Second Annual Coal Combustion Residuals Groundwater Monitoring and Corrective Action Report 2018

Prepared for: Marquette Board of Light & Power Shiras Steam Plant

> Project No. 180827 January 23, 2019









Fishbeck, Thompson, Carr & Huber, Inc. engineers | scientists | architects | constructors



Groundwater Monitoring System Certification

Certification Statement 40 CFR 257.93 (f)(6) – Statistical Approach for Evaluation of Groundwater Monitoring Data for CCR Management Area

CCR: MBLP: Shiras Steam Plant; Holding Pond

I, Stephen J. MacDonald, a professional engineer licensed in the State of Michigan, hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification is prepared in accordance with the accepted practice in engineering.

The Shiras Steam Plant CCR unit is located adjacent to the northern border of the Shiras Steam plant. The CCR rule groundwater monitoring system requirement is addressed by a single unit system consisting of two upgradient (background) and three downgradient monitoring wells. To my best knowledge, the location and depth of these wells yield groundwater samples that accurately represent: the quality of the background groundwater that has not been affected by leakage from the CCR unit; and groundwater passing the waste boundary of the CCR unit and monitoring all potential contaminant pathways.

Through this document, I certify that the groundwater monitoring system designed and constructed in 2017 for the above CCR unit and redeveloped in 2018 (as described in the Second Annual CCR Groundwater Monitoring and Corrective Action Report 2018), meets the requirements of CFR 257.91.

Stephen J. MacDonald, PE

Senior Environmental Engineer

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Date: January 23, 2019



Statistical Methods Certification

Certification Statement 40 CFR 257.93 (f)(6) – Statistical Approach for Evaluation of Groundwater Monitoring Data for CCR Management Area

CCR: MBLP: Shiras Steam Plant; Holding Pond

I, Stephen J. MacDonald, a professional engineer licensed in the State of Michigan, hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification is prepared in accordance with the accepted practice in engineering. I certify, for the above CCR unit, that the statistical approach selected for the groundwater monitoring system, as described in this document, is appropriate and in accordance with CFR 40 257.93(f), as found in the federal regulation CFR 40 257, subpart D - Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments. The statistical method selected to evaluate the groundwater monitoring data for the Shiras Steam Plant is described below, and it complies with the CFR 40 257.93(f)(3), that is, prediction limits were determined from the distribution of the background data and the level of each constituent in each compliance well was compared to the upper tolerance or prediction limit.

Stephen J. MacDonald, PE

Senior Environmental Engineer

Date: January 23, 2019



Statistical Analysis Approach

The selection of a statistical method to evaluate groundwater monitoring data for each specified constituent is required by the United States Code of Federal regulations (CFR), Chapter 40, part 257, subpart D - Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments (the Federal CCR Rule – Section 93 (f).

On behalf of the Shiras Steam Plant, FTCH recommended the following statistical method to be used for the evaluation of the groundwater monitoring data for each specified constituent: 257.93 (f)(3) "A tolerance or prediction interval procedure, in which an interval for each constituent is established from the distribution of the background data and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit."

All statistical analysis was made using recognized and generally accepted methods and the EPA software ProUCL 5.1. (USEPA, 2016) and following USEPA CCR rule, USEPA (2009) and ASTM D6312-17 groundwater statistics guidance.

For that, the statistical analysis process included the following steps:

- Background (upgradient) wells and downgradient wells were determined/confirmed
- The statistical database for the background data was updated
- Detection frequencies in upgradient and downgradient wells were computed
- A Dixon's test was performed to identify potential outliers with a 0.99 confidential level.
- Normality and lognormality tests were performed for the background data (Shapiro-Wilk).
- Based on detection frequency and tests of statistical distribution (normal or lognormal) the prediction limits were calculated.
 - o For detection frequency ≥ 50%, and data Normal in distribution, compute a Normal prediction limit
 - For detection frequency ≥ 50%, and data Lognormal in distribution, compute a Lognormal prediction limit
 - For detection frequency ≥ 50%, and data neither Normal or Lognormal in distribution, compute a nonparametric prediction limit
 - For detection frequency >0% and < 50%, compute a nonparametric prediction limit
 - For detection frequency equal to zero (=0%), compute lab specific prediction limit equal to quantitation limit (= QL)
- Upgradient prediction limits and downgradient wells data were compared and plots were generated.
- Observe any wells which exceed the prediction limits:
 - An initial statistically significant increase (SSI) would be noted if downgradient is greater than background. In that case, the well would be resampled.
 - If the resample would not to exceed the prediction limit, detection monitoring would be resumed
 - If the resample would to exceed the prediction limit, an alternate source demonstration (ASD) would be conducted
- Mann-Kendall Trend Test Analysis was performed for the monitoring wells
- False positive and false negative rates for current upgradient vs downgradient monitoring program was calculated



References

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Second Annual Coal Combustion Residuals Groundwater Monitoring and Corrective Action Report 2018

Prepared For:
Marquette Board of Light & Power
Shiras Steam Plant
2200 Wright Street, Marquette, Michigan

January 23, 2019 Project No. 180827

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List of Abbreviations/Acronyms

ASD Alternative Source Demonstration

bgs Below Ground Surface
CCR Coal Combustion Residuals
CFR Code of Federal Regulations

FTCH Fishbeck, Thompson, Carr & Huber, Inc GWMS Ground Water Monitoring System GWPS Groundwater Protections Standards IGLD85 International Great Lakes Datum of 1985

MBLP Marquette Board of Light & Power MCL Maximum Contaminant Level

NPDES National Pollutant Discharge Elimination System

SDWA Safe Drinking Water Act

SSI Statistically Significant Increase

UPL Upper Prediction Limit



1.0 Introduction

Fishbeck, Thompson, Carr & Huber, Inc. (FTCH), on behalf of Marquette Board of Light & Power (MBLP), has prepared this document to report the groundwater monitoring and corrective action activities conducted in 2018 for the Shiras Steam Plant generating station located at 400 East Hampton Street, Marquette, Michigan; Ash Impoundment WDS ID 478988 (Shiras Steam Plant). This report has been prepared in accordance with 40 Code of Federal Regulations (CFR) Part 257, Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (CCR rule) published in April 17, 2015.

1.1 Regulatory Background

The CCR rule 40 CFR Part 257.90 established standards for the disposal of CCR in landfills and surface impoundments (CCR units). According to this rule, MBLP must prepare an Annual Groundwater Monitoring and Corrective Action Report for the Shiras Steam Plant due by the end of January of each year. The report must document the status of the groundwater monitoring and corrective action program for each CCR unit, summarize key actions completed in the previous year, and project key activities for the upcoming year. As per Part 257.105(h)(1), the prepared annual document must be placed in the facility's operating record. According to Part 257.910 (e), at a minimum, the annual groundwater monitoring and corrective action report must contain:

- A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient identified monitoring wells that are part of the groundwater monitoring program.
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.
- In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the
 number of groundwater samples that were collected for analysis for each background and downgradient
 well, the dates the samples were collected, and whether the sample was required by the detection
 monitoring or assessment monitoring programs.
- A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring, in addition to identifying the constituent(s) detected at a statistically significant increase over background levels).
- Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.

The following sections of this annual report cover these requirements for the calendar year 2018.

1.2 Facility Location and Operational History

The Shiras Steam Plant was built in 1967 and it is located at 400 East Hampton Street, in Marquette, Michigan, along the shoreline of Lake Superior. The plant has one CCR surface impoundment (aka, holding pond), which is located north of the generating station. It was originally built in 1981 and improvements were completed in 1990 and 2013. The plant and holding pond locations are shown on Figure 1. Presently, the plant has three coal-fired, power-generating units:

- Unit 1 Built in 1967, capability of 10 megawatts, currently out-of-service with no plans to re-commission.
- Unit 2 Built in 1972, capability of 21 megawatts, currently off-line.
- Unit 3 Built in 1983, capability of 44 megawatts, currently in cold standby.



1.3 CCR Unit Description

The holding pond is composed of five cells, which are enclosed by steel sheet pile walls. The south and west boundaries are formed by the shoreline of Lake Superior, while the east and north boundaries are formed by sheet pile walls which were constructed in 1981. The walls for the inner cells 1, 2, and 3 were constructed in 1990. An additional wall was constructed in the north boundary to replace the existing wall in 2013. The new wall was placed inside of the existing north wall, which remains in place but does not provide control. There are also some other abandoned sheet pile walls in place from previous configurations. The holding pond is operated as a zero-discharge facility during normal conditions meaning water does not typically discharge to Lake Superior. All process water and precipitation were discharged to the pond by sluicing. Water was pumped from the pond to a reuse storage tank or recirculated to the plant. No water was discharged to Lake Superior during 2018.

The normal operating level of the holding pond varies but is approximately 606.0 feet International Great Lakes Datum of 1985 (IGLD85). The ordinary high-water surface elevation of Lake Superior is 603.1 feet. During emergency situations, an overflow of 607.4 feet, which is regulated via a NPDES permitted outfall (#004A), discharges water from the holding pond through the east wall directly into Lake Superior. The north and east perimeter sheet pile walls have a top elevation of 609 feet.

1.4 Physical Setting and Geology

The site is located in the Peshekee Highlands portion of the Superior Bedrock Uplands physiographic province. The region is described by the Michigan Geological Survey (MGS) as of high elevation, largely bedrock-controlled landscapes, which have been modified by glacial scour and deposition with areas of high hills and low mountains formed on bedrock (Bedrock-controlled landscape of high relief and irregular topography and glacially-eroded bedrock knobs and drift-filled valleys). Peshekee Highlands are the highest elevation area in Michigan (MGS, 2013). According to the Bedrock geologic map available at the Natural Features and Resource Maps of the Marquette County, the bedrock in this region is characterized as Archean volcanic and sedimentary, of the Precambrian age (Marquette County, 2013). As described in last year's annual report (Marquette Board of Light and Power, 2017), the depth to bedrock around the site is variable and can be seen as outcrops in some areas, while in other areas depth to bedrock is estimated to be 100 to 150 feet below ground surface (bgs). At the site, this bedrock is located at approximately 40 feet bgs.

The surficial soils in the region are generally well-drained. Shallow soils are present in uplands while poorly drained soils and Histosols are present in lowlands. Many upland soils have a thin loess cap and most parent materials are sandy. The hydrology of the region is Major Upland of the Western Upper Peninsula, forming regional drainage dividing many lakes and few through-flowing streams. The region accumulates heavy snow in the winter. Pre-settlement vegetation is primarily sugar maple-hemlock forest on uplands and conifer swamp in lowlands. The use of the land in the region is mostly forest with patches of open land. Two large iron mines are in operation in the southeast part of the Peshekee Highlands region (MGS, 2013).

2.0 Groundwater Monitoring and Corrective Action Process Overview

The groundwater monitoring and corrective action process is described in Parts 257.90 through 257.98 of the CCR rule. This annual CCR Groundwater Monitoring and Corrective Actions Report is developed as required by section 257.90 (e).



Groundwater monitoring is performed using a network of monitoring wells (groundwater monitoring system) that includes wells monitoring background (non-impacted area by the CCR unit) and wells downgradient boundary of the CCR unit. The first phase of groundwater monitoring is the Detection Monitoring phase, which focuses on a set of constituents (listed in Appendix III of the CCR rule) that are the more mobile components of CCR and represent indicators of possible impacts from CCR in groundwater.

According to CCR 257.94(e) and 257.93(h), if a facility determines there is a statistically significant increase (SSI) over background levels for one or more constituents within 90 days of detecting an SSI, the facility will establish an Assessment Monitoring Program (second phase) and/or demonstrate an alternative explanation for the exceedance. Alternate explanations could include the existence of a source other than the CCR Unit that could have caused the SSI; the SSI resulted from errors in sampling, analysis, or statistical evaluation; and natural variation in groundwater quality. The owner/operator of the CCR must complete and produce a written document (Alternative Source Demonstration [ASD]) that must be certified by a qualified professional engineer, and the CCR unit may continue with detection monitoring. The facility must also include the ASD in the annual groundwater monitoring and corrective action report required by CCR 257.90(e), in addition to certification by a qualified professional engineer. If the SSI is identified and cannot be attributed to an ASD, the facility must begin assessment monitoring for the CCR Unit. Per the CCR Rule, assessment monitoring must begin within 90 days of identification of an SSI that is not attributed to an alternative source and include the Appendix IV constituents in accordance to CCR 257.95(b).

The second phase of groundwater monitoring focuses on the constituents listed in Appendix IV of the CCR rule. The Appendix IV constituents generally are less mobile and occur at lower concentrations in groundwater than the Appendix III constituents. Concentrations of Appendix IV constituents in downgradient wells are compared to the higher of either the federal Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) or the background concentration for each constituent.

The monitoring process counts on appropriate sampling locations (wells), baseline data, and statistical methods to establish local background concentrations of the constituents in both Appendices III and IV and to compare the concentrations in downgradient wells to background and/or MCLs.

If exceedances are determined to be occurring in the downgradient boundary wells at statistically significant levels, and no alternative sources for the exceedances can be demonstrated, then both additional groundwater characterization and Assessment of Corrective Actions are initiated. According to the CCR rule, groundwater corrective action will continue until compliance with the Groundwater Protections Standards (GWPS) has been attained in all impacted wells and sustained for a period of 3 consecutive years.

3.0 Groundwater Activities in 2018

In January 2018, the MBLP completed the first Annual Groundwater Monitoring and Corrective Action Report for the 2017 activities. The data in this report showed an SSI in the Appendix III parameter pH at MW-2 and MW-3 over the background (Marquette Board of Light and Power, 2017). According to CCR 257.94 (e)(2), "The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality." To address the observed SSI for pH, MBLP completed an ASD after the redevelopment of all five wells belonging to the groundwater monitoring system on May 30, 2018. Also, as required by 257.90 (e), monitoring data was collected in May and September 2018 for the annual CCR Groundwater Monitoring and Corrective Actions Report developed for the year 2018.



This report summarizes the activities completed in 2018, including reporting of the ASD study and the analytical results and statistical analysis of the semi-annual sampling events executed at the groundwater well system of the MBLP holding pond shown on Figure 2. These activities were completed in support of the CCR rule and are described below.

3.1 Monitoring Wells Redevelopment and Alternative Source Demonstration

The monitoring well network, installed in 2017, meets the requirement for a groundwater monitoring system in the CCR rule 40 CFR Part 257.91. The network includes the minimum required three downgradient monitoring wells because of the small size of the CCR unit. Although all monitoring wells were reported to be in excellent condition on October 2017, the detection of an SSI for pH during the annual report raised questions on whether the well conditions could be interfering with the pH, in which case it would possibly explain the SSI for pH observed during the monitoring event of 2017.

The redevelopment activities were originally scheduled to begin in April 2018; however, ice present surrounding the downgradient wells located in Lake Superior prevented safe access to complete the work. The MDEQ agreed with postponing sampling until the wells could be accessed safely.

The redevelopment of the holding pond well system occurred on May 30, 2018, and it was executed by FTCH staff. Prior to redevelopment activities, static water levels were collected from monitoring wells MW-1 through MW-5 and the data was used to calculate groundwater elevations. During redevelopment, pH values were monitored for stabilization. The pH data obtained during redevelopment of the wells and at the semi-annual groundwater sampling event 24 hours after the redevelopment, were added to the existing pH database and used to develop the ASD study.

The ASD study was submitted on September 5, 2018, and a copy of the document is included in Appendix A. Details on the process and results obtained in the redevelopment and ASD study are summarized in Section 4.0 below.

3.2 Groundwater Monitoring Events for 2018

The semi-annual groundwater monitoring events for the reporting period of 2018 included groundwater level measurements and sample collection for all five wells on May 31, 2018, and September 20, 2018. Equipment calibration, monitoring well water level measurement, monitoring well purging and sampling documentation are provided in Appendix B. Laboratory data reports and data validation reports for both the May and September 2018 monitoring events are provided in Appendix C. The sampling, analysis, and results of these sampling events are summarized in section 5.0 below.

4.0 Alternative Source Demonstration Investigation

To address the SSI for pH observed in 2017, the MBLP holding pond well system was redeveloped on May 30, 2018, by FTCH staff. These included monitoring wells MW-1, MW-2, and MW-3, located downgradient of the holding pond, as well as monitoring wells MW-4 and MW-5, installed upgradient of the holding pond. The first semi-annual monitoring event occurred on May 31, 2018, and that data was also used to verify the success of the monitoring well redevelopment activities for the ASD investigation.

The groundwater elevation data, collected prior to redevelopment activities, were contoured and are shown on Figure 3 of Appendix A. As depicted on the figure, groundwater flows toward the east and Lake Superior with groundwater elevations ranging from approximately 609 feet, IGLD85 on the upgradient (southwest) side to



approximately 605 feet, IGLD85 on the downgradient (northeast) side of the holding pond. These conditions are consistent with those anticipated for long-term monitoring of the CCR unit and with the assignment of background and downgradient monitoring locations.

The pH data, obtained during the semi-annual monitoring event 24 hours after redevelopment, were added to the existing pH database and used in combination with the baseline data collected in 2017 for statistical analyses of the ASD.

Historical downgradient data for pH (MW-1, MW-2, and MW-3) were compared with the prediction limit calculated for the updated background data (6.782-8.303). All three monitor wells measured following the redevelopment (on May 31, 2018), were within the acceptable limits calculated for background (MW-1 = 7.62, MW-2 = 7.88, and MW-3 = 8.07). Thus, at that time, previous well conditions seemed to explain the SSI for pH observed during the monitoring event of 2017. Because no other Appendix III constituent exhibited an SSI in the 2017 monitoring event, the variation in pH data was considered to some extent a potential indicator of natural variation.

Overall, the ASD document re-assessed the potential SSI of pH for the downgradient wells MW-2 and MW-3 at the Shiras Steam Plant. Based on the statistical study executed after the redevelopment of the wells, previous well conditions explained the SSI. As no SSI was noted after redeveloping the wells, it was established that the 2018 monitoring program report was only required to cover Appendix III parameters in both sampling events. The complete ASD document is attached in Appendix A.

5.0 Groundwater Sampling and Analysis for 2018

On both May 31, 2018, and September 20, 2018, all five monitoring wells from the holding pond were sampled for the Detection Monitoring Program (Appendix III, CCR Rule) parameters (Boron, Calcium, Chloride, Fluoride, pH, Sulfate, and Total Dissolved Solids). The upgradient wells were opened to allow for equilibration and an electronic water level meter was used to collect depth to water measurements to the nearest tenth of a foot prior to well purging. The measured water levels were used to calculate groundwater elevations at each monitoring well. The groundwater elevation data were contoured and are shown on Figure 3. The groundwater flow direction is toward the east and Lake Superior, consistent with previous monitoring events.

Groundwater sampling was completed at each well using low-flow procedures using a peristaltic pump. New polyethylene and silicone tubing were used at each sampling location. Wells were purged at a low-flow rate (100-300mL/min). Purge water was collected into 5-gallon buckets and transferred to the holding pond for disposal. A YSI Inc. Pro Plus handheld instrument with an in-line, flow-through cell was used to measure field parameters including pH, temperature, specific conductivity, oxidation reduction potential (ORP), and dissolved oxygen (DO). Turbidity was measured using a LaMotte 2020we turbidimeter. Readings were recorded on low-flow sampling forms. Groundwater sample documentation is provided in Appendix B.

Once the groundwater quality parameters had stabilized (+/- 0.1 SU over 3 consecutive readings), groundwater samples were collected. The tubing was disconnected from the flow-through cell, and the samples were collected directly from the sample tubing into pre-preserved laboratory containers. Bottles were labeled with the site name, sample identification, analysis type, preservation method, and date and time of collection before being placed immediately into a cooler of ice. Groundwater samples were transferred, under chain of custody procedures, to TestAmerica Laboratories (North Canton, OH), a certified laboratory for analysis of Appendix III constituents. Laboratory analytical and data validation reports for the May and September 2018 sampling events are provided in Appendix C. Cumulative analytical results are summarized in Table 1.

Please note that samples were also collected and analyzed for Appendix IV parameters on May 31, 2018, to provide additional data for the assessment in the event that the statistical analysis demonstrated any Appendix



III exceedance. Since statistical analyses of Appendix III data did not demonstrate any such exceedance, the Appendix IV data was not utilized in the statistical evaluation. This analytical data is provided in Appendix C (Laboratory Analytical and Data Validation Reports).

