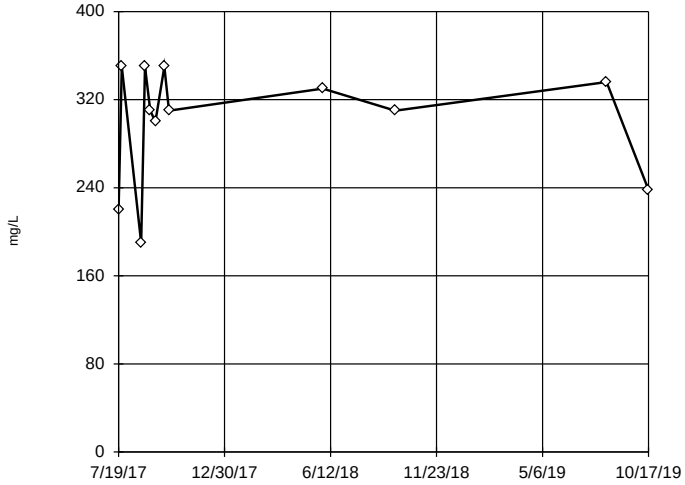
Tukey's Outlier Screening

MW-2



n = 12

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were x^5 transformed to achieve best W statistic (graph shown in original units).

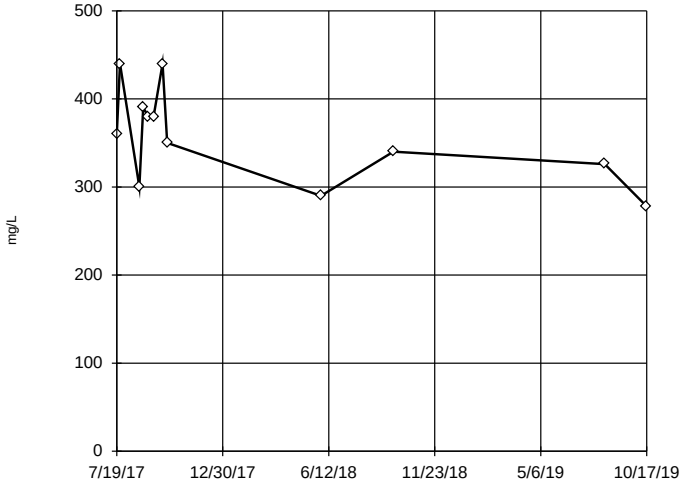
High cutoff = 427.5, low cutoff = -379.9, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:08 PM

Shiras Client: GEI Data: Shiras Database

EPA Screening (suspected outliers for Dixon's Test)

MW-3



n = 12

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 356.2, std. dev. 53.26, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9508
Critical = 0.883
The distribution was found to be normally distrib-uted.

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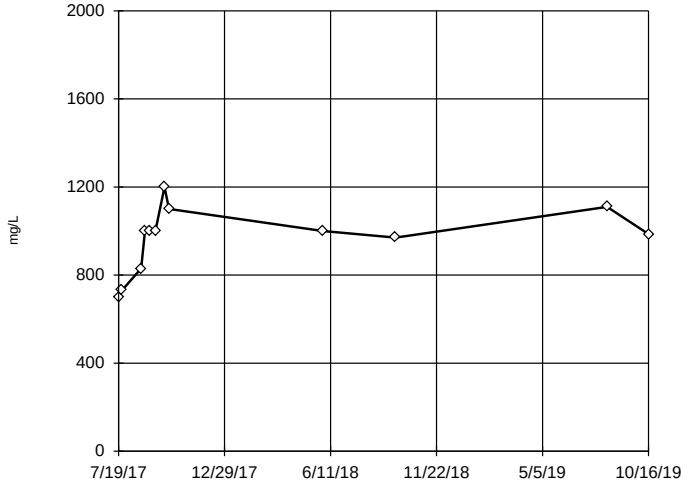
EPA Screening (suspected outliers for Dixon's Test)

MW-4 (bg)



n = 12

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 968.8, std. dev. 148.7, critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9059
Critical = 0.883
The distribution was found to be normally distrib-uted.

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:09 PM

Shiras Client: GEI Data: Shiras Database

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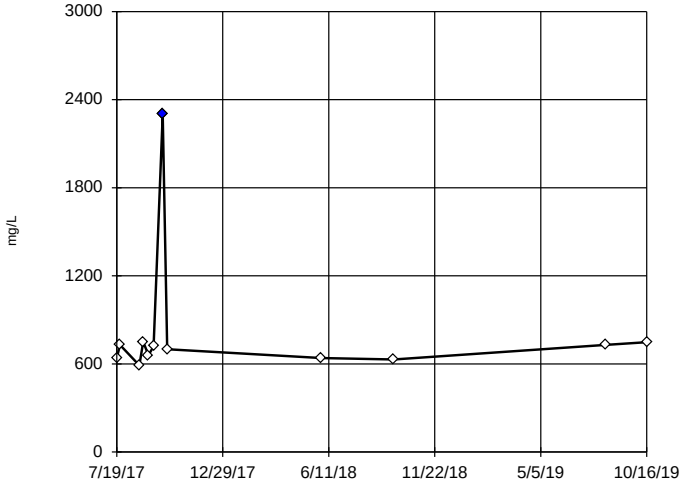
Dixon's Outlier Test

MW-5 (bg)



n = 12

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 819.8.
Std. Dev. = 469.1.
2300: c = 0.9293
tabl = 0.546.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.907
Critical = 0.876
The distribution, after removal of suspect val-ue, was found to be nor-mally distributed.

Constituent: Total Dissolved Solids Analysis Run 11/6/2019 3:09 PM

Shiras Client: GEI Data: Shiras Database