6.0 Statistical Analysis

Statistical analyses were completed using the latest version of ProUCL 5.1 software developed by the USEPA (USEPA, 2016) and following USEPA CCR rule, USEPA (2009) and ASTM D6312-17 groundwater statistics guidance. All analyses for the background and downgradient groundwater results are presented in Appendix D.

Initially, the detection frequencies for all wells were computed (Table 1 of Appendix D). A Dixon's test was performed to identify potential outliers with a 0.99 confidence level. Regarding the new and historical data for the background, the Total Dissolved Solids value of 2,300 mg/L for background data (MW-5 sample from 9/28/2017) was identified as potential outlier. Still, this value was kept in the data set because its potential to be an outlier was not confirmed. Table 2 of Appendix D presents the Shapiro-Wilk test of normality for the background data. Field pH background data was classified as normal, total calcium was classified as lognormal and all other parameters from Appendix III were classified as nonparametric. Following that, upper prediction limits were calculated for each parameter based on the shape of the distribution of the background data (MW-4 and MW-5) and lower prediction limit was calculated for pH only (Table 3 of Appendix D).

Historical downgradient data for pH (MW-1, MW-2, and MW-3) were compared with the prediction limits calculated for the updated background data. Although some historical values were in exceedance when compared to the prediction limits calculated for 2018, when the background upper limits were compared the most recent concentrations (2018) of the compliance wells (MW-1, MW-2, and MW-3), no SSI above background occurred.

Time series plots of the Appendix III parameters were created for all monitoring wells (Attachment B of Appendix D). Overall, significant variability (either increase or decrease) was observed both upgradient (MW-4 and MW-5) and downgradient (MW-1, MW-2, and MW-3) for calcium, chloride, pH-field, sulfate, and total dissolved solids. This variability in both upgradient and downgradient wells signals a natural variation in groundwater. Upgradient vs. downgradient prediction limit comparison plots (Attachment C of Appendix D) were also generated and they showed that currently there are no SSIs for wells MW-1, MW-2, and MW-3 for any of the Appendix III parameters.

7.0 Anticipated Future Activities

Based on the analytical results and statistical analysis of the 2018 data, the following actions are anticipated:

- It is FTCH's understanding that the plant has ceased power generation activities and has since placed Unit 3 into Long Term Cold Storage. Therefore, FTCH recommends the following:
 - Prepare and submit a Surface Impoundment Closure Plan for the closure of the CCR surface impoundment. The closure plan is required under Title 40, Code of Federal Regulations (40 CFR) Part 257.101 and detailed in 40 CFR Part 257.102.
 - Implement the closure plan.
- In the event that the CCR material is closed in-place, a post closure plan including groundwater monitoring for a period of 30 years may be needed (40 CFR 257.104).



8.0 References

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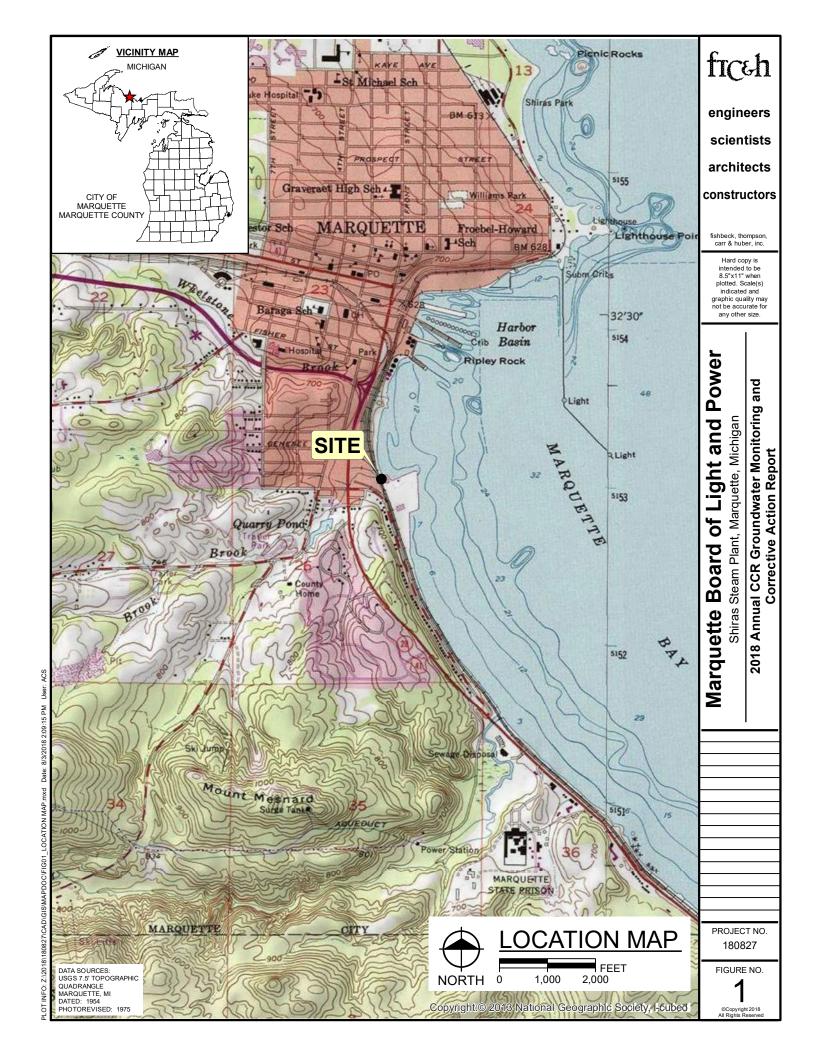
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- ASTM D6312-17, 2017. Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs at Waste Disposal Facilities, 15 p.

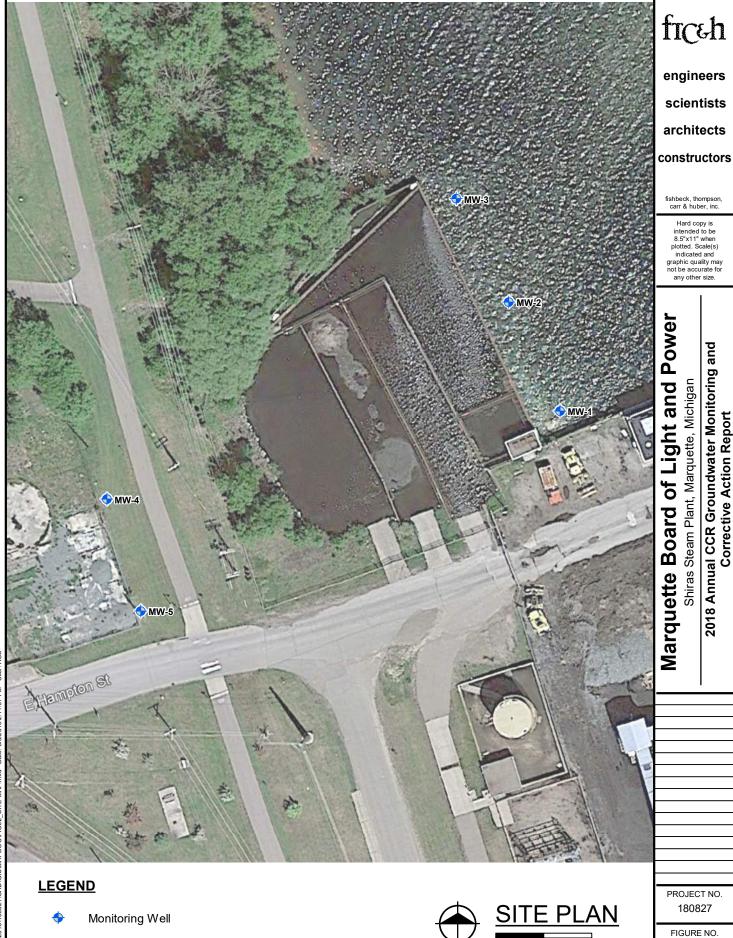


9.0 Certification

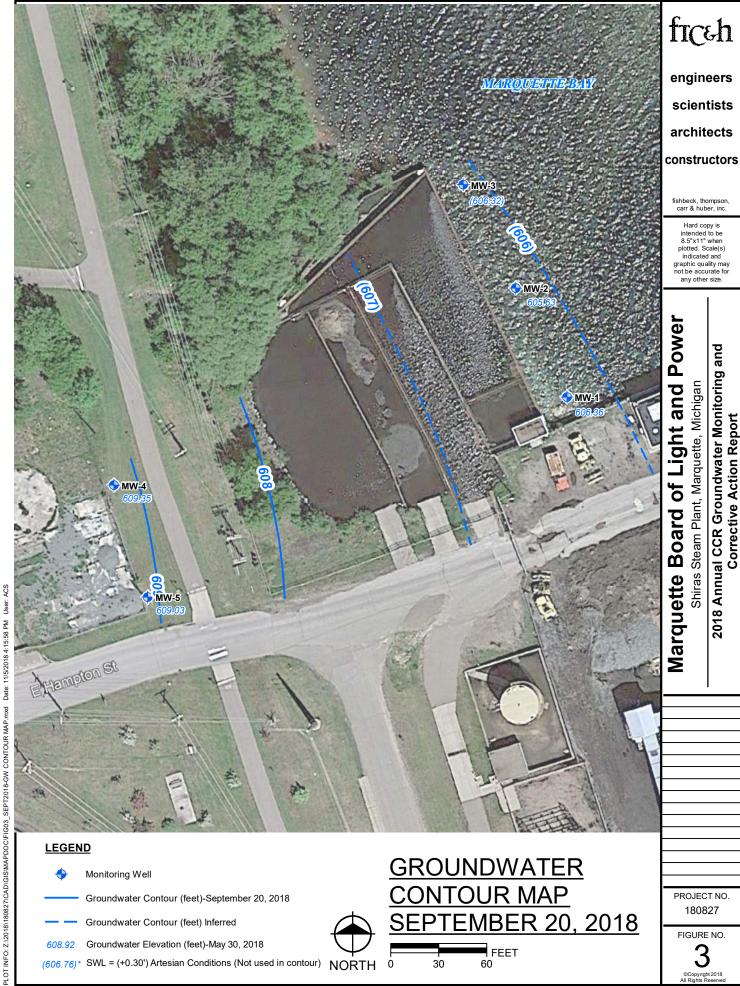
See attached Groundwater Monitoring System and Statistical Methods Certifications at the beginning of this report.

Figures





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(606.76)* SWL = (+0.30') Artesian Conditions (Not used in contour) NORTH

Corrective Action Report

Tables

Table 1 - Cumulative Analytical Data Summary

Marquette Board of Light and Power

Shiras Steam Plant

September 2018

September 2018 Lab Suite: CCR Appendix III									CCR Appendix IV																		
Parameter:				Boron	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 228 Combined	Radium 226	Radium 228	Selenium	Thallium
				4	/1	,	/	/1	(TDS)	CII	/1	-	4	/	4	/1	/	/1	11		/1	,,	0:1	0:1	6: //	/1	4
Units: U.S. EPA MCL:				μg/L <i>NE</i>	μg/L <i>NE</i>	mg/L <i>NE</i>	mg/L 4.0	mg/L <i>NE</i>	mg/L <i>NE</i>	SU NE	μg/L 6.0	μg/L 10	mg/L 2.0	μg/L 4.0	μg/L 5.0	μg/L 100	μg/L <i>NE</i>	mg/L 4.0	μg/L 15	μg/L <i>NE</i>	μg/L 2.0	μg/L <i>NE</i>	pCi/L 5.0	pCi/L <i>NE</i>	pCi/L <i>NE</i>	μg/L 50	μg/L 2.0
U.S. EPA IVI	LL.	Collection		INE	INE	INE	4.0	INE	INE	INE	0.0	10	2.0	4.0	5.0	100	INE	4.0	15	INE	2.0	IVE	3.0	INE	IVE	30	2.0
Location	Well ID	Date	Duplicate																								
	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 09/14/17		300 U 300 U	130,000 110,000	270 290	0.10 U 0.10 U	21 22	930 980	7.56 7.60	2.0 U 2.0 U	5.0 U 5.0 U	0.13 0.13	1.0 U 1.0 U	1.0 U 1.0 U	10 U 10 U	20 U 20 U		3.0 U 3.0 U	10 U	0.20 U 0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U 1.00 U	1.00 U 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		09/14/17		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	Х	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	Х	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																	
	MW-2	07/19/17 07/24/17		300 U 300 U	51,000 63,000	60 59	0.38 U 0.38 U	22 21	220 350	8.41 8.09	2.0 U 2.0 U	5.0 U 5.0 U	0.10 U 0.10 U	1.0 U 1.0 U	1.0 U 1.0 U	10 U 10 U	20 U 20 U		3.0 U 3.0 U	10 U	0.20 U 0.20 U	50 U 50 U	1.00 U 1.56	1.00 U 1.00 U	1.00 U 1.56	5.0 U 5.0 U	2.0 U 2.0 U
		08/23/17		300 U	51,000	62	0.38 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	Х	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 74 J	61,000	65 86	0.10 U	21	310 330	7.99	2.0 U 2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U	0.055	3.0 U 1.0 U	10 U 5.9 J	0.20 U	50 U	1.00 U	1.00 U 0.204 U	1.00 U	5.0 U	2.0 U 1.0 U
ient		05/31/18 05/31/18	Х	74 J 75 J	68,000 70,000	86	0.056 0.057	31 31	330	8.0 8.0	2.0 U	0.84 J 1.0 J	0.073 0.072	1.0 U 1.0 U	1.0 U 1.0 U	2.2 1.7 J	0.38 J 0.38 J	0.055 0.055	1.0 U	6.0 J	0.20 U 0.20 U	1.1 J 5.0 U	0.519 0.299 U	0.204 0	0.315 U 0.106 U	5.0 U 5.0 U	1.0 U
grad		09/20/18		55 J	64,000	85	0.058	29	310	8.0																	
w B	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
۵		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 25	380 380	7.77 7.85	2.0 U 2.0 U	5.0 U	0.10 U	1.0 U 1.0 U	1.0 U	10 U	20 U 20 U		3.0 U 3.0 U	10 U	0.20 U 0.20 U	50 U 50 U	1.05	1.00 U 1.00 U	1.05	5.0 U 5.0 U	2.0 U 2.0 U
		09/14/17 09/14/17	X	300 U 300 U	57,000 56,000	83 84	0.10 U 0.10 U	25	380	7.85	2.0 U	5.0 U 5.0 U	0.10 U 0.10 U	1.0 U	1.0 U 1.0 U	10 U 10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.17 1.00 U	1.00 U	1.17 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											-						
	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	V	300 U	89,000	220	0.38 U	18	730	7.86	2.0 U	5.0 U 5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U 20 U		3.0 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 2.0 U
		07/24/17 08/23/17	^	300 U 300 U	89,000 100,000	230 300	0.38 U 0.10 U	19 24	710 830	7.86 7.93	2.0 U 2.0 U	5.0 U	0.10 U 0.10 U	1.0 U 1.0 U	1.0 U 1.0 U	10 U 10 U	20 U		3.0 U	10 U	0.20 U 0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U 1.00 U	1.00 U 1.00 U	5.0 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	0.22	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 09/20/18		120 110	130,000 130,000	450 450	0.23 0.23	42 42	1,000 970	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	Х	110	130,000	450	0.23	42	1,000	7.7																	
	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	Χ	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
nt		08/23/17	Х	300 U	110,000	190	0.10 U	19	620 750	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
adie		08/29/17 09/06/17		300 U 300 U	110,000 100,000	190 190	0.10 U 0.10 U	18 18	750 660	6.76 7.43	2.0 U 2.0 U	5.0 U 5.0 U	0.12 0.11	1.0 U 1.0 U	1.0 U 1.0 U	10 U 10 U	20 U 20 U		3.0 U 3.0 U	10 U	0.20 U 0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U 1.00 U	1.00 U 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
pgr		09/06/17	Х	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																	

Table 1 - Cumulative Analytical Data Summary

Marquette Board of Light and Power

Shiras Steam Plant September 2018

September 2018									CCD Assendiv IV																	
Lab Suite: CCR Appendix III								CCR Appendix IV																		
Paramete	er:		Boron	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids (TDS)	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 228 Combined	Radium 226	Radium 228	Selenium	Thallium
Units:	Jnits: μg/L μg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L m				mg/L	SU	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 I	U.S. EPA MCL: NE			NE	NE	4.0	NE	NE	NE	6.0	10	2.0	4.0	5.0	100	NE	4.0	15	NE	2.0	NE	5.0	NE	NE	50	2.0
Location	Well ID	Collection Duplicat	e																							
	Equipment	07/20/17	300 U	1,000 U	10 U	0.38 U	2.5 U	10 U	8.05	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	1.24	1.00 U	1.24	5.0 U	2.0 U
	Blank	07/24/17	300 U	1,000 U	10 U	0.38 U	2.5 U	10 U	7.94	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	1.03	1.00 U	1.03	5.0 U	2.0 U
		08/29/17	300 U	1,000 U	10 U	0.10 U	1 U	10 U	NA	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
gc		09/06/17	300 U	1,000 U	10 U	0.10 U	1 U	10	NA	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	1,000 U	10 U	0.10 U	1 U	10 U	NA	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	1,000 U	10 U	0.10 U	1 U	10	NA	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	1,000 U	10 U	0.10 U	1 U	18	NA	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

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

Appendix A

Monitoring Well Development Alternative Source Demonstration

Marquette Board of Light and Power 400 East Hampton Street, Marquette, Michigan

Project No. 180827 September 5, 2018



Fishbeck, Thompson, Carr & Huber, Inc. engineers | scientists | architects | constructors



Monitoring Well Development Alternative Source Demonstration

Prepared For:
Marquette Board of Light & Power
400 East Hampton Street, Marquette, Michigan

September 5, 2018 Project No. 180827

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List of Abbreviations/Acronyms

ASD Alternative Source Demonstration

CCR Coal Combustion Residuals

FTCH Fishbeck, Thompson, Carr & Huber, Inc

GOF good of fitness

MBLP Marquette Board of Light & Power SSI statistically significant increase

UPL upper prediction limit



1.0 Introduction

Fishbeck, Thompson, Carr & Huber, Inc. (FTCH) on behalf of Marquette Board of Light & Power (MBLP) has prepared this Alternative Source Demonstration (ASD) for the Shiras Steam Plant generating station located at 400 East Hampton Street, Marquette, Michigan; Ash Impoundment WDS ID 478988 (Shiras Steam Plant). This document provides a description of the redevelopment of the five monitoring wells located at the Shiras Steam Plant, pH data collected during and after well redevelopment, and the statistical analysis used to determine if the statistically significant increase (SSI) in pH for monitoring wells MW-2 and MW-3 (reported in the 2017 annual monitoring report) may be a result of a source(s) other than the Coal Combustion Residuals (CCR) unit. This report has been prepared in accordance with 40 Code of Federal Regulations (CFR) Part 257, Disposal of Coal Combustion Residuals from Electric Utilities (CCR rule) published in April 17, 2015.

2.0 Summary of Previous Investigations and Regulations Background

The Shiras Steam Plant is located at 400 East Hampton Street, in Marquette, Michigan, along the shoreline of Lake Superior, as shown on Figure 1. The Shiras Steam Plant has one CCR surface impoundment (aka holding pond) located north of the generating station. In January 2018, the MBLP completed the Annual Groundwater Monitoring and Corrective Action Report, which documented the 2017 activities in accordance with the CCR 257.90(e), including data from monitoring wells shown on Figure 2. According to the report, the Shiras Steam Plant Site data showed an SSI in the Appendix III parameter pH at MW-2 and MW-3 over the background (Marquette Board of Light and Power, 2017).

According to CCR 257.94(e) and 257.93(h), if a facility determines there is an SSI over background levels for one or more constituents within 90 days of detecting an SSI, the facility will establish an Assessment Monitoring Program and/or demonstrate an alternative explanation for the exceedance. Alternate explanations could include the existence of a source other than the CCR Unit that could have caused the SSI; the SSI resulted from errors in sampling, analysis, or statistical evaluation; and natural variation in groundwater quality. The owner/operator of the CCR must complete and produce a written document (ASD) that must be certified by a qualified professional engineer, and the CCR unit may continue with detection monitoring. The facility must also include the ASD in the annual groundwater monitoring and corrective action report required by CCR 257.90(e), in addition to certification by a qualified professional engineer.

If the SSI is identified and cannot be attributed to an ASD, the facility must begin assessment monitoring for the CCR Unit. Per the CCR Rule, assessment monitoring must begin within 90 days of identification of an SSI that is not attributed to an alternative source and also include the Appendix IV constituents in accordance to CCR 257.95(b).

3.0 Objective

To support collection of high quality data to address CCR 257.94 (e)(2), redevelopment of the existing five monitoring wells (MW-1 through MW-5) for pH was proposed. The objective of this report is to document the redevelopment of these wells and determine if an alternative source other than the CCR unit, previous well conditions, errors, or natural variation in groundwater quality can explain the SSI in pH for MW-2 and MW-3 over the background. According to CCR 257.94 (e)(2), "The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or



that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality." The current ASD investigated the following lines of evidence:

- Well conditions may affect pH readings. Redeveloping the wells could improve sampling conditions for more representative field parameters measurements.
- There is inherent error present in the equipment used to measure pH in the field.
- There is natural variation within pH ranges from both background wells (MW-4 and MW-5) and downgradient monitoring wells (MW-1, MW-2 and MW-3).

4.0 Alternative Source Demonstration Investigation

4.1 Well Redevelopment and Re-Evaluation of the Data

Redevelopment activities were originally scheduled to occur during April 2018; however, ice present in the area of the wells prevented safe access to complete the work. The delay in access to the monitoring wells was communicated to the Michigan Department of Environmental Quality (MDEQ) in an email from Mr. John Schultz (MBLP) on April 16, 2018. Ms. Margie Ring, MDEQ State Solid Waste Engineering Coordinator, responded via email that the MDEQ was in agreement with postponing sampling until the wells could be accessed safely. Ms. Ring recommended documenting the delay in the monitoring report if the samples were not collected by April 30, 2018.

Monitoring well redevelopment activities were executed on May 30, 2018, at all five wells within the monitoring network. Prior to redevelopment activities, static water levels were collected from monitoring wells MW-1 through MW-5 and the data was used to calculate groundwater elevations. The groundwater elevation data was then contoured and is shown on Figure 3. As depicted on Figure 3, groundwater flows toward the east and Lake Superior. During redevelopment, pH values were monitored for stabilization (+/- 0.1 SU over 3 consecutive readings) using a YSI Inc. Pro Plus handheld instrument containing a pH meter probe. The pH values were recorded on field documentation forms provided in Appendix A. Statistical analysis was completed on background and downgradient groundwater pH data. As established in the 2017 annual groundwater report, an inter-well approach was considered appropriate for statistical analysis, as the groundwater monitoring system for the WDS ID 478988 unit contains two upgradient (MW-4 and MW-5) and three downgradient wells (MW-1, MW-2, and MW-3 in Lake Superior), which were installed in the uppermost aquifer.

The pH data, obtained during redevelopment of the wells and 24 hours after redevelopment, were added to the existing pH database. The new pH data, except for pH data collected during redevelopment, were used in combination with the baseline data collected in 2017 for statistical analyses of the ASD. The redevelopment pH data was not used because this data is not representative of undisturbed steady-state conditions. All statistical evaluations were completed using the latest version of ProUCL 5.1 software developed by the USEPA (USEPA, 2016).

Initially, the detection frequencies for all wells were computed (Table 1). To establish the prediction limit, historical data and pH measurements collected 24 hours after the redevelopment for MW-4 and MW-5 were used for background calculations. To check for outliers, background data was plotted on a box plot, histogram, and Q-Q plot for a visual assessment of potential outliers followed by the calculations of the Dixon's outlier test (Appendix B). No outliers were detected with a one percent significance level. A good of fitness (GOF) test was used to determine the statistical distribution of the background data; to verify whether the dataset is normal, gamma, lognormal or nonparametrically distributed. The background dataset was identified to be normally distributed (Appendix C). The upper and lower prediction limit were calculated based on normal distribution and



results are shown on Table 2 (additional calculations executed by ProUCL regarding prediction limits are shown on Appendix D).

Historical downgradient data for pH (MW-1, MW-2, and MW-3) were compared with the prediction limit calculated for the updated background data (6.782-8.303) and are shown on Table 3. Among the data tested, only one measurement at MW-2 exceeded the updated prediction limit. This measurement was from the first sampling event on July of 2017 (pH = 8.41), which should not be a concern since many other measurements were taken afterwards. As discussed above, the redevelopment pH data was not used for statistical analysis due to the nature of redeveloping wells, which include mixing solutions, solids, and minerals to clean up the well. These unstable conditions, noticeable by the variability in values observed on each well throughout the redevelopment event, are not representative of undisturbed steady-state conditions. For that reason, the pH measurement collected 24 hours following redevelopment better represents the parameter in these wells. All three monitor wells' measurements, following the redevelopment (on May 31, 2018), were within the acceptable limits calculated for background (MW-1 = 7.62, MW-2 = 7.88 and MW-3 = 8.07). Thus, at this time, previous well conditions seem to explain the SSI for pH observed during the monitoring event of 2017. Figures 4, 5, and 6 display the Upgradient vs. Downgradient analysis for MW-1, MW-2, and MW-3.

4.2 Evaluation of Inherent Error

The potential of errors due to the calibration of the measurement instrument and the inherent error present due to accuracy limits of the instrument were also evaluated. An investigation of the field forms was conducted to verify if the calibration drifted throughout the course of the sampling event, if adequate amount of groundwater was withdrawn to obtain a representative sample from each monitoring well, and if pH readings were allowed to stabilize prior to sample collection. Additionally, the accuracy limitations of the instrument used to measure pH was assessed and compared to the baseline upper prediction limit (UPL) to ascertain if the margin of error for the pH measurements in questions is below UPL.

Investigation of the field notes/calibration forms showed little drift in pH value (7.06, 7.02 and 7.04 over the course of the day) and reported an adequate amount of water was used to obtain representative pH measurements; thus, these lines of evidence would not be able to explain the SSI for pH in MW-2 and MW-3. Regarding accuracy limitations of the instrument used to measure pH, the instrument manual reports an accuracy of ± 0.2 (YSI, 2011). By accounting for the equipment accuracy, all pH values measured using this instrument during redevelopment and 24h after the redevelopment event would be actually ± 0.2 S.U.

4.3 Evaluation of Natural Variation

Because no other Appendix III constituent exhibited an SSI in the 2017 monitoring event, the variation in pH data may be indicative of natural variation. Trend analysis of pH was executed using the Mann-Kendall test on ProUCL and results are shown on Appendix E. The purpose of the Mann-Kendall (MK) test (Mann 1945, Kendall 1975, Gilbert 1987) is to statistically assess if there is a monotonic upward or downward trend of the variable of interest over time. Similar to background, both MW-2 and MW-3 had insufficient evidence to identify a significant trend at the 0.01 level of significance (confidence coefficient 0.99).

5.0 Conclusions and Recommendations

- 24 hours after redevelopment of the wells, values greater than the prediction limit, set based on current background data, were not observed in MW-2 and MW-3.
- Based on the data, previous well conditions explain the evidence of SSI for pH previously reported.



There is insufficient evidence to identify a significant increasing trend for pH at MW-2 and MW-3, this
indicates that, to some extent, any difference between background field pH and downgradient may be
naturally-occurring.

This ASD documents the re-assessment of the potential SSI of pH for the downgradient wells MW-2 and MW-3 at the Shiras Steam Plant. Based on all above, especially the statistical study executed after the redevelopment of the wells, previous well conditions explain the SSI. As no SSI was noted after redeveloping the wells, the 2018 monitoring program report will cover Appendix III parameters exclusively.

6.0 Monitoring Schedule

Following the ASD study, two monitoring events are expected for the 2018 annual report. The first monitoring event occurred in May 31, 2018 (only pH data shown in this document) and the second sampling event is expected to occur in September 2018. The annual report will be submitted in January 2019 and, based on this ASD, the report will only include Appendix III parameters.

7.0 References

Marquette Board of Light and Power, 2017. First Annual CCR Groundwater Monitoring and Corrective Action Report 2017.

YSI, 2011. Professional Plus Water Quality Instrument - Specifications

USEPA, 2016. ProUCL Version 5.1 User Guide - Statistical Software for Environmental Applications for Data Sets with and without Non-detect Observations. https://www.epa.gov/sites/production/files/2016-05/documents/proucl_5.1_user-guide.pdf, accessed in July 2018.

8.0 Certification

I, Stephen J. MacDonald, a qualified professional engineer, certify that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the CCR ash Impoundment WDS ID 478988 at the Shiras Steam Plant.

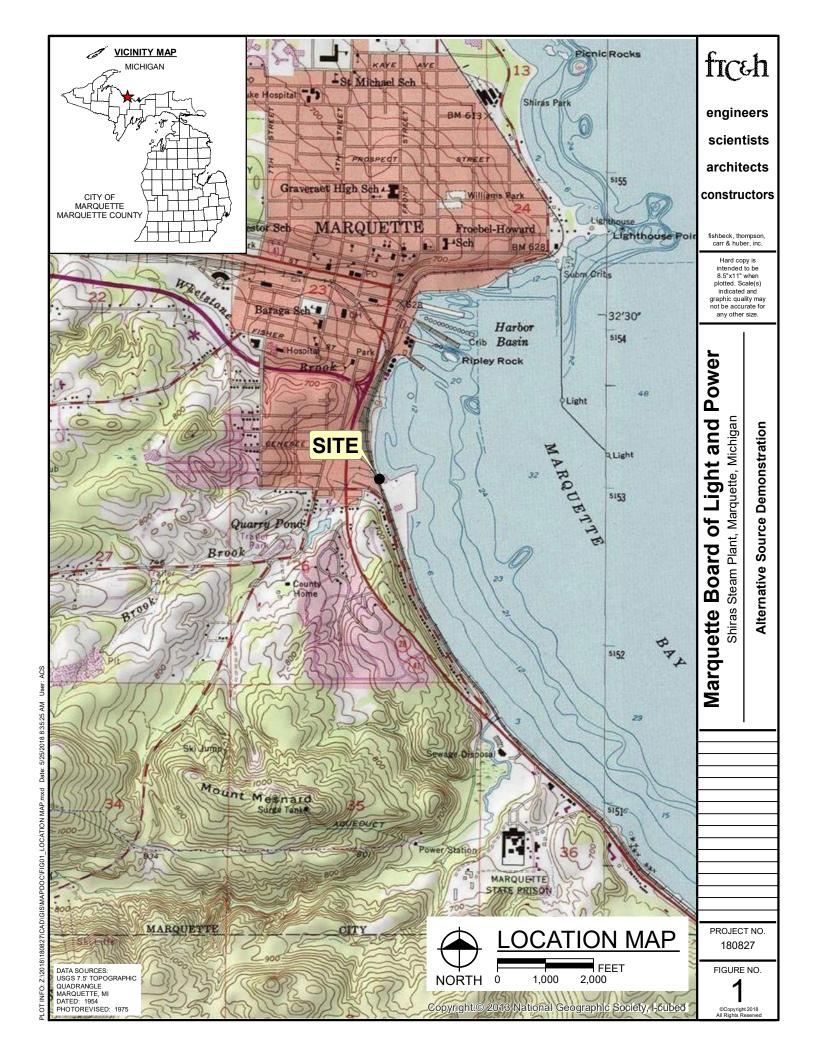


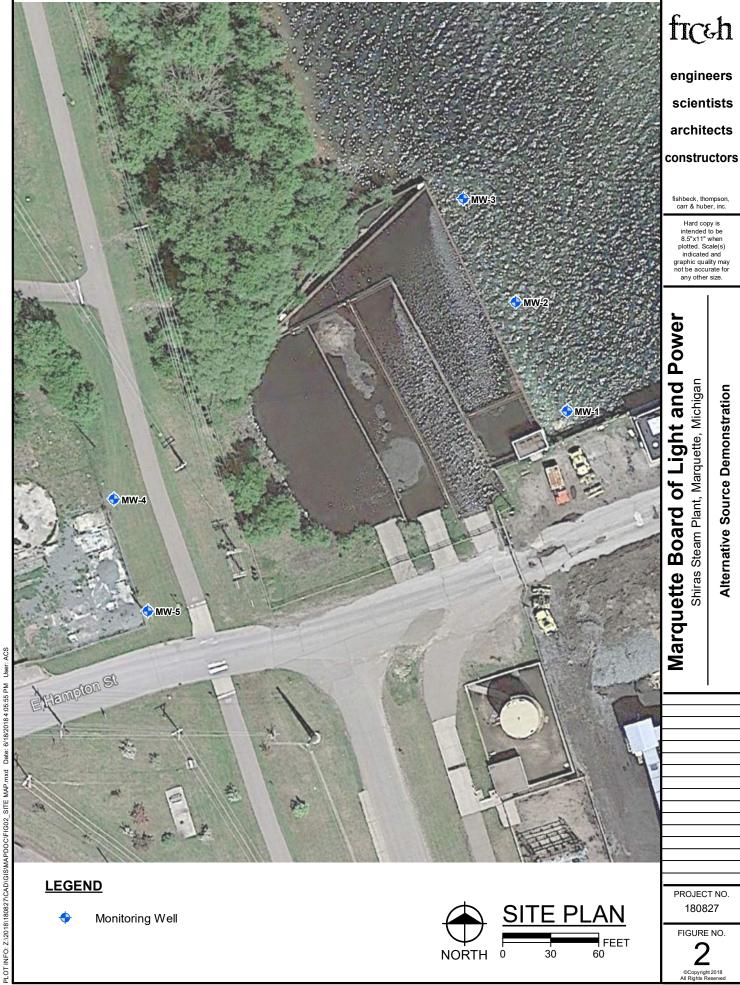
Stephen J. MacDonald, PE License Number 40569

Senior Environmental Engineer

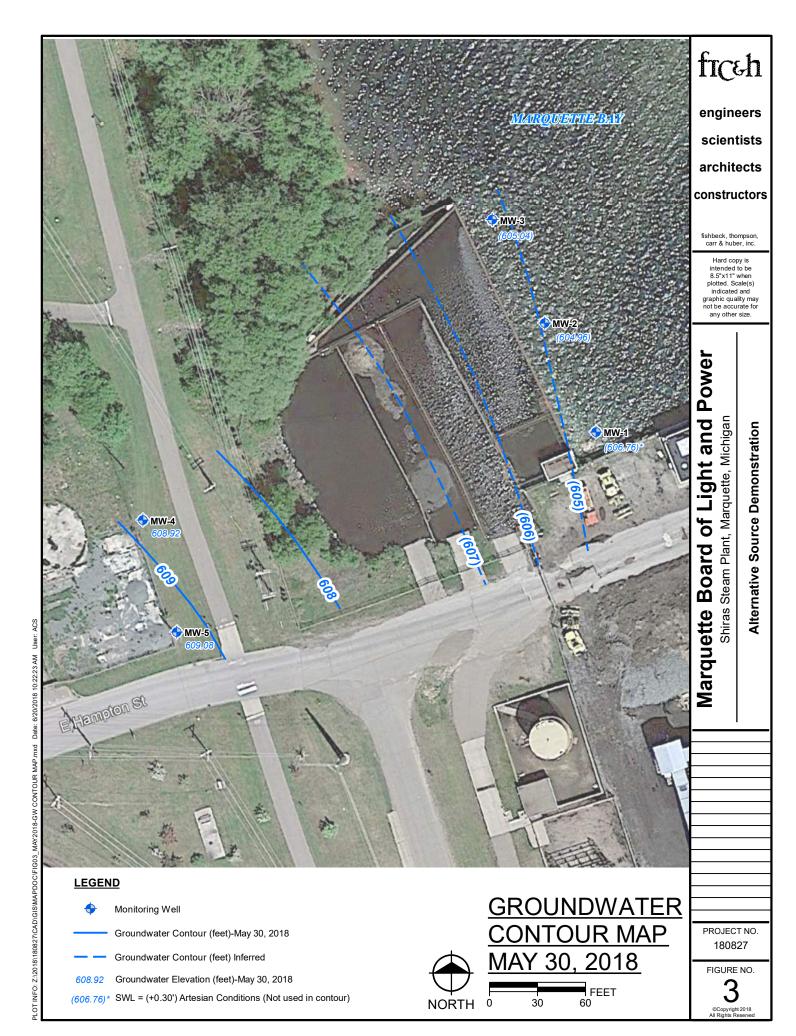
Date: September 5, 2018

Figures

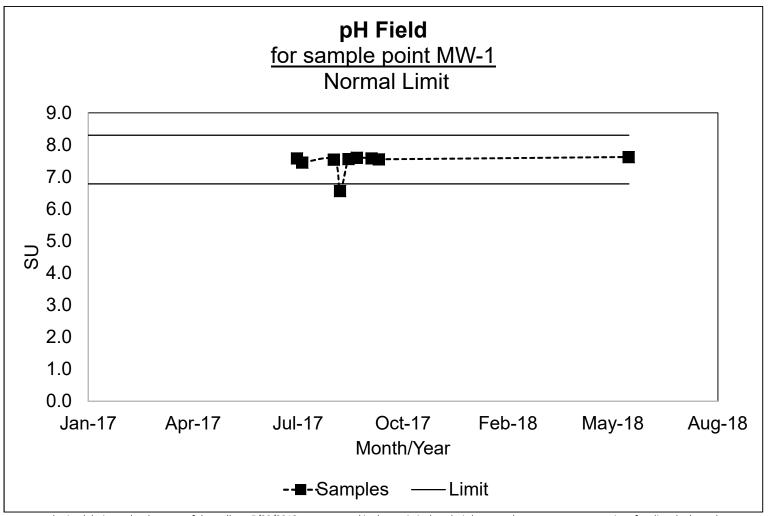




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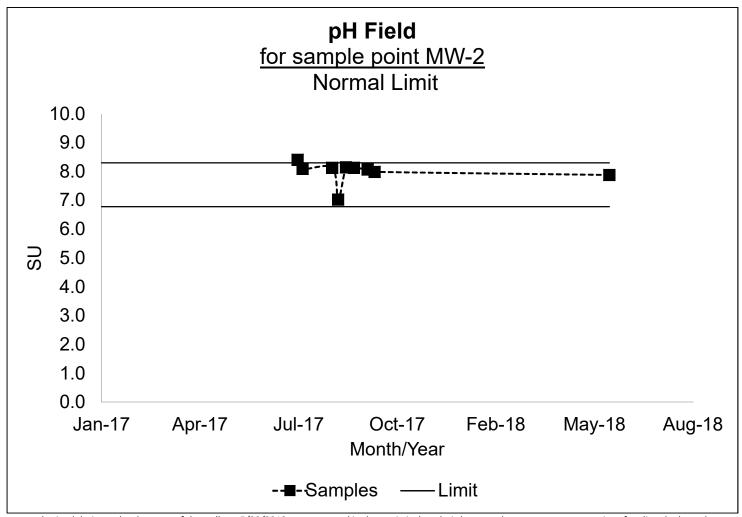
Up vs. Down Prediction Limits



^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

Graph 1

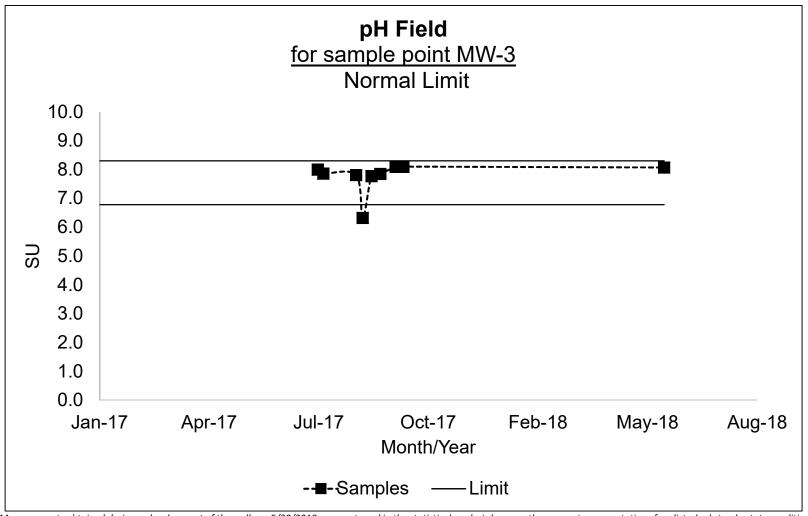
Up vs. Down Prediction Limits



^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

Graph 2

Up vs. Down Prediction Limits



^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

Graph 3

Tables

Table 1 - Summary of Detection Frequencies for Appendix III Parameter of pH

Marquette Board of Light and Power

Shiras Steam Plant

Parameter	Detection Frequency	MW-1	MW-2	MW-3	MW-4	MW-5
рН	n	9	9	9	9	9
	ND	0	0	0	0	0
	%ND	0%	0%	0%	0%	0%

Notes:

n - sample size

ND - count of nondetect values in sample

%ND - percentage of nondetects in sample

Table 2 - Summary Statistics and Prediction Limits

Marquette Board of Light and Power

Shiras Steam Plant

							Student's T test	Upper	Lower
		Model	Sample			Standard	critical value	Prediction	Prediction
Parameter	Unit	Туре	Size	Detect	Mean	Deviation	(.99 confidence)	Limit	Limit
рН	SU	Normal	18	18	7.541	0.289	2.567	8.303	6.782

Table 3 - Historical Downgradient Data for pH which Failed the Current Statistical Evaluation
Marquette Board of Power and Light
Shiras Steam Plant

Parameter	Unit	Well	Date	Result	Prediction Limit	SSI
рН	SU	MW-1	7/19/2017	7.58	6.861-8.211	
рН	SU	MW-1	7/24/2017	7.45	6.861-8.211	
рН	SU	MW-1	8/23/2017	7.54	6.861-8.211	
рН	SU	MW-1	8/29/2017	6.56	6.861-8.211	
рН	SU	MW-1	9/6/2017	7.56	6.861-8.211	
рН	SU	MW-1	9/14/2017	7.6	6.861-8.211	
рН	SU	MW-1	9/28/2017	7.58	6.861-8.211	
рН	SU	MW-1	10/5/2017	7.55	6.861-8.211	
pH*	SU	MW-1	5/30/2018	7.56	6.861-8.211	
pH*	SU	MW-1	5/30/2018	8.11	6.861-8.211	
pH*	SU	MW-1	5/30/2018	7.77	6.861-8.211	
pH*	SU	MW-1	5/30/2018	9.54	6.861-8.211	
рН	SU	MW-1	5/31/2018	7.62	6.861-8.211	
рН	SU	MW-2	7/19/2017	8.41	6.861-8.211	>PL
рН	SU	MW-2	7/24/2017	8.09	6.861-8.211	
рН	SU	MW-2	8/23/2017	8.13	6.861-8.211	
рН	SU	MW-2	8/29/2017	7.03	6.861-8.211	
рН	SU	MW-2	9/6/2017	8.15	6.861-8.211	
рН	SU	MW-2	9/14/2017	8.13	6.861-8.211	
рН	SU	MW-2	9/28/2017	8.07	6.861-8.211	
рН	SU	MW-2	10/5/2017	7.99	6.861-8.211	
рН*	SU	MW-2	5/30/2018	8.01	6.861-8.211	
рН*	SU	MW-2	5/30/2018	7.89	6.861-8.211	
pH*	SU	MW-2	5/30/2018	8.28	6.861-8.211	
рН	SU	MW-2	5/31/2018	7.88	6.861-8.211	
рН	SU	MW-3	7/19/2017	8	6.861-8.211	
рН	SU	MW-3	7/24/2017	7.86	6.861-8.211	
рН	SU	MW-3	8/23/2017	7.81	6.861-8.211	
рН	SU	MW-3	8/29/2017	6.32	6.861-8.211	
рН	SU	MW-3	9/6/2017	7.77	6.861-8.211	
рН	SU	MW-3	9/14/2017	7.85	6.861-8.211	
рН	SU	MW-3	9/28/2017	8.09	6.861-8.211	
рН	SU	MW-3	10/5/2017	8.1	6.861-8.211	
рН*	SU	MW-3	5/30/2018	8.61	6.861-8.211	
pH*	SU	MW-3	5/30/2018	6.95	6.861-8.211	
рН*	SU	MW-3	5/30/2018	7.82	6.861-8.211	
рН	SU	MW-3	5/31/2018	8.07	6.861-8.211	

^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because this data is not representative of undisturbed steady-state conditions

Notes:

>PL - results exceeds prediction limit; significantly increased over background



Appendix A

FIELD NOTES

Project Name:	MBLP/Shiras ASD & GW Monitoring
Project Number:	180827
Site Location:	Marquette, MI
Date:	<u> </u>
Jave.	5/30/18 P (0F 7
Weather Conditions:	62° puercest
Bullion and British and	
Purpose: MW de	velopment
F. 0.2 . MO .	AOS docidos da comencia de la comencia del la comencia de la comencia de la comencia del la comencia de la comencia del la comencia de la comencia del la comen
6	- APS Onsite , a librating
8:30 Tom	(MBLP) onste to provide verys/observe
	5 developed, ~17 sellors purgel
9:45 MW.	4 pursed dry at ~ \$521, two tooling tubidity and plt
97.50	able to MW. 5, will retarn towarow to sample
10:30 : 1 annol	A T
11:20: 129	in devoloping MW-3- purged dry of ~ 5 gallons
w: []	let well recover and return after other 2 wells
A DECEMBER OF THE PARTY OF THE	he nater - boat taking on water, used bilge pump
1145: 5150	development of MW-2, pused dry at ~ 5gillons
bont	taking in nater sceningly quider, plus is in, scaled well
contai	
will c	eturn after allows, three for Mw.) to recove
1219: MW 1	purged dry at ~ 6 sal
12)5: midday	pt cal check - 7. 32 5.4.
1728: WM;	3 his recovered to 29 below TOL pumping asoun
1305 - MW-1	puzzl dy grand 8.4'
time,	after 4 5-1100s pured (9 sallons pured total), move to
MW-	
Completed by:	(signature)
	(date)

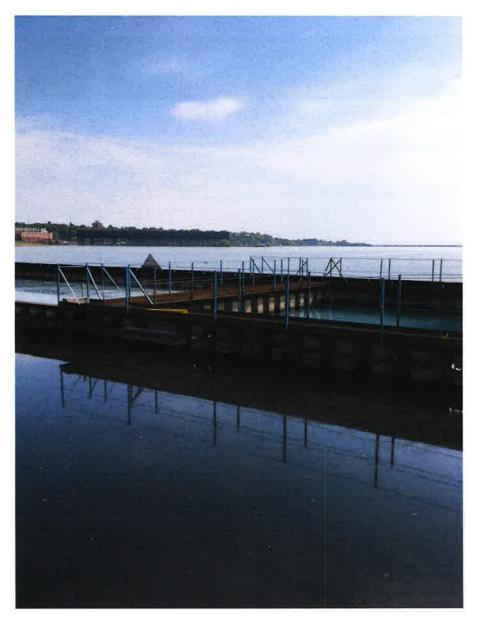
FIELD NOTES

Project Name:	MBLP/Shiras ASD & GW Monitoring
Project Number:	180827
Site Location:	Marquette, MI
Date:	5/30/18
	<u> </u>
Weather Conditions:	
Purpose: Mw dec	religions +
-	
1319 - MW-2	his away recovered to 5.55' below too restarting
DWEL	14,000.64
1322 MW-2	perget day after 3 gallons - 8 gallons puryet total
	are to MW-1 - boot filling with substantial amounts
0 £ w	est regularly - use pilge pump
1337 Mw-1	
NOTE: MW-1, MU	1.2, MW-3 did not recover fully due to sout issues (ceals)
-	aby thundestorns
1342: MW-1	puzzl dry after 4 gallors in second attorpt, 10 gal puzzl total
190	or marina
1446 retars	puge of MW-4, SWL:
1944: AWA	of purply my a second time; sold there follows (8.5 Julians total)
Next	a Dodeside Morina They are heapy the boot for the
1530: Leavin	
throw	
101100	with livewell Dain. AD, ATT done for the day
Completed by:	(signature)

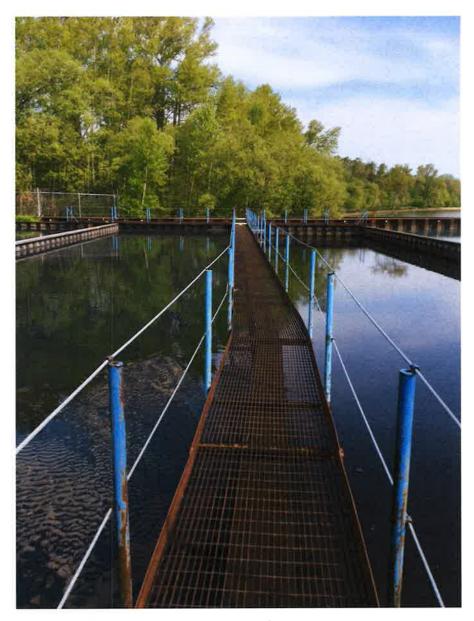
Fishbeck, Thompson, Carr & Huber, Inc.

MBLP/Shiras ASD & GW Monitoring.

Marquette, MI



Retention ponds, facing NNW.



Retention ponds, facing W.



Well development (MW-4)



Well development (MW-4)



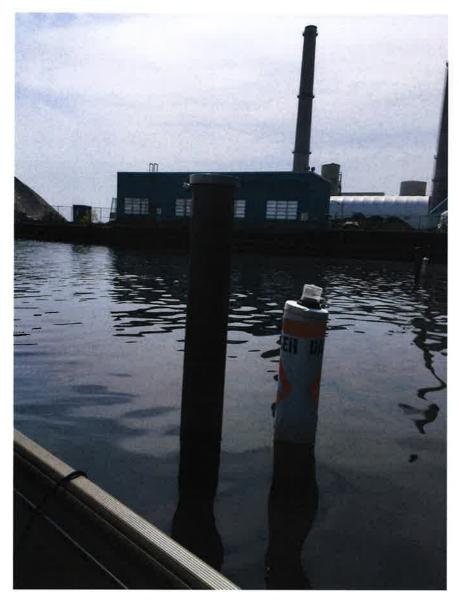
Project No.: 180827 Date: 5/31/2018 Project Name: MBLP/Shiras ASD & GW Monitoring.



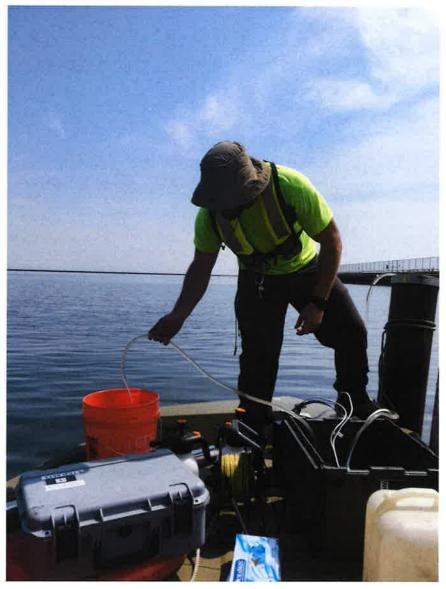
Equipment decon between locations.



Dumping of development water.



Offshore wells (MW-3)



Development of offshore locations (MW-3)

180827

5/31/2018 Date:

Project Name:

MBLP/Shiras ASD & GW Monitoring.



Low flow sampling offshore location (MW-3)



Low flow sampling offshore location (MW-1)

Project No.: 180827 Date: 5/31/2018 Project Name: MBLP/Shiras ASD & GW Monitoring.

EQUIPMENT CALIBRATION FORM

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5/30/18	8:40					
Initials:	AD					NA = Not	t Applicable
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ID Number
	4.00	4612941-01117	S.U.	4.06		3.9 - 4.1	YSIPP
рН	7.00	4709695-11087		7.06	21.1	6.9 - 7.1	4513
	10.00	442804-011117	S.U.	9.99		9.9 - 10.1	
Specific	147		μmhos/cm			132 - 162	
Conductance	1412		μmhos/cm			1342 - 1484	
	2765		μmhos/cm			2628 - 2905	
Eh	Zobell's solution		mV	/			
Dissolved Oxygen	NA	NA	mg/L		,	±10% Theoretical:	
Turbidity	10 NTU	A6272	NTU	9.41		9 - 11	LeNate 2000 me
Notes:							#410

EQUIPMENT CALIBRATION VERIFICATION FORM

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5/30/18 122	25					
Initials:	Ao	٨				NA = Not Applicable	
Danamakan	Chandand	Lathurhan		Measured	Measurement Temperature	Calibration Verification	Instrument Model/
Parameter	Standard	Lot Number	Units	Value	(°C)	Acceptance Window	ID Number
pH Specific	7.00	4709 645-110817	S.U.	7.02	23	6.9 - 7.1	73111
Specific Conductance	1412		μmhos/cm			1342 - 1484	
Eh	Zobell's solution		mV				
Dissolved Oxygen	NA	NA	mg/L			±10% Theoretical:	
Turbidity	10 NTU		NTU		NA	9 - 11	
Notes:							
							^
		11					

EQUIPMENT CALIBRATION VERIFICATION FORM

Project Name: Project Number: Date/Time:	MBLP/Shiras ASD 180827 5/30/18 /530	& GW Monitoring					
Initials:	413		-			NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
рН	7.00	4709095-110817	S.U.	7-04	21.3	6.9 - 7.1	18, P.P. #31351
Specific Conductance	1412		μmhos/cm			1342 - 1484	7
Eh	Zobell's solution		m√				
Dissolved Oxygen	NA	NA	mg/L			±10% Theoretical:	
Turbidity	10 NTU	A6272	NTU	9.22	NA	9 - 11	1-7020 We \$4550
Notes:							
	ik.	4					
			in an				

EQUIPMENT CALIBRATION FORM

			EQUI MEITI	CALIBITATION			
Project Name:	MBLP/Shiras ASE	& GW Monitoring	_				
Project Number:	180827		<u></u>				
Date/Time:	5/31/18 10	00	_				
Initials:	APS		_			NA = Not	: Applicable
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ Number
	4.00	4612941-61117	S.U.	3.98		3.9 - 4.1	
рH	7.00	4709095-110917	S.U.	7.04	135	6.9 - 7.1	YS1 P.7
	10.00	4612804-011117	S.U.	10.00		9.9 - 10.1	#429
c .c	147	50130208-16	μmhos/cm	161		132 - 162	
Specific Conductance	1412	SC180208-ZA	μmhos/cm	1410	18.7	1342 - 1484	
Conductance	2765	50180103-36	μmhos/cm	2802		2628 - 2905	
Eh	Zobell's solution	20821045-1	mV	429.5	18.8	925-8-445.8	

Notes:		
		1

9.20

9.75

mg/L

NTU

NA

A6272

19.8

Dissolved Oxygen

Turbidity

±10%

9 - 11

L. 2020 LEAL

Theoretical: 9.09

NA

10 NTU

Project Name:		MBLP/Shira	as ASD & GW	Monitoring		Monitoring Location	n:	MW	- 1	_
Project Number:		180827			_	Sample ID:		NA		
Site Location:		Marquette	, MI		2	Well Type:		2" 50	Juan, 2d	
Weather/Temp.:		74°	, some	clos ds		Key Number:			6	
INSPECTION		101 11-01		4, 0, 3, 5, 1		leu d'India			1 Sept. 1 1 Sept. 16	
Label on well?			YES / 10 / RI	EMEDIED		Is cement pad in goo	od repair?		YES / NO / REM	NEDIED NA/A
ls reference mark	visible?		YES / (10)/ RI	EMEDIED		Is protective casing l	ocked and in goo	d repair?	NO / REM	1EDIED
standing water pr	esent?	-(YES / NO / RI	EMEDIED		ls inner cap in place	and properly seal	ling well?	YES NO / REM	1EDIED
ndication of surfa	ace runoff in we	ell? 🕰	YF / NO / RI	EMEDIED		Is well casing in visib	oly good repair?		MB / NO / REM	1EDIED
Repair Notes:		-	·							
TATIC WATER LE	VEL		DATE: 5	130/18		TIME: 1209	# THE			
Top of Casing Ele	vation:		M	ft		Measured with:	(Electronic tape	/ Chalked tape / Other:	
Depth to Water:		+0.	30	ft		Well depth verified?		CYESY NO		
Elevation of Wate	er;		•):	ft						
WELL PURGING		tell or s	DATE: 5	130/18		TIME: 12:12				Carto Syley
CALCULATION OF	3 CASING VOL	UMES		. M		PURGE METHOD:				
Depth of well from	n TOC	29.	44	ft		Bailer / Grundfos / P	eristaltic / Bladde	er / Other:	_whale	
Depth to water			. 30	ft		Equipment #:	603			
Height of water co	olumn	= 29	1.74	Vit				3		
Conversion factor		x(Q.	49)	1		Conversion Facto	rs (gallons/ft)	1		
3 Water volumes		= L	-	gallons		1.25" well - 0.20	4" well - 1.96	-		
Actual volume pu	rged:	_~10		gallons		2" well - 0.49	8" well - 7,83]		
WATER QUALITY	STABILIZATION	(If require	d)	The state of the s		FAMILY S. 1. S				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Time	Volume I	Purged	рН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
12:12	←start	purge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
12:15	3		7.56	NA	NA	11.0	NA	ادر ﷺ		
12:19	6		8.11	NA	NA	NA 3.4	NA	Su 118	purged dy m	+ ~6 get
1339	rital	wh	-	NA	NA	NA	NA	NA	1 1	
1341	8	, ,	7.77	NA	NA	MA 9.4	NA	WK 1267		
1342	iO		9.54	NA	NA	NA 9.6	NA	DK 951	sweet do a	+ 10 gol.
				NA	NA	NA	NA	NA	-second	stenet
FIELD ANALYSES			DATE:	HE INCHIDA		TIME:	A LEWY			
Temperature:			NA	°C		Carbo	n Dioxide:	NA NA	_mg/L HACH CA-DT (F	RL = 10mg/L)
pH:				S.U.		Sulfide	e:	NA	_mg/L HACH HS-WR (RL = 0.0Smg/L)
pecific Conducta	nce:		NA	µmhos/cm		Ferro	us Iron (Fe ⁺²):	NA	mg/L HACH IR-18C (F	RL = 0,2mg/L)
h:			NA	mV						
Dissolved O ₂ :			NA -	mg/L						
urbidity:			NA	NTU						
AMPLE COLLECT	ION		DATE:			TIME:	n puntayi	years Index	Dental Autor	
Sample appearance	ce:						-	Duplicate sam	ple collected?	YES / NO
Collection method	d:	Bailer / Gru	undfos / Peris	taltic / Bladder ,	Other:			MS/MSD samp	ole collected?	YES / NO
quipment#:								Chain of Custo	dy Number;	
Filter used:		0.4S μm (8	100) / 0.45 μι	m (8200) / NON	E					
Quantity	Size	Тұре	Filtered		Preservativ	ve			Parameters	
	40 mL	Glass	Yes No	None	HCI HNO ₃ I	H ₂ SO ₄ NaOH				
	250 mL	Plas c	Y N-	/ Ner	THO!	10 N: W				
	S00 mL	Plas c	1.7 NE-	7 de .2	. H.O.	16.	-			
	500 mL	Plastic	Yes No	None	HCI HNO₃ I	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3 I	H ₂ SO ₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO ₃ I	H₂SO₄ NaOH				
SAMPLING PERSO	ONNEL /						deptiling.	7101117-55		
Name (SIGNATU	IRE):	/	7			Name (SIGNATURE)	EL.			
	7-1-1		, ,							

Is reference mark visible? Standing water present? Standing water present. Standing water pre	
Site Location: Marquette, Mi Weath Type: 2	toring MonItoring Location: MW-L
NESPECTION	Sample ID:
Label on well? YES @ FREMEDIED Is cement pad in good repair? YES / MO / REMEDIED Is protective easing locked and in good repair? YES / MO / REMEDIED Is protective easing locked and in good repair? YES / MO / REMEDIED Is inner cap in place and properly sealing well? YES / MO / REMEDIED Is inner cap in place and properly sealing well? YES / MO / REMEDIED Is well capin in visibly good repair? YES / MO / REMEDIED YES / MO / REMEDIED Is well capin in visibly good repair? YES / MO / REMEDIED YES / MO / NO	
Label on well? VES MO / REMEDIED Is reference mark visible? VES MO / REMEDIED Is reference mark visible? VES MO / REMEDIED Is inner cap in place and properly sealing well? VES MO / REMEDIED Is inner cap in place and properly sealing well? VES MO / REMEDIED Is well casing in visibly good repair? VES MO / REMEDIED Repair Notes: STATC WATER LEVEL DATE: //D/T TIME: L-U TIME:	Key Number:
Is reference mark visible? Standing water present? Standing water present. Standing water pre	
Standing water present? Indication of surface runoff in well? YES BO / REMEDIED Is inner cap in place and properly sealing well? YES BO / REMEDIED Is well casing in visibly good repair? ITIME:	DIED Is cement pad in good repair? YES / NO / REMEDIED
Notestion of surface runoff in well? YES	IED Is protective casing locked and in good repair? YESY NO / REMEDIED
Repair Notes: STATC WATER LEVEL DATE:	IED Is inner cap in place and properly sealing well?
STATIC WATER LEVEL DATE: 70 Y TIME: 1.4 S	IED Is well casing in visibly good repair?
Top of Casing Elevation:	
Depth to Water: 0.70	71 T TIME: 11.43
Elevation of Water:	Measured with: Electronic tape / Chalked tape / Other:
### PURGING DATE: 5/30/18 TIME: U	Well depth verified?
CALCULATION OF 3 CASING VOLUMES PURGE METHOD:	
Depth of well from TOC	(18 TIME: 11 4 5
Depth to water	PURGE METHOD:
Height of water column	Bailer / Grundfos / Peristaltic / Bladder / Other:
Conversion factor	Equipment #: 607
1.25" well - 0.20	
Actual volume purged:	Conversion Factors (gallons/ft)
### WATER QUALITY STABILIZATION (if required) Time	
Time	ons 2" well - 0.49 8" well - 7,83
1 1 5	
1	pec Cond Dissolved O ₂ Temperature Eh Turbidity
12 9 NA	nhos/cm) (mg/L) (°C) (mV) (NTU)
3 2 1 6	NA NA 12.9 NA NA TOT B parged day at ~ 5 gal
132 2	
NA NA NA NA NA NA NA NA	
NA NA NA NA NA NA NA NA	NA MA DI NA MA DESS Regul dry at 8 gal
FIELD ANALYSES DATE: TIME: Temperature: NA °C Carbon Dioxide: NA mg/L HACH CA-DT (RL = 10 mg/L) pH: S.U. Sulfide: NA mg/L HACH HS-WR (RL = 0.05 mg/L) NA mg/L HACH HS-WR (RL = 0.02 mg/L) HACH IR-18C (RL = 0.2 mg/L) HACH IR-18C (RL = 0.2 mg/L) NA mg/L HACH IR-18C (RL = 0.2 mg/L) NA Tubidity: NA NA NTU NA NTU NA NTU NA NTU NA NA NTU NA NA <td></td>	
Temperature: NA °C Carbon Dioxide: NA mg/L HACH CA-DT (RL = 10mg/L) pH: S.U. Sulfide: NA mg/L HACH HS-WR (RL = 0.05mg/L) Specific Conductance: NA μmhos/cm Ferrous Iron (Fe ²²): NA mg/L HACH IR-18C (RL = 0.2mg/L) Eh: NA mV Dissolved O ₂ : NA mg/L Turbidity: NA NTU TIME:	
pH: S.U. Sulfide: NA mg/L HACH HS-WR (RL = 0.05mg/s) Specific Conductance: NA μmhos/cm Ferrous Iron (Fe ⁺²): NA mg/L HACH IR-18C (RL = 0.2mg/L) Eh: NA mV Dissolved O ₂ : NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	
Specific Conductance: NA μmhos/cm Ferrous Iron (Fe ⁴²): NA mg/L HACH IR-18C (RL = 0.2mg/L) Eh: NA mV Dissolved O ₂ : NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	
Eh: NA mV Dissolved O₂: NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	
Dissolved O₂: NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	osyctil refronts from (re). NA ing/L nAch in-16c (kL = 0.2mg/L)
Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	L
SAMPLE COLLECTION DATE: TIME:	
Dublicate sample collected (YEV / NO	
Collection method: Bailer / Grundfos / Peristaltic / Bladder / Other: MS/MSD sample collected? YES / NO	
Equipment #: Chain of Custody Number:	
Filter used: 0.45 µm (8100) / 0.45 µm (8200) / NONE	
O. 15 MIII (O TOO) / MOINE	oy) was
Quantity Size Type Filtered Reservative Parameters	Reservative Parameters
40 mL Glass Yes No None HCI HNO ₃ H ₂ SO ₄ NaOH	None HCI HNO ₃ H ₂ SO ₄ NaOH
250 mL Plas V No No H O No	
500 mL Plas c 5. Nc 10 1 H O 10 10 10 10 10 10 10 10 10 10 10 10 10	16 .4 1.4 H 05 1.50 1.6.4
500 mL Plastic Yes No None HCI HNO ₃ H,5O ₄ NaOH	The state of the s
500 mL Plastic Yes No None HCl HNO ₃ H ₂ SO ₄ NaOH	None HCI HNO ₃ H ₂ SO ₄ NaOH
1000 mL Plastic Yes No None HCl HNO ₃ H ₂ SO ₄ NaOH	None HCI HNO ₃ H ₂ SO ₄ NaOH
SAMPLING PERSONNEL	

									1.3	
Project Name:	9	MBLP/Shira	s ASD & GW I	Monitoring		Monitoring Location	1:		W-3	-
Project Number:	3	180827			-	Sample ID:		- 2/4		-
Site Location:		Marquette,	. MI			Well Type:		2 " s	alumized	-
Weather/Temp.;					_	Key Number:		035	6	=
INSPECTION	Maria de	_ nihán	a Toler	TACE	programs to				is substitution	The Section of The
Label on well?			YES / RE	MEDIED		Is cement pad in goo	od repair?		YES / NO / REM	EDIED N/A
Is reference mark	visible?		YES NO / RE			Is protective casing I	ocked and in good	d repair?	MB/NO/REM	IEDIED
Standing water pre	esent?		753 / NO / RE			Is inner cap in place	and properly seal	ing well?	NO / REM	IEDIED
Indication of surfa	ce runoff in we	:117	YES (NO)/ RE	MEDIED		Is well casing in visib	ly good repair?		(YES / NO / REM	IEDIED
Repair Notes:										
STATIC WATER LEV	VEL	/=iv/ai	DATE: 5/	30/18		TIME: 11,10	CALKEL!			2 5 4 (4)
Top of Casing Elev	ation:	H	M .	ft		Measured with:		Electronic tape	/ Chalked tape / Other:	
Depth to Water:	33	0.	9	ft		Well depth verified?		(YES / NO		
Elevation of Wate	er:		T.	ft		,				
WELL PURGING		PICHER	DATE: 5	130/18	w Filmini	TIME: [120	MI TO THE	日宝いり	A CHILDING SE	17 - K - 1 - K
CALCULATION OF	3 CASING VOLU	JMES				PURGE METHOD:				
Depth of well from			ો.ગ	ft		Bailer / Grundfos / P	eristaltic / Bladde	er / Other:	while	
Depth to water			.90	ft		Equipment #:	603			_
Height of water co	olumn			ft				-		
Conversion factor		x(0,		s Vii		Conversion Facto	rs (gallons/ft)			
3 Water volumes	2	= 13		gallons		1.25" well - 0.20	4" well - 1,96			
Actual volume pur	ged:	t	1009	gallons +	5	2" well - 0.49	8" well - 7.83	1		
WATER QUALITY		(if require		ALBOURA	S IN DAMES	OF STATE		I CALLERY	The sales of the sales	
Time	Volume F		pН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
	←start g		(S.U ₊)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)	ζÜ.	- 1
1124	(3,017)	Juige	8.61	NA	NA NA	11.6	NA (III)	BASESTE'	and dry a	Sol
1303 6	ا مایا			NA -	NA	NA	NA -	NA	po see org n	-34
1304	restart	gen &	6.95	NA	NA	NA 11. 1	NA	NA 1493	44	
A	7		7.5)	NA	NA NA	W 8.7	NA	NA 98 NTU		C) 001/4
1305			1.64	NA	NA	NA NA	NA NA	NA NA	4030 Wy 21	950 (450
				NA NA	NA NA	NA	NA NA	NA:		A SAC
FIELD ANALYSES			DATE:		I E E E DE LA SE	TIME:			With The Street	
Temperature:			NA	°C		Carbo	n Dioxide:	NA	mg/L HACH CA-DT (F	RL = 10mg/L)
pH:				5.U.		Sulfid	e:	NA NA		RL = 0.05 mg/L)
Specific Conducta	nce:		NA	μmhos/cm			us Iron (Fe ⁺²):	NA NA	mg/L HACH IR-18C (
Eh:	2		NA	mV						
Dissolved O ₂ :			NA	mg/L						
Turbidity:			NA	NTU						
SAMPLE COLLECT	ION	003 200	DATE: -		ES CAMES	TIME:				PASSED BY
Sample appearance			ente.					Duplicate samp	ole collected?	YES / NO
Collection method		Bailer / Gr	undfos / Daries	taltic / Bladder ,	/ Other:		-	MS/MSD samp		YES / NO
Equipment #:	_	Daniel / GIL	andios / PCIIS	and plauder	, Julier.			Chain of Custo		,
Filter used:		0.45 μm/9	1001-/0.45	- n (8200) / NON	F			S.I.E.III OI CUSTO	_,	1
riitei useu.		0.43 діп (6	100// 0.43 μ	11 (8200) / 14014						
Quantity	Size	Туре	Filtered		Preservati	ve			Parameters	
	40 mL	Glass	Yes No	Моле	HCI HNO ₃	HOP NaOH	4			
	250 mL	Plas c	YEN!	1 Nem	KA H O	20 V				
	S00 mL	Plas c	1 NE -	1 16.2	H 0,	767187	-			
	500 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO ₃	H ₂ SO ₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO ₃	H ₂ SO ₄ NaOH				
SAMPLING PERSO	ONNEL		admit ain			ALL STATE				为一世以 与 市
Name (SIGNATU	IRE):	1		-		Name (SIGNATURE)	10			

Project Name:	98	MBLP/Shira	as ASD & GW	Monitoring	-	Monitoring Location	n:	- MW	1-4	
Project Number:	59	180827			2	Sample ID:		-NA		-
Site Location:	The state of the s		Well Type:		5. Mr	FM				
Weather/Temp.:		64%	andon	-		Key Number:		_N/A		
INSPECTION		1,000	CHANGE I		10 2005				the same that it	
Label on well?		(YES NO / RE	MEDIED		Is cement pad in goo	od repair?		YES/N	O / REMEDIED
ls reference mark	visible?		NO / RE	MEDIED		Is protective casing	locked and in goo	od repair?	(YES) N	O / REMEDIED
Standing water pre	esent?		YES NO / RE	MEDIED		Is inner cap in place	and properly sea	ling well?	CYESY N	O / REMEDIED
ndication of surfa	ce runoff in we	:II?	YES NO/ RE	MEDIED		Is well casing in visib	oly good repair?		(YES/N	O / REMEDIED
Repair Notes:										
STATIC WATER LE	VEL	011	DATE: 5/	30/18		TIME: 9:28		The state of		
Top of Casing Elev	ration:	10	1	ft		Measured with:	(Electronic tape	Chalked tape /	Other:
Depth to Water:		15	35	ft		Well depth verified?	,	YES/NO		
Elevation of Wate	r: y			ft						
WELL PURGING	and party		DATE: 5	30/18		TIME: 430	0940 (AS)	4 74 1		
CALCULATION OF	3 CASING VOLU	JMES	,	162		PURGE METHOD:				
Depth of well from	TOC	46.	73	ft		Bailer / Grundfos / P	eristaltic / Bladd	er / Other;	whole	
Depth to water		-(15	35	9		Equipment #:	603	20		
Height of water co	lumn	= 31	. 34	ft				a		
Conversion factor	10	x(0.	.49	·/		Conversion Facto	ors (gallons/ft)	X 14:41	- purgel	My a scord 8.5 gal tot Herel gallons as
3 Water volumes	10	= 15.	39 1	gallons		1.25" well - 0.20	4" well - 1.96		time at	8.5 cal tot
Actual volume pur	ged: 8.5	(5.5	+3)	gallons		2" well - 0.49	8" well - 7.83		(3.11.	Herel order 1 as
WATER QUALITY	TABILIZATION	(if required	3)	434 4						Janois W
Time	Volume f	urged	рН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
430	←start ;	ourge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
0946	5.5		7.46	NA	NA	NA 11.6	NA	NA 23. 6	4 PURGED	DRY @5.554
- //// -	++		Non	NA	NA	NA	NA	NA-		DEIONER MO
-A/A-	40.5	í l	VM	NA	NA	NA	NA	NA	SAMPLE	
1446	restat	ouze	50	NA	NA	NA-	NA	NA	44 PETUR	BOANS OF DEW
1447	7		7.80	NA	NA	NA 9.9	NA	MA 401		ELLONG TIMES
14-18	8		7.70	NA	NA	NA 9.7	NA	NA 30 L	SUL= ZZ	Control of the Contro
FIELD ANALYSES	organia de m	in the book	DATE:			TIME: -	WE WELL			
Temperature:			NA	°C		Carbo	on Dioxide:	NA	_mg/L HACH (CA-DT (RL = 10mg/L)
pH:			//	S.U.		Sulfid	e:	NA	_mg/L HACH H	HS-WR (RL = 0.05mg/L)
Specific Conductar	nce:		NA	μmhos/cm		Ferro	us Iron (Fe ⁺²):	NA	_mg/L HACHI	R-18C (RL = 0.2mg/L)
Eh:			NA	_mV						
Dissolved O ₂ :			NA	mg/L						A STATE OF THE PARTY OF THE PAR
urbidity:			NA	NTU						7
AMPLE COLLECTI	ON	Maria III	DATE:	Windowski II		TIME:	The state of the	=101001 11	at? All ally	AS A PART OF TAKE
Sample appearance	e:						_	Duplicate sam	ple collected?	YES / NO
Collection method	:	Bailer / Gru	ındfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	ole collected?	YES / NO
Equipment #:								Chain of Custo	dy Number:	
Filter used:		0.45 µm (8)	100) / 0.45 μι	m (8200) / NONE	E					
Quantity	Size	Туре	Filtered		Preservativ	/e			Parameters	
	40 mL	Glass	Yes No	None	HCI HNO3 H	H ₂ SO ₄ NaOH				
	250 mL	Plas	y- N	/ Ngv	Ma HO	70. NE W	D			
	S00 mL	Plas c	17.7 1	1 19.	1.7 H.O, T.	36513311	L-			
	S00 mL	Plastic	Yes No	None	HCI HNO, H	H ₂ SO ₄ NaOH				
			Van Na	None	HCI HNO, H	H ₂ SO ₄ NaOH				
	S00 mL	Plastic	Yes No	None	1101 111103	12001 110011				
	500 mL 1000 mL	Plastic Plastic	Yes No			H ₂ SO ₄ NaOH				



								MINDARD	
Project Name:		MBLP/Shir	ras ASD & GW	Monitoring	-	Monitoring Locati	on:	MW-5	
Project Number:		180827				Sample ID:		NIA	
Site Location:		Marquette	e. MI			Well Type:		2" PI	30
Weather/Temp.:		630,	overest		=0	Key Number:		N/A	
INSPECTION	The Evalua	#6 Firm		12.					
Label on well?			YES / NO / R	EMEDIED		Is cement pad in go	ood repair?		/ NO / REMEDIED
ls reference mark	visible?	- 9	MB/NO/R	EMEDIED		Is protective casing	g locked and in goo	od repair?	YES NO / REMEDIED
Standing water pr	esent?		YES (NO)/ R	EMEDIED		ls inner cap in plac	e and properly sea	ling well?	YES / NO / REMEDIED
Indication of surfa	ace runoff in w	ell?	YES / (O) R	EMEDIED		Is well casing in vis	ibly good repair?		(YES) NO / REMEDIED
Repair Notes:			1						
STATIC WATER LE	VEL	Parity .	DATE: 5	130/18	JUNE 1	TIME: 8:50	22/11/21/21		Mary Tales and Mary Mary Mary
Top of Casing Ele	vation:	-		ft		Measured with:		Electronic tap	<pre>/ Chalked tape / Other:</pre>
Depth to Water:		14	.79	_ft		Well depth verified	17	YESY NO	
Elevation of Wate	er:			ft					
WELL PURGING			DATE: S	130/18	4,817	TIME: \$:59		STEWN BY	
CALCULATION OF	3 CASING VOL	UMES				PURGE METHOD:			
Depth of well from	n TOC	40	1.75	_ft		Bailer / Grundfos /	Peristaltic / Bladde	er / Other:	WHALE
Depth to water		-(14	1.79	-f}		Equipment #:	# 603	=0	
Height of water co	olumn	= 29	96	ft		<u></u>			
Conversion factor		X(0.4	49	1		Conversion Fact	ors (gallons/ft)		
3 Water volumes		= 14	.68.	gallons		1.25" well - 0,20	4" well - 1.96		
Actual volume pur	rged:	17	O.	gallons		2" well - 0.49	8" well - 7.83		
WATER QUALITY	STABILIZATION	N (if require	d)	TO BE THE	الإيالدي	UJ SE DE CA	Description for	VIII Na L. QUE	
Time	Volume	Purged	рН	Spec Cond	Dissolved O	2 Temperature	Eh	Turbidity	
8:59	←start	purge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)	
0904	5		7.28	NA	NA	NA	NA	NA	TURBIONY: 708AV, TEMP: 11.19
8908	10		7.48	NA	NA	NA	NA	NA	TU:281) TY : 199 NTO TEMP/1.0°L
5215	15		7.42	NA	NA	NA	NA	NA .	TUR. 11.5 NTS TENS: 67"
				NA	NA	NA	NA	NA	1000 11000
				NA	NA	NA	NA	NA	
				NA	NA	NA	NA	NA	
FIELD ANALYSES		The P.	DATE: 37	30/13	NE THE PERSON	TIME: PIT		11/2011	
Temperature:		W.Z -	NA	°C		Carbo	on Dioxide:	NA	mg/L HACH CA-DT (RL = 10mg/L)
pH:		7.41	6	S.U.		Sulfic	de:	NA	mg/L HACH HS-WR (RL = 0.0Smg/L)
Specific Conductar	nce:		NA	μmhos/cm		Ferro	ous Iron (Fe ⁺²):	NA	mg/L HACH IR-18C (RL = 0.2mg/L)
Eh:			NA	mV					
Dissolved O₂:			NA	mg/L					
Turbidity:		12.8 -	NA-	NTU .	÷				
SAMPLE COLLECTI	ON	THE PARTY	DATE:			TIME;			
Sample appearance	e:							Duplicate samp	ple collected? YES / NO
Collection method	:	Bailer / Gru	undfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	ole collected? YES / NO
Equipment #:						1 1945 F		Chain of Custo	dy Number:
Filter used:	Α.	0,45 µm (8	100) / 0,4S µr	m (8200) / NONE					
Quantity	Size	Тұре	Filtered		Preservat	ive			Parameters
	40 mL	Glass	Yes No	None	HCI HNO,	H₂SO ₄ NaOH			
	2S0 mL	Plas c	Y N-	/ Nove	HO H O	120 Va W	φ		0
	500 mL	Plas c	1.7 Nc -	7 de .].PH]	1.50.13311	F		
	S00 mL	Plastic	Yes No	None	HCI HNO3	H₂SO₄ NaOH			
	S00 mL	Plastic	Yes No	None	HCI HNO ₃	H ₂ SO ₄ NaOH			
	1000 mL	Plastic	Yes No	None	HCI HNO₃	H₂SO₄ NaOH			
SAMPLING PERSO	NNEL	,						il Mont	
Name (SIGNATUR	RE):	15	>			Name (SIGNATURE)	12		

GROUNDWATER SAMPLE COLLECTION FORM - LOW FLOW

Project Name:	Name: MBLP/Shiras ASD & GW Monitoring				Monitoring Loca		MW-1			
Project Numbe							MBLPS-18-0S-N	/W-1(I/MS/MS	D)	* :
Site Location:		Marquette, MI			te, MI Well Type:		2" galvanzed			
Weather/Temp	o:									
INSPECTION		2,380	7,3						over the same	
Label on well?			YES /NO)/ RE	EMEDIED	Is cement pad in	good repair?			YES / NO / REM	IEDIED NA
Is reference ma	ark visible?		YES / 100/ RE			ing locked and in	good repair?		NO / REM	
Standing water	present?		NO / RE			ace and properly			YES / NO / REM	
Indication of su	ırface runoff i	n well?	YES / N / RE		Is well casing in	visibly good repa	ir?		YES NO / REM	
Repair Notes:	C9514	full.	1	to top buil	ed out,	APPED 12	e at M.			-
STATIC WATER	LEVEL	Hillian	DATE: 5/31	/18	TIME: 15C	3		in the new line	falls of	IN PACE
Top of Casing I	Elevation:	NM	ft		Measured with:	(Electronic tape	/ Chalked tape	/ Other:	
Depth to Wate	er:	0.04	ft		Well depth verif	ied?	YES / CO			
Elevation of W	ater:		ft	* 70.21	ED CHIE	.u Done	500 10 A			
WELL PURGING	3 - 11		DATE: 5/31		TIME: 155	and the second second	102 10 1-	105 10 2	175/0"/ /	35-77-1012
Purge Method:		PERISTALTIC		O BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC or <u></u> b	ottom
Equipment No.	:		\$2							
Measured well	depth:	29.44	ft	Screen length:	5	ft	Depth to scree	n midpoint:	26.94	ft
		r Level	Drawdown	Pumping Rate	рН	Temp	Spec Cond	Turbidity	Eh	D,O,
Time		eet)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1618	6.		6.10	140	7.64	14.3	135 /	14.0	472	0.19
621	6		6-11	140	7.63	14.9	1361	21.0	471	0.30
1624	6.		6.11	140	7.62	14.9	1378	21.2	471	0.36
1627	6.1	5	6.11	140	7.62	14.8	1370	20.0	470	0.29
Volume:	2.1	(Gallons)		Stabilization Criteria:	±0,1	±3%	±3%	±10% for	±10 mV	±10%
FIELD ANALYSE	S	0.57 Brill	DATE: 4/31	118	TIME: 162	8		values >20		
Temperature:		14.9	*c	Carbon Di	oxide:	NA	mg/L	HACH CA-DT (I	RL = 10 mg/L)	
рН:		7.62		Sulfide (S ⁻¹	²):	NA	mg/L	HACH HS-WR	(RL = 0.0S mg/L)	
Specific Conduc	ctance:	1367	μmhos/cm	Ferrous Ire	on (Fe ⁺²):	NA NA	_mg/L	HACH IR-18C (RL = 0.2 mg/L)	- 4
Eh:		469	mV							
Dissolved Oxyg	en:	0.29	mg/L							
Turbidity:		14.5	NTU							
SAMPLE COLLE	CTION	Harris Sing	DATE: 5/3	1/18	TIME: 162	91			ACHIEVA III	
Sample appear			2			-11	Duplicate samp		-	YES /MO
Collection meti	(O BLADDER / OTHER:			MS/MSD samp			YES/NO
Equipment No.	:		52				Chain of Custo			2036
Filter used:		0.45 µm (810	00) / 0.45 µm (8200	DIV NONE			Chain of Custo	Designated N	la Du	2060 CR
Quantity	Size	Туре	Filtered		Preservative				meters	
	40 mL	Glass	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH			-	
	12S mL	Plastic	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH	6	041501		
3	S00 mL	Plastic	No		None			-	FI	,
3	S00 mL	Plastic	No		None				, Calcium	, ,
3	S00 mL	Plastic	No		HNO ₃				H, TDS, SO ₄	-
3	500 mL	Plastic	No		HNO ₃		Sb, As,		Co, Pb, Hg, Mo,	Se, Tl, Li
9	1000 mL	Plastic	No		HNO ₃			Radium 22	6, Radium 228	/
*******	1000 mL	Glass	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH	The same of the last	V-1245		un library and
SAMPLING PER		_	<			0.0155.00		W. W. W. C.		NAME OF THE
Name (SIGNA	TURE):		-	Name (SIG	SNATURE):					



Appendix B

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.17/27/2018 2:26:36 PM From File WorkSheet_a.xls

Full Precision OFF

Dixon's Outlier Test for Background

Number of Observations = 18 10% critical value: 0.424 5% critical value: 0.475 1% critical value: 0.561

1. Observation Value 7.93 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.131

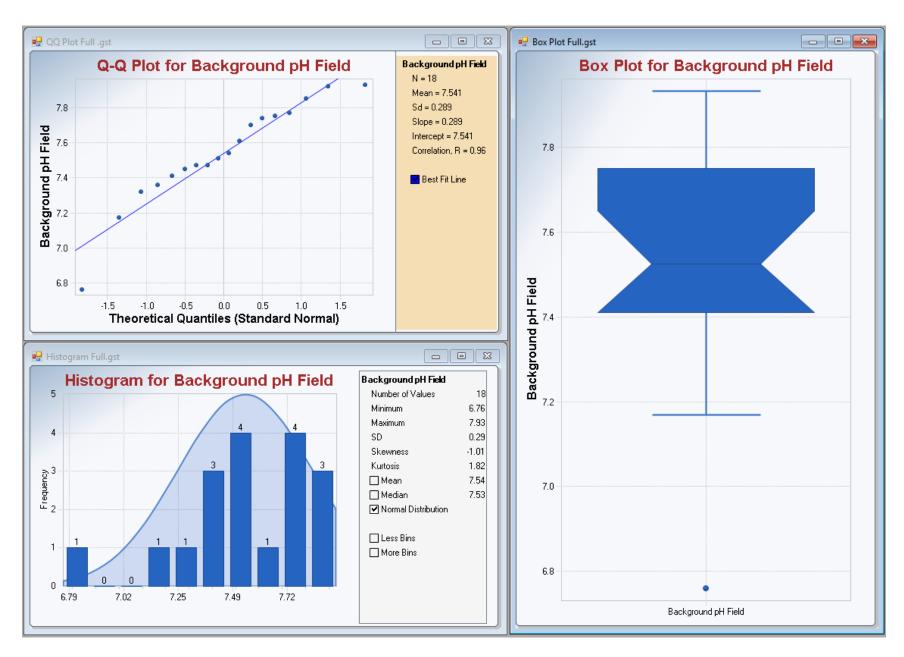
For 10% significance level, 7.93 is not an outlier. For 5% significance level, 7.93 is not an outlier. For 1% significance level, 7.93 is not an outlier.

2. Observation Value 6.76 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.514

For 10% significance level, 6.76 is an outlier. For 5% significance level, 6.76 is an outlier.

For 1% significance level, 6.76 is not an outlier.



Data Visualization for detection of Potential Outliers

Appendix C

Goodness-of-Fit Test Statistics for Uncensored Full Data Sets without Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.17/27/2018 3:27:19 PM

From File WorkSheet_a.xls

Full Precision OFF
Confidence Coefficient 0.99

Background

Raw Statistics	
Number of Valid Observations	18
Number of Distinct Observations	17
Minimum	6.76
Maximum	7.93
Mean of Raw Data	7.541
Standard Deviation of Raw Data	0.289
Khat	701.7
Theta hat	0.0107
Kstar	584.8
Theta star	0.0129
Mean of Log Transformed Data	2.02
Standard Deviation of Log Transformed Data	0.0391

Normal GOF Test Results

Correlation Coefficient R	0.96
Shapiro Wilk Test Statistic	0.929
Shapiro Wilk Critical (0.01) Value	0.858
Approximate Shapiro Wilk P Value	0.182
Lilliefors Test Statistic	0.112
Lilliefors Critical (0.01) Value	0.235

Data appear Normal at (0.01) Significance Level

Gamma GOF Test Results

Correlation Coefficient R	0.958
A-D Test Statistic	0.387
A-D Critical (0.01) Value	1.006
K-S Test Statistic	0.11
K-S Critical(0.01) Value	0.236

Data appear Gamma Distributed at (0.01) Significance Level

Lognormal GOF Test Results

Correlation Coefficient R	0.953
Shapiro Wilk Test Statistic	0.917
Shapiro Wilk Critical (0.01) Value	0.858
Approximate Shapiro Wilk P Value	0.109
Lilliefors Test Statistic	0.118
Lilliefors Critical (0.01) Value	0.235

Data appear Lognormal at (0.01) Significance Level

Appendix D

Normal Background Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation ProUCL 5.17/27/2018 2:58:33 PM

From File WorkSheet_a.xls

Full Precision OFF

Confidence Coefficient 99%
Coverage 99%
New or Future K Observations 1

Background

General Statistics

Total Number of Observations	18 Number of Distinct Observations	17
Minimum	6.76 First Quartile	7.42
Second Largest	7.92 Median	7.525
Maximum	7.93 Third Quartile	7.748
Mean	7.541 SD	0.289
Coefficient of Variation	0.0384 Skewness	-1.012
Mean of logged Data	2.02 SD of logged Data	0.0391

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL) 3.96 d2max (for USL) 2.821

Normal GOF Test

Shapiro Wilk Test Statistic 0.929 Shapiro Wilk GOF Test

5% Shapiro Wilk Critical Value 0.897 Data appear Normal at 5% Significance Level

Lilliefors Test Statistic 0.112 Lilliefors GOF Test

5% Lilliefors Critical Value 0.202 Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

99% UTL with 99% Coverage	8.686 90% Percentile (z)	7.911
99% UPL (t)	8.303 95% Percentile (z)	8.016
99% USL	8.356 99% Percentile (z)	8.213

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV

One Sample t-Test for Uncensored Full Data Sets without NDs

User Selected Options

Date/Time of Computation ProUCL 5.17/27/2018 3:08:00 PM

From File WorkSheet_a.xls

Full Precision OFF
Confidence Coefficient 99%
Substantial Difference 0

Action Level 0

Selected Null Hypothesis Mean <= Action Level (Form 1)
Alternative Hypothesis Mean > the Action Level

Background

One Sample t-Test

Raw	Stat	istics

Number of Valid Observations	18
Number of Distinct Observations	17
Minimum	6.76
Maximum	7.93
Mean	7.541
Median	7.525
SD	0.289
SE of Mean	0.0682

H0: Sample Mean <= 0 (Form 1)

Test Value	110.6
Degrees of Freedom	17
Critical Value (0.01)	2.567
P-Value	4.88E-26

Conclusion with Alpha = 0.01 Reject H0, Conclude Mean > 0 P-Value < Alpha (0.01)

Appendix E

Mann-Kendall Trend Test Analysis

User Selected Options

Date/Time of Computation ProUCL 5.17/27/2018 3:40:33 PM

From File WorkSheet_a.xls

Full Precision OFF

Confidence Coefficient 0.99 Level of Significance 0.01

pH-mw-1

_	
(-anarai	Statistics
General	Juanishics

Number of Events Reported (m)	9
Number of Missing Events	0
Number or Reported Events Used	9
Number Values Reported (n)	9
Minimum	6.56
Maximum	7.62
Mean	7.449
Geometric Mean	7.442
Median	7.56
Standard Deviation	0.337
Coefficient of Variation	0.0452

Mann-Kendall Test

M-K Test Value (S)	13
Tabulated p-value	0.13
Standard Deviation of S	9.539
Standardized Value of S	1.258
Approximate p-value	0.104

Insufficient evidence to identify a significant trend at the specified level of significance.

pH-mw-2

General Statistics

Number of Events Reported (m)	9
Number of Missing Events	0
Number or Reported Events Used	9
Number Values Reported (n)	9
Minimum	7.03
Maximum	8.41
Mean	7.987
Geometric Mean	7.978
Median	8.09
Standard Deviation	0.386
Coefficient of Variation	0.0483

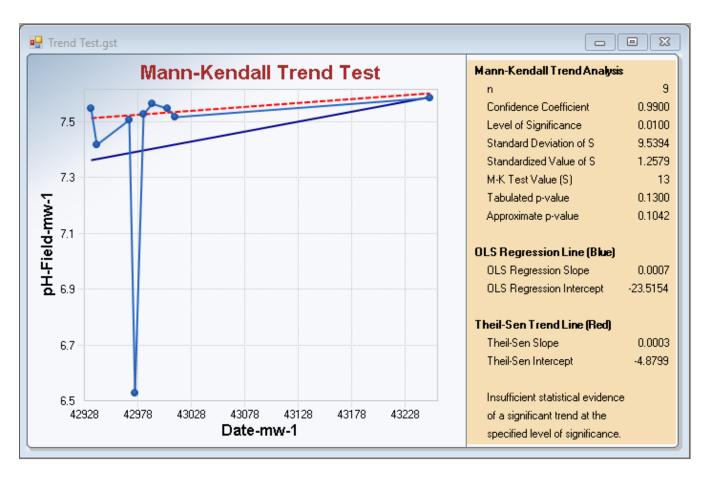
Mann-Kendall Test	
M-K Test Value (S)	-17
Tabulated p-value	0.06
Standard Deviation of S	9.539
Standardized Value of S	-1.677
Approximate p-value	0.0467

Insufficient evidence to identify a significant trend at the specified level of significance.

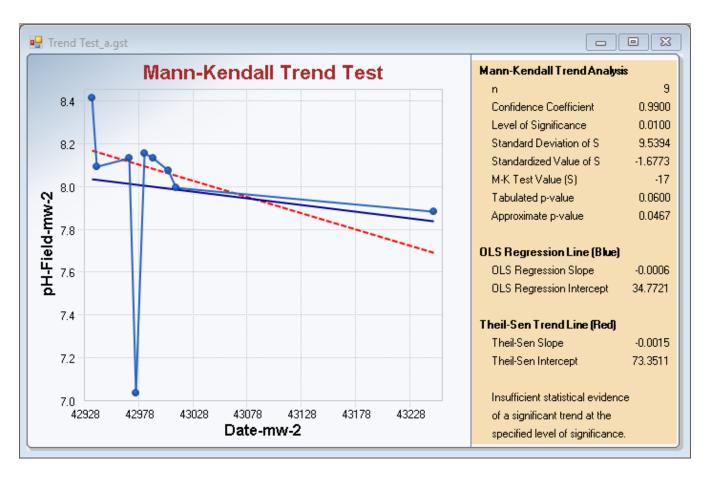
pH-mw-3

General Statistics	
Number of Events Reported (m)	9
Number of Missing Events	0
Number or Reported Events Used	9
Number Values Reported (n)	9
Minimum	6.32
Maximum	8.1
Mean	7.763
Geometric Mean	7.744
Median	7.86
Standard Deviation	0.556
Coefficient of Variation	0.0716
Mann-Kendall Test	
M-K Test Value (S)	10
Tabulated p-value	0.179
Standard Deviation of S	9.592
Standardized Value of S	0.938
Approximate p-value	0.174

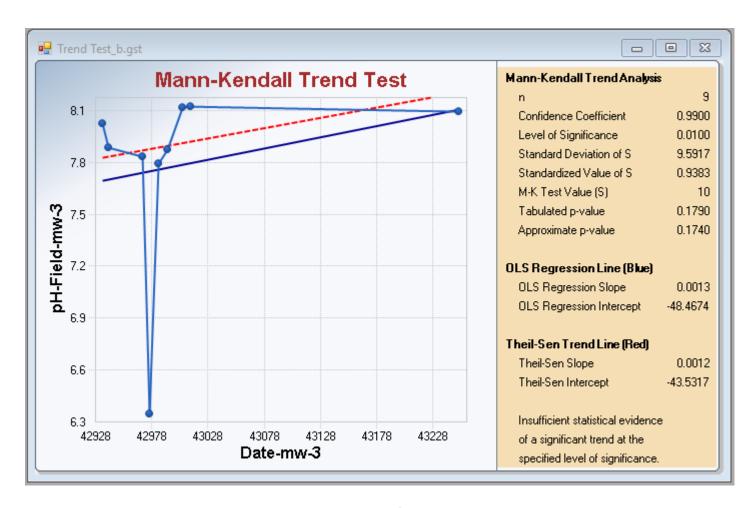
Insufficient evidence to identify a significant trend at the specified level of significance.



Trend Analysis for MW-1



Trend Analysis for MW-1



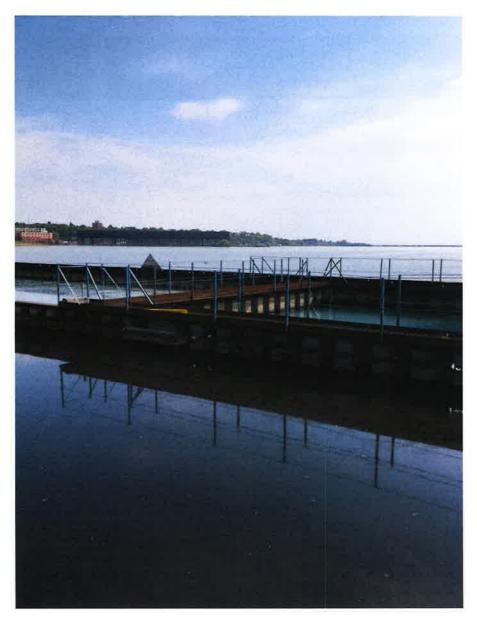
Trend Analysis for MW-1

Appendix B

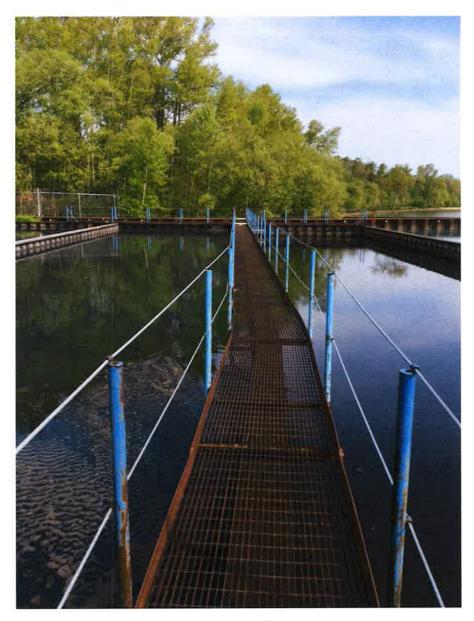
Fishbeck, Thompson, Carr & Huber, Inc.

MBLP/Shiras ASD & GW Monitoring.

Marquette, MI



Retention ponds, facing NNW.



Retention ponds, facing W.



Well development (MW-4)



Well development (MW-4)



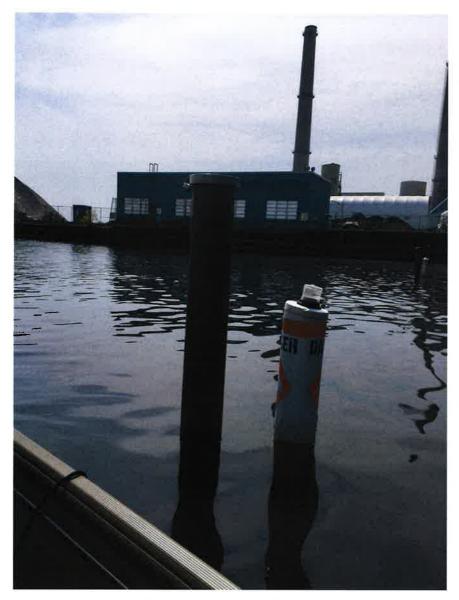
Project No.: 180827 Date: 5/31/2018 Project Name: MBLP/Shiras ASD & GW Monitoring.



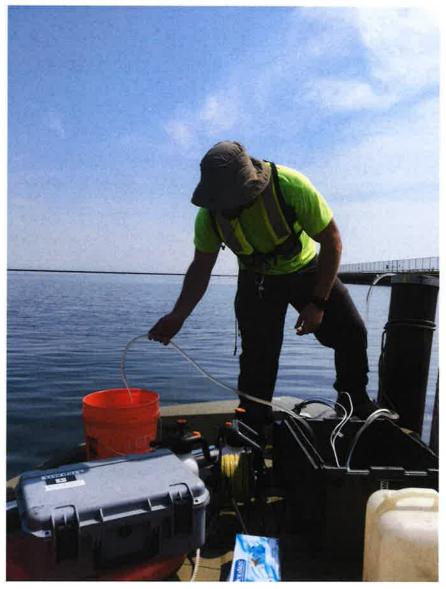
Equipment decon between locations.



Dumping of development water.



Offshore wells (MW-3)



Development of offshore locations (MW-3)

180827

5/31/2018 Date:

Project Name:

MBLP/Shiras ASD & GW Monitoring.



Low flow sampling offshore location (MW-3)



Low flow sampling offshore location (MW-1)

Project No.: 180827 Date: 5/31/2018 Project Name: MBLP/Shiras ASD & GW Monitoring.

EQUIPMENT CALIBRATION FORM

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5/30/18	8:40					
Initials:	AD					NA = Not	t Applicable
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ID Number
	4.00	4612941-01117	S.U.	4.06		3.9 - 4.1	YSIPP
рН	7.00	4709695-11087		7.06	21.1	6.9 - 7.1	4513
	10.00	442804-011117	S.U.	9.99		9.9 - 10.1	
Specific	147		μmhos/cm			132 - 162	
Conductance	1412		μmhos/cm			1342 - 1484	
	2765		μmhos/cm			2628 - 2905	
Eh	Zobell's solution		mV	/			
Dissolved Oxygen	NA	NA	mg/L		,	±10% Theoretical:	
Turbidity	10 NTU	A6272	NTU	9.41		9 - 11	LeNate 2000 me
Notes:							#410

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5/30/18 122	25					
Initials:	Ao	٨				NA = Not Applicable	
Danamakan	Chandand	Lathurhan		Measured	Measurement Temperature	Calibration Verification	Instrument Model/
Parameter	Standard	Lot Number	Units	Value	(°C)	Acceptance Window	ID Number
pH Specific	7.00	4709 645-110817	S.U.	7.02	23	6.9 - 7.1	73111
Specific Conductance	1412		μmhos/cm			1342 - 1484	
Eh	Zobell's solution		mV				
Dissolved Oxygen	NA	NA	mg/L			±10% Theoretical:	
Turbidity	10 NTU		NTU		NA	9 - 11	
Notes:							
							^
		11					

Project Name: Project Number: Date/Time:	MBLP/Shiras ASD 180827 5/30/18 /530	& GW Monitoring					
Initials:	413		-			NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
рН	7.00	4709095-110817	S.U.	7-04	21.3	6.9 - 7.1	18, P.P. #31351
Specific Conductance	1412		μmhos/cm			1342 - 1484	7
Eh	Zobell's solution		m√				
Dissolved Oxygen	NA	NA	mg/L			±10% Theoretical:	
Turbidity	10 NTU	A6272	NTU	9.22	NA	9 - 11	1-7020 We \$4550
Notes:							
	ik.	4					
			in an				

EQUIPMENT CALIBRATION FORM

			EQUI MEITI	CALIBITATION			
Project Name:	MBLP/Shiras ASE	& GW Monitoring	_				
Project Number:	180827		<u></u>				
Date/Time:	5/31/18 10	00	_				
Initials:	APS		_			NA = Not	: Applicable
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ Number
	4.00	4612941-61117	S.U.	3.98		3.9 - 4.1	
рH	7.00	4709095-110917	S.U.	7.04	135	6.9 - 7.1	YS1 P.7
	10.00	4612804-011117	S.U.	10.00		9.9 - 10.1	#429
c .c	147	50180208-16	μmhos/cm	161		132 - 162	
Specific Conductance	1412	SC180208-ZA	μmhos/cm	1410	18.7	1342 - 1484	
Conductance	2765	50180103-36	μmhos/cm	2802		2628 - 2905	
Eh	Zobell's solution	20821045-1	mV	429.5	18.8	925-8-445.8	

Notes:		
		1

9.20

9.75

mg/L

NTU

NA

A6272

19.8

Dissolved Oxygen

Turbidity

±10%

9 - 11

L. 2020 LEAL

Theoretical: 9.09

NA

10 NTU

Project Name:	MBLP/Shiras ASD	& GW Monitoring	_				
Project Number:	180827		_			5	
Date/Time:	5/31/18 113	0					
Initials:	APS		=			NA = Not Applicable	-
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
pΗ	7.00	SAME AS INTIAL	S.U.	7.07	19.8	6.9 - 7.1	451 P.P. #48
Specific Conductance	1412	CAL.	μmhos/cm	1370	13.9	1342 - 1484	
Eh	Zobell's solution		mV	427.8	19.8	424.5.444.5	
Dissolved Oxygen	NA	NA	mg/L	993	15.8	±10% Theoretical: 9.89	+
Turbidity	10 NTU	Y	NTU	10.67	NA	9 - 11	L. 2020 ce #6
Notes:							
						-	
-							

EQUIPMENT CALIBRATION FORM

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5131/18	(0:∞					
Initials:	AD					NA = Not	: Applicable
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ID Number
	4.00	4612941-01117	S.U.	3.98		3.9 - 4.1	451 PP
рН	7.00	4709695-11081	S.U.	7.01	19.4	6.9 - 7.1	
	10.00	4612804-01117	S.U.	9.97		9.9 - 10.1	# 513
Specific	147	30180208-10	μmhos/cm	157.6	•	132 - 162	
Conductance	1412	SU80208-23	μmhos/cm	1371	fa.2	1342 - 1484	
	2765	56180103-30	μmhos/cm	2663		2628 - 2905	
Eh	Zobell's solution	ZOB 21045-1	mV	427.5	19.5	424.5-444.5	
Dissolved Oxygen	NA	NA	mg/L	1.50	11.0	±10% Theoretical: 9.28	1
Turbidity	10 NTU	A6272	NTU	9.52		9 - 11	Latotle 2020 we 4410
Notes:				_			

Project Name:	MBLP/Shiras ASD	& GW Monitoring							
Project Number:	180827								
Date/Time:	5/31/18 1	345							
Initials:	AD			NA = Not Applicable					
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number		
рН	7.00	Same as	S.U.	7.08	25.7	6.9 - 7.1	Y51 PP 513		
Specific Conductance	1412	initial cal.	μmhos/cm	1420	25.1	1342 - 1484			
Eh	Zobell's solution		mV	424.0	21.7	421.9-441.9			
Dissolved Oxygen	NA	NA	mg/L	9.07	16	±10% Theoretical: 4.87	→		
Turbidity	10 NTU		NTU	10.6	NA	9 - 11	Lattothe 2020 we		
Notes:							₽ 4(0		
		£							

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5/31/18	1635					
Initials:	AD					NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
рН	7.00	Same as 11. Hal	S.U.	7.08	28.8	6.9 - 7.1	45188 # 513
Specific Conductance	1412	cel.	μmhos/cm	1478	21.4	1342 - 1484	
Eh	Zobell's solution		mV	427.3	17.6	427.1 - 447.1	
Dissolved Oxygen	NA	, NA	mg/L	9.04	16.6	±10% Theoretical: 9.67	*
Turbidity	10 NTU	Y	NTU	4.7	NA	9 - 11	1.3020 WE #4/0
Notes:							

Project Name:		MBLP/Shira	as ASD & GW	Monitoring		Monitoring Location	n:	MW	- 1	
Project Number:		180827			_	Sample ID:		NA		
Site Location:		Marquette	, MI		2	Well Type:		2" 50	Juan, 2d	
Weather/Temp.:		74°	, some	clos ds		Key Number:			6	
INSPECTION		101 11-01		4, 0, 3, 5, 1		leu Elizabeth III			1 Sept. 1 1 Sept. 16	
Label on well?			YES / 10 / RI	EMEDIED		Is cement pad in goo	od repair?		YES / NO / REM	NEDIED NA/A
ls reference mark	visible?		YES / (10)/ RI	EMEDIED		Is protective casing l	ocked and in goo	d repair?	NO / REM	1EDIED
standing water pr	esent?	-(YES / NO / RI	EMEDIED		ls inner cap in place	and properly seal	ling well?	YES NO / REM	1EDIED
ndication of surfa	ace runoff in we	ell? 🕰	YF / (10) / RI	EMEDIED		Is well casing in visib	oly good repair?		MB / NO / REM	1EDIED
Repair Notes:		-	·							
TATIC WATER LE	VEL		DATE: 5	130/18		TIME: 1209	# THE			
Top of Casing Ele	vation:		M	ft		Measured with:	(Electronic tape	/ Chalked tape / Other:	
Depth to Water:		+0.	30	ft		Well depth verified?		CYESY NO		
Elevation of Wate	er;		•):	ft						
WELL PURGING		tell or s	DATE: 5	130/18		TIME: 12:12				Carto Syley
CALCULATION OF	3 CASING VOL	UMES		. M		PURGE METHOD:				
Depth of well from	n TOC	29.	44	ft		Bailer / Grundfos / P	eristaltic / Bladde	er / Other:	_whale	
Depth to water			. 30	ft		Equipment #:	603			
Height of water co	olumn	= 29	1.74	Vit				3		
Conversion factor		x(Q.	49)	1		Conversion Facto	rs (gallons/ft)	1		
3 Water volumes		= L	-	gallons		1.25" well -0.20	4" well - 1.96	-		
Actual volume pu	rged:	_~10		gallons		2" well - 0.49	8" well - 7,83]		
WATER QUALITY	STABILIZATION	(If require	d)	The state of the s		FAMILY S. 1. S				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Time	Volume I	Purged	рН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
12:12	←start	purge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
12:15	3		7.56	NA	NA	11.0	NA	ادر ﷺ		
12:19	6		8.11	NA	NA	NA 3.4	NA	Su 118	purged dy m	+ ~6 get
1339	rital	wh	-	NA	NA	NA	NA	NA	1 1	
1341	8	, ,	7.77	NA	NA	MA 9.4	NA	WK 1267		
1342	iO		9.54	NA	NA	NA 9.6	NA	DK 951	sweet do a	+ 10 gol.
				NA	NA	NA	NA	NA	- second	stenet
FIELD ANALYSES			DATE:	HE INCHIDA		TIME:	A LEWY			
Temperature:			NA	°C		Carbo	n Dioxide:	NA NA	_mg/L HACH CA-DT (F	RL = 10mg/L)
pH:				S.U.		Sulfide	e:	NA	_mg/L HACH HS-WR (RL = 0.0Smg/L)
pecific Conducta	nce:		NA	µmhos/cm		Ferro	us Iron (Fe ⁺²):	NA	mg/L HACH IR-18C (F	RL = 0,2mg/L)
h:			NA	mV						
Dissolved O ₂ :			NA "	mg/L						
urbidity:			NA	NTU						
AMPLE COLLECT	ION		DATE:			TIME:	n puntayi	years Index	Dental Autor	
Sample appearance	ce:						-	Duplicate sam	ple collected?	YES / NO
Collection method	d:	Bailer / Gru	undfos / Peris	taltic / Bladder ,	Other:			MS/MSD samp	ole collected?	YES / NO
quipment#:								Chain of Custo	dy Number:	
Filter used:		0.4S μm (8	100) / 0.45 μι	m (8200) / NON	E					
Quantity	Size	Тұре	Filtered		Preservativ	ve			Parameters	
	40 mL	Glass	Yes No	None	HCI HNO ₃ I	H ₂ SO ₄ NaOH				
	250 mL	Plas c	Y N-	/ Ner	THO!	10 N: W				
	S00 mL	Plas c	1.7 NE-	7 de .2	. H.O.	16.	-			
	500 mL	Plastic	Yes No	None	HCI HNO₃ I	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3 I	H ₂ SO ₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO ₃ I	H₂SO₄ NaOH				
SAMPLING PERSO	ONNEL /						deptiling.	7101117-55		0,0000000000000000000000000000000000000
Name (SIGNATU	IRE):	/	7			Name (SIGNATURE)	EL.			
	7-1-1		, ,							

Is reference mark visible? Standing water present? Standing water present. Standing water pre	
Site Location: Marquette, Mi Weath Type: 2	toring MonItoring Location:
NESPECTION	Sample ID:
Label on well? YES @ FREMEDIED Is cement pad in good repair? YES / MO / REMEDIED Is protective easing locked and in good repair? YES / MO / REMEDIED Is protective easing locked and in good repair? YES / MO / REMEDIED Is inner cap in place and properly sealing well? YES / MO / REMEDIED Is inner cap in place and properly sealing well? YES / MO / REMEDIED Is well capin in visibly good repair? YES / MO / REMEDIED YES / MO / REMEDIED Is well capin in visibly good repair? YES / MO / REMEDIED YES / MO / NO	
Label on well? VES MO / REMEDIED Is reference mark visible? VES MO / REMEDIED Is reference mark visible? VES MO / REMEDIED Is inner cap in place and properly sealing well? VES MO / REMEDIED Is inner cap in place and properly sealing well? VES MO / REMEDIED Is well casing in visibly good repair? VES MO / REMEDIED Repair Notes: STATC WATER LEVEL DATE: //D/T TIME: L-U Top Of Casing Elevation: JPM	Key Number:
Is reference mark visible? Standing water present? Standing water present. Standing water pre	
Standing water present? Indication of surface runoff in well? YES BO / REMEDIED Is inner cap in place and properly sealing well? YES BO / REMEDIED Is well casing in visibly good repair? ITIME:	DIED Is cement pad in good repair? YES / NO / REMEDIED
Notestion of surface runoff in well? YES	IED Is protective casing locked and in good repair? YESY NO / REMEDIED
Repair Notes: STATC WATER LEVEL DATE:	IED Is inner cap in place and properly sealing well?
STATIC WATER LEVEL DATE: 70 Y TIME: 1.4 S	IED Is well casing in visibly good repair?
Top of Casing Elevation:	
Depth to Water: 0.70	71 T TIME: 11.43
Elevation of Water:	Measured with: Electronic tape / Chalked tape / Other:
### PURGING DATE: 5/30/18 TIME: U	Well depth verified?
CALCULATION OF 3 CASING VOLUMES PURGE METHOD:	
Depth of well from TOC	(18 TIME: 11 4 5
Depth to water	PURGE METHOD:
Height of water column	Bailer / Grundfos / Peristaltic / Bladder / Other:
Conversion factor	Equipment #: 607
1.25" well - 0.20	
Actual volume purged:	Conversion Factors (gallons/ft)
### WATER QUALITY STABILIZATION (if required) Time	
Time	ons 2" well - 0.49 8" well - 7,83
1 1 5	
1	pec Cond Dissolved O ₂ Temperature Eh Turbidity
12 9 NA	nhos/cm) (mg/L) (°C) (mV) (NTU)
3 2 1 6	NA NA 12.9 NA NA TOT B parged day at ~ 5 gal
132 2	
NA NA NA NA NA NA NA NA	
NA NA NA NA NA NA NA NA	NA MA DI NA MA DESS Regul dry at 8 gal
FIELD ANALYSES DATE: TIME: Temperature: NA °C Carbon Dioxide: NA mg/L HACH CA-DT (RL = 10 mg/L) pH: S.U. Sulfide: NA mg/L HACH HS-WR (RL = 0.05 mg/L) NA mg/L HACH HS-WR (RL = 0.02 mg/L) HACH IR-18C (RL = 0.2 mg/L) HACH IR-18C (RL = 0.2 mg/L) NA mg/L HACH IR-18C (RL = 0.2 mg/L) NA Tibility: NA NA NTU NA NTU NA NTU NA NTU NA NA NTU NA NA <td></td>	
Temperature: NA °C Carbon Dioxide: NA mg/L HACH CA-DT (RL = 10mg/L) pH: S.U. Sulfide: NA mg/L HACH HS-WR (RL = 0.05mg/L) Specific Conductance: NA μmhos/cm Ferrous Iron (Fe ²²): NA mg/L HACH IR-18C (RL = 0.2mg/L) Eh: NA mV Dissolved O ₂ : NA mg/L Turbidity: NA NTU TIME:	
pH: S.U. Sulfide: NA mg/L HACH HS-WR (RL = 0.05mg/s) Specific Conductance: NA μmhos/cm Ferrous Iron (Fe ⁺²): NA mg/L HACH IR-18C (RL = 0.2mg/L) Eh: NA mV Dissolved O ₂ : NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	
Specific Conductance: NA μmhos/cm Ferrous Iron (Fe ⁴²): NA mg/L HACH IR-18C (RL = 0.2mg/L) Eh: NA mV Dissolved O ₂ : NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	
Eh: NA mV Dissolved O₂: NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	
Dissolved O₂: NA mg/L Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	osyctil refronts from (re). NA ing/L nAch in-16c (kL = 0.2mg/L)
Turbidity: NA NTU SAMPLE COLLECTION DATE: TIME:	L
SAMPLE COLLECTION DATE: TIME:	
Dublicate sample collected (YES / NO	
Collection method: Bailer / Grundfos / Peristaltic / Bladder / Other: MS/MSD sample collected? YES / NO	
Equipment #: Chain of Custody Number:	
Filter used: 0.45 µm (8100) / 0.45 µm (8200) / NONE	
O. 15 MIII (O TOO) / MOINE	oy) was
Quantity Size Type Filtered Reservative Parameters	Reservative Parameters
40 mL Glass Yes No None HCI HNO ₃ H ₂ SO ₄ NaOH	None HCI HNO ₃ H ₂ SO ₄ NaOH
250 mL Plas V No No H O No	
500 mL Plas c 5. Nc 10 1 H O 10 10 10 10 10 10 10 10 10 10 10 10 10	16 .4 1.4 H 05 1.50 1.6.4
500 mL Plastic Yes No None HCI HNO ₃ H,5O ₄ NaOH	The state of the s
500 mL Plastic Yes No None HCl HNO ₃ H ₂ SO ₄ NaOH	None HCI HNO ₃ H ₂ SO ₄ NaOH
1000 mL Plastic Yes No None HCl HNO ₃ H ₂ SO ₄ NaOH	None HCI HNO ₃ H ₂ SO ₄ NaOH
SAMPLING PERSONNEL	

									1.3	
Project Name:	9	MBLP/Shira	s ASD & GW I	Monitoring		Monitoring Location	1:		W-3	-
Project Number:	3	180827			-	Sample ID:		- 2/4		-
Site Location:		Marquette,	. MI			Well Type:		2 " s	alumized	-
Weather/Temp.;					_	Key Number:		035	6	=
INSPECTION	Maria de	_ nihán	a Toler	TAC III	programs to				is substitution	The Section of The
Label on well?			YES / RE	MEDIED		Is cement pad in goo	od repair?		YES / NO / REM	EDIED N/A
Is reference mark	visible?		YES NO / RE			Is protective casing I	ocked and in good	d repair?	MB / NO / REM	IEDIED
Standing water pre	esent?		753 / NO / RE			Is inner cap in place	and properly seal	ing well?	NO / REM	IEDIED
Indication of surfa	ce runoff in we	:117	YES (NO)/ RE	MEDIED		Is well casing in visib	ly good repair?		(YES / NO / REM	IEDIED
Repair Notes:										
STATIC WATER LEV	VEL	/=iv/ai	DATE: 5/	30/18		TIME: 11,10	CALKEL!			2 5 4 (4)
Top of Casing Elev	ation:	H	M .	ft		Measured with:		Electronic tape	/ Chalked tape / Other:	
Depth to Water:	32	0.	9	ft		Well depth verified?		(YES / NO		
Elevation of Wate	er:		T.	ft		,				
WELL PURGING		PICHER	DATE: 5	130/18	w Filmini	TIME: [120	ME TO THE	日宝いり	A CHILDING SE	17 - X - 3 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
CALCULATION OF	3 CASING VOLU	JMES				PURGE METHOD:				
Depth of well from			16.1	ft		Bailer / Grundfos / P	eristaltic / Bladde	er / Other:	while	
Depth to water			.90	ft		Equipment #:	603			_
Height of water co	olumn			ft				-		
Conversion factor		x(0,		s Vii		Conversion Facto	rs (gallons/ft)			
3 Water volumes	2	= 13		gallons		1.25" well - 0.20	4" well - 1,96			
Actual volume pur	ged:	t	1009	gallons +	5	2" well - 0.49	8" well - 7.83	1		
WATER QUALITY		(if require		ALBOURA	S IN DAMES	OF STATE		TES DOS	The sales of the sales	
Time	Volume F		pН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
	←start g		(S.U ₊)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)	ζÜ.	- 1
1124	(3,017)	Juige	8.61	NA	NA NA	11.6	NA (III)	BASESTE'	and dry a	Sol
1303 6	ا مایا			NA -	NA	NA	NA -	NA	po see org n	-34
1304	restart	gen &	6.95	NA	NA	NA 11. 1	NA	NA 1493	44	
A	7		7.5)	NA	NA NA	W 8.7	NA	NA 98 NTU		C) 001/4
1305			1.64	NA	NA	NA NA	NA NA	NA NA	4030 Wy 21	950 (450
				NA NA	NA NA	NA	NA NA	NA:		A SAC
FIELD ANALYSES			DATE:		I E E E DE LA SE	TIME:			Wite Surface	
Temperature:			NA	°C		Carbo	n Dioxide:	NA	mg/L HACH CA-DT (F	RL = 10mg/L)
pH:				5.U.		Sulfid	e:	NA NA		RL = 0.05 mg/L)
Specific Conducta	nce:		NA	μmhos/cm			us Iron (Fe ⁺²):	NA NA	mg/L HACH IR-18C (
Eh:	2		NA	mV					•	
Dissolved O ₂ :			NA	mg/L						
Turbidity:			NA	NTU						
SAMPLE COLLECT	ION	003 200	DATE: -		ES CAMES	TIME:				PASSED BY
Sample appearance			ente.					Duplicate samp	ole collected?	YES / NO
Collection method		Bailer / Gr	undfos / Daries	taltic / Bladder ,	/ Other:		-	MS/MSD samp		YES / NO
Equipment #:	_	Daniel / GIL	andios / PCIIS	and plauder	, Juici.			Chain of Custo		,
Filter used:		0.45 μm/9	1001-/0.45	- n (8200) / NON	F			S.I.E.III OI CUSTO	_,	1
riitei useu.		0.43 діп (6	100// 0.43 μ	11 (8200) / 14014						
Quantity	Size	Туре	Filtered		Preservati	ve			Parameters	
	40 mL	Glass	Yes No	Моле	HCI HNO ₃	HOP NaOH	4			
	250 mL	Plas c	YEN!	1 Nem	KA H O	20 V				
	S00 mL	Plas c	1 NE -	1 16.2	H O,	767187	-			
	500 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO ₃	H ₂ SO ₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO ₃	H ₂ SO ₄ NaOH				
SAMPLING PERSO	ONNEL		admit ain			ALL STATE				为一世以 与 市
Name (SIGNATU	IRE):	1		-		Name (SIGNATURE)	10			

Project Name:	98	MBLP/Shira	as ASD & GW	Monitoring	-	Monitoring Location	n:	- MW	1-4	
Project Number:	59	180827			2	Sample ID:		-NA		-
Site Location:		Marquette,	, MI		4	Well Type:		5. Mr	FM	
Weather/Temp.:		64%	andon	-		Key Number:		_N/A		
INSPECTION		1,0,00	CHANGE I		10 2005				the same that it	
Label on well?		(YES NO / RE	MEDIED		Is cement pad in goo	od repair?		YES/N	O / REMEDIED
ls reference mark	visible?		NO / RE	MEDIED		Is protective casing	locked and in goo	od repair?	(YES) N	O / REMEDIED
Standing water pre	esent?		YES NO / RE	MEDIED		Is inner cap in place	and properly sea	ling well?	CYESY N	O / REMEDIED
ndication of surfa	ce runoff in we	:II?	YES NO/ RE	MEDIED		Is well casing in visib	oly good repair?		(YES/N	O / REMEDIED
Repair Notes:										
STATIC WATER LE	VEL	011	DATE: 5/	30/18		TIME: 9:28		The state of		
Top of Casing Elev	ration:	10	1	ft		Measured with:	(Electronic tape	Chalked tape /	Other:
Depth to Water:		15	35	ft		Well depth verified?	,	YES/NO		
Elevation of Wate	r: y			ft						
WELL PURGING	and party		DATE: 5	30/18		TIME: 430	0940 (AS)	4 74 1		Time delivery vol.
CALCULATION OF	3 CASING VOLU	JMES	,	162		PURGE METHOD:				
Depth of well from	TOC	46.	73	ft		Bailer / Grundfos / P	eristaltic / Bladd	er / Other;	whole	
Depth to water		-(15	35	9		Equipment #:	603	20		
Height of water co	lumn	= 31	. 34	ft				a		
Conversion factor	10	x(0.	.49	·/		Conversion Facto	ors (gallons/ft)	X 14:41	- puzzel	My a scord 8.5 gal tot Herel gallons as
3 Water volumes	10	= 15.	39 1	gallons		1.25" well - 0.20	4" well - 1.96		time at	8.5 cal tot
Actual volume pur	ged: 8.5	(5.5	+3)	gallons		2" well - 0.49	8" well - 7.83		(3.11.	Herel order 1 as
WATER QUALITY	TABILIZATION	(if required	3)	434 4						Janois W
Time	Volume f	urged	рН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
430	←start ;	ourge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
0946	5.5		7.46	NA	NA	NA 11.6	NA	NA 23. 6	4 PURGED	DRY @5.554
- //// -	++		Non	NA	NA	NA	NA	NA-		DEIONER MO
-A/A-	40.5	í l	VM	NA	NA	NA	NA	NA	SAMPLE	
1446	restat	ouze	50	NA	NA	NA-	NA	NA	44 PETUR	BOANS OF DEW
1447	7		7.80	NA	NA	NA 9.9	NA	MA 401		ELLONG TIMES
14-18	8		7.70	NA	NA	NA 9.7	NA	NA 30 L	SUL= ZZ	Control of the Contro
FIELD ANALYSES	organism in	in the book	DATE:			TIME: -	WE WELL			
Temperature:			NA	°C		Carbo	on Dioxide:	NA	_mg/L HACH (CA-DT (RL = 10 mg/L)
pH:			//	S.U.		Sulfid	e:	NA	_mg/L HACH H	HS-WR (RL = 0.05mg/L)
Specific Conductar	nce:		NA	μmhos/cm		Ferro	us Iron (Fe ⁺²):	NA	_mg/L HACHI	R-18C (RL = 0.2mg/L)
Eh:			NA	_mV						
Dissolved O ₂ :			NA	mg/L						A STATE OF THE PARTY OF THE PAR
urbidity:			NA	NTU						7
AMPLE COLLECTI	ON	Maria III	DATE:	Windshift In		TIME:	The state of the	=101001 11	at? All ally	AS A PART OF TAKE
Sample appearance	e:						_	Duplicate sam	ple collected?	YES / NO
Collection method	:	Bailer / Gru	ındfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	ole collected?	YES / NO
Equipment #:								Chain of Custo	dy Number:	
Filter used:		0.45 µm (8)	100) / 0.45 μι	m (8200) / NONE	E					
Quantity	Size	Туре	Filtered		Preservativ	/e			Parameters	
	40 mL	Glass	Yes No	None	HCI HNO3 H	H ₂ SO ₄ NaOH				
	250 mL	Plas	y- N	/ Ngv	Ma HO	70. NE W	D			
	S00 mL	Plas c	17.7 1	1 19.	1.7 H.O, T.	36513311	L-			
	S00 mL	Plastic	Yes No	None	HCI HNO, H	H ₂ SO ₄ NaOH				
			Van Na	None	HCI HNO, H	H ₂ SO ₄ NaOH				
	S00 mL	Plastic	Yes No	None	1101 111103	12001 110011				
	500 mL 1000 mL	Plastic Plastic	Yes No			H ₂ SO ₄ NaOH				



								MINDARD	
Project Name:		MBLP/Shir	ras ASD & GW	Monitoring	-	Monitoring Locati	on:	MW-5	
Project Number:		180827				Sample ID:		NIA	
Site Location:		Marquette	e. MI			Well Type:		2" PI	30
Weather/Temp.:		630,	overest		=0	Key Number:		N/A	
INSPECTION	The Evalua	#6. "Ini		12.					
Label on well?			YES / NO / R	EMEDIED		Is cement pad in go	ood repair?		/ NO / REMEDIED
ls reference mark	visible?	- 9	MB/NO/R	EMEDIED		Is protective casing	g locked and in goo	od repair?	YES NO / REMEDIED
Standing water pr	esent?		YES (NO)/ R	EMEDIED		ls inner cap in plac	e and properly sea	ling well?	YES / NO / REMEDIED
Indication of surfa	ace runoff in w	ell?	YES / (O) R	EMEDIED		Is well casing in vis	ibly good repair?		(YES) NO / REMEDIED
Repair Notes:			1						
STATIC WATER LE	VEL	Parity .	DATE: 5	130/18	JUNE 1	TIME: 8:50	22/11/21/21		Mary Telephone With Mary Market
Top of Casing Ele	vation:	-		ft		Measured with:		Electronic tap	<pre>/ Chalked tape / Other:</pre>
Depth to Water:		14	.79	_ft		Well depth verified	17	YESY NO	
Elevation of Wate	er:			ft					
WELL PURGING			DATE: S	130/18	(-2 q ₁ 81 p	TIME: \$:59		STEWN BY	
CALCULATION OF	3 CASING VOL	UMES				PURGE METHOD:			
Depth of well from	n TOC	40	1.75	_ft		Bailer / Grundfos /	Peristaltic / Bladde	er / Other:	WHALE
Depth to water		-(14	1.79	-f}		Equipment #:	# 603	=0	
Height of water co	olumn	= 29	96 1	ft		<u></u>			
Conversion factor		X(0.4	49	1		Conversion Fact	ors (gallons/ft)		
3 Water volumes		= 14	.68.	gallons		1.25" well - 0,20	4" well - 1.96		
Actual volume pur	rged:	17	O.	gallons		2" well - 0.49	8" well - 7.83		
WATER QUALITY	STABILIZATION	N (if require	d)	TO BE THE	الإيالدي	UJ SE DE CA	Description for	VIII Na L. QUE	
Time	Volume	Purged	рН	Spec Cond	Dissolved O	2 Temperature	Eh	Turbidity	
8:59	←start	purge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)	
0904	5		7.28	NA	NA	NA	NA	NA	TURBIONY: 708AV, TEMP: 11.19
8908	10		7.48	NA	NA	NA	NA	NA	TU:281) TY : 199 NTO TEMP/1.0°L
5215	15		7.42	NA	NA	NA	NA	NA .	TUR. 11.5 NTS TENS: 67"
				NA	NA	NA	NA	NA	1000 11000
				NA	NA	NA	NA	NA	
				NA	NA	NA	NA	NA	
FIELD ANALYSES		The P.	DATE: 37	30/13	No. of Parties	TIME: PIT		11/2011	
Temperature:		W.Z -	NA	°C		Carbo	on Dioxide:	NA	mg/L HACH CA-DT (RL = 10mg/L)
pH:		7.41	6	S.U.		Sulfic	de:	NA	mg/L HACH HS-WR (RL = 0.0Smg/L)
Specific Conductar	nce:		NA	μmhos/cm		Ferro	ous Iron (Fe ⁺²):	NA	mg/L HACH IR-18C (RL = 0.2mg/L)
Eh:			NA	mV					
Dissolved O₂:			NA	mg/L					
Turbidity:		12.8 -	NA-	NTU .	÷				
SAMPLE COLLECTI	ON	THE PARTY	DATE:			TIME;			
Sample appearance	e:							Duplicate samp	ple collected? YES / NO
Collection method	;	Bailer / Gru	undfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	ole collected? YES / NO
Equipment #:						1 1945 F		Chain of Custo	dy Number:
Filter used:	Α.	0,45 µm (8	100) / 0,4S µr	m (8200) / NONE					
Quantity	Size	Тұре	Filtered		Preservat	ive			Parameters
	40 mL	Glass	Yes No	None	HCI HNO,	H₂SO ₄ NaOH			
	2S0 mL	Plas c	Y N-	/ Nove	HO H O	120 Va W	φ		0
	500 mL	Plas c	1.7 Nc -	7 de .].PH]	1.50.13311	F		
	S00 mL	Plastic	Yes No	None	HCI HNO3	H₂SO₄ NaOH			
	S00 mL	Plastic	Yes No	None	HCI HNO ₃	H ₂ SO ₄ NaOH			
	1000 mL	Plastic	Yes No	None	HCI HNO₃	H₂SO₄ NaOH			
SAMPLING PERSO	NNEL	,						ille lle Ma	
Name (SIGNATUR	RE):	15	>			Name (SIGNATURE)	12		

Project Name:		MBLP/Shiras	ASD & GW Monito	Oring	Monitoring Loca		MW-1			
Project Numbe	er:	180827			Sample ID:		MBLPS-18-0S-N	/W-1(I/MS/MS	D)	* :
Site Location:		Marquette, I	MI		Well Type:		TANKS IN		-,	•:
Weather/Temp	o:	75 Su		Luds	Key Number:		03	56		•
INSPECTION		2,380	7,3						over the same	
Label on well?			YES /NO)/ RE	EMEDIED	Is cement pad in	good repair?			YES / NO / REM	IEDIED NA
Is reference ma	ark visible?		YES / 100/ RE			ing locked and in	good repair?		NO / REM	
Standing water	present?		NO / RE			ace and properly			YES / NO / REM	
Indication of su	ırface runoff i	n well?	YES / N / RE		Is well casing in	visibly good repa	ir?		YES NO / REM	
Repair Notes:	C9514	full.	1	to top buil	ed out,	APPED 12	e at M.			-
STATIC WATER	LEVEL	Hillian	DATE: 5/31	/18	TIME: 15C	3		in the new line	falls of	IN PACE
Top of Casing I	Elevation:	NM	ft		Measured with:	(Electronic tape	/ Chalked tape	/ Other:	
Depth to Wate	er:	0.04	ft		Well depth verif	ied?	YES / CO			
Elevation of W	ater:		ft	* 70.21	ED CHIE	Done	500 10 A			
WELL PURGING	3 - 11		DATE: 5/31		TIME: 155	and the second second	102 10 1-	105 10 2	175/0"/ /	35-77-1012
Purge Method:		PERISTALTIC		O BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC or <u></u> b	ottom
Equipment No.	:		\$2							
Measured well	depth:	29.44	ft	Screen length:	5	ft	Depth to scree	n midpoint:	26.94	ft
		r Level	Drawdown	Pumping Rate	рН	Temp	Spec Cond	Turbidity	Eh	D,O,
Time		eet)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1618	6.		6.10	140	7.64	14.3	135 /	14.0	472	0.19
621	6		6-11	140	7.63	14.9	1361	21.0	471	0.30
1624	6.		6.11	140	7.62	14.9	1378	21.2	471	0.36
1627	6.1	5	6.11	140	7.62	14.8	1370	20.0	470	0.29
Volume:	2.1	(Gallons)		Stabilization Criteria:	±0,1	±3%	±3%	±10% for	±10 mV	±10%
FIELD ANALYSE	S	0.57 Brill	DATE: 4/31	118	TIME: 162	8		values >20		
Temperature:		14.9	*c	Carbon Di	oxide:	NA	mg/L	HACH CA-DT (I	RL = 10 mg/L)	
рН:		7.62		Sulfide (S ⁻¹	²):	NA	mg/L	HACH HS-WR	(RL = 0.0S mg/L)	
Specific Conduc	ctance:	1367	μmhos/cm	Ferrous Ire	on (Fe ⁺²):	NA NA	_mg/L	HACH IR-18C (RL = 0.2 mg/L)	- 4
Eh:		469	mV							
Dissolved Oxyg	en:	0.29	mg/L							
Turbidity:		14.5	NTU							
SAMPLE COLLE	CTION	Harris Sing	DATE: 5/3	1/18	TIME: 162	91			ACHIEVA III	
Sample appear			2			-11	Duplicate samp			YES /MO
Collection meti	(O BLADDER / OTHER:			MS/MSD samp			YES/NO
Equipment No.	:		52				Chain of Custo			2036
Filter used:		0.45 µm (810	00) / 0.45 µm (8200	DIV NONE			Chain of Custo	Designated N	la Du	2060 CR
Quantity	Size	Туре	Filtered		Preservative				meters	
	40 mL	Glass	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH			-	
	12S mL	Plastic	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH	6	041501		
3	S00 mL	Plastic	No		None			-	FI	,
3	S00 mL	Plastic	No		None				, Calcium	, ,
3	S00 mL	Plastic	No		HNO ₃				H, TDS, SO ₄	-
3	500 mL	Plastic	No		HNO ₃		Sb, As,		Co, Pb, Hg, Mo,	Se, Tl, Li
9	1000 mL	Plastic	No		HNO ₃			Radium 22	6, Radium 228	/
*******	1000 mL	Glass	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH	The same of the last	V- / 450		un library and
SAMPLING PER		_	<			0.0155.00		W. W. W. C.		NAME OF THE
Name (SIGNA	TURE):		-	Name (SIG	SNATURE):					



Project Name:		MBLP/5hiras	ASD & GW Monito	oring	Monitoring Loca	ation:	MW-2			•
Project Numbe	r:	180827			Sample ID:		MBLPS-18-05-N	/IW-2(I) & (D)		•
Site Location:		Marquette, f	МІ		Well Type:		2 " Jalo	m.Zc		•
Weather/Temp) :	760	some cloud	5	Key Number:		0356			50
INSPECTION							a belle			
Label on well?			YES NO / RE	MEDIED	Is cement pad in	n good repair?			YES / NO / REM	IEDIED WAY
s reference ma	ark visible?		YES (NO) / RE	MEDIED	Is protective cas	ing locked and in	good repair?		YES/ NO / REN	IEDIED
Standing water	present?	1	RE (MO) RE	MEDIED	Is inner cap in pl	lace and properly	sealing well?	9	△¥8 / NO / REM	IEDIED
Indication of su	rface runoff i	n well?	YES MO / RE	MEDIED	Is well casing in	visibly good repa	ir?		NO / REM	IEDIED
Repair Notes:	- 40	ded	1' Master	Lex.						Ē1
STATIC WATER	LEVEL	JEH W.S	DATE: 5/31	118	TIME: 142	1	AND MILLION			
Top of Casing E		MK		7	Measured with:		Electronic tape	/ Chalked tape	/ Other:	
Depth to Wate		1.09			Well depth verif		YES /(NO)	e#s:	,	
Elevation of W			ft	# puzza	•		1130000	£ 1.	1 441	(A & C
WELL PURGING	H. H. LEW		DATE: 5/31		TIME: 14	rite for	> many	70 119	IN STASSIZE	1700
Purge Method:		PERISTALTIC		O BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC orb	ottom
Equipment No.:	-		52							
Measured well	depth:	28.92	ft	Screen length:	_ 5	_ft	Depth to scree	1176	26.42	ft
T'		r Level	Drawdown	Pumping Rate	pH (S.L.)	Temp		Turbidity	Eh ()()	D.O.
1447		eet)	(feet)	(mL/min)	(S.U.)	(°C)	(μmhos/cm)	(NTU)	(mV)	(mg/L)
1450		51	4.52	100			578	1	497	0.16
1453	2.	85	4.72	/00	7.88	12.3	574	17.8		0.26
			4.76		7.88	133	571	18.2	491	0.26
1456		89	4.80	100	7.88	13.6	574	14.7	490	0-26
1459		70	4.8	100	7.88	14.0	575	20.8	459	2.27
1501		94	4.85	100	7.89	13.9	577	23	488	0.26
1505	5	1/	4.88	100	7.89	14.1	575	26.0	487	0.25
Volume:	1.96	(Gallons)		Stabilization Criteria:	±0.1	±3%	±389	±10% for	±10 mV	±10%
FIELD ANALYSE	The second second	WHITE STATE	DATE: 5/3	1/14	TIME: 150	6	18	values >20		
Temperature:		14.1		Carbon D		NA	mg/L	HACH CA-DT (RL = 10 mg/L)	
pH:		7. 88	11	Sulfide (S	⁻²):	NA	mg/L		(RL = 0.05 mg/L)	
Specific Conduc	tance:		μmhos/cm		on (Fe ⁺²):	NA	mg/L		(RL = 0.2 mg/L)	
Eh:		487			adown a		-	. 1		
Dissolved Oxyge	en:	0.14	- 1100			,	and a	19 4	5/25.1.26	
Turbidity:		24.4	NTU	10	45 mon	13				
SAMPLE COLLE	CTION		DATE: 5/3	1/19	TIME: 15 0	71				F.
Sample appeara	ance:		elen				Duplicate samp	ole collected?	(YES NO
Collection meth	nod:	PERISTALTIC	BLADDER / MICR	O BLADDER / OTHER:			MS/MSD samp	le collected?		YES
Equipment No.:		-	52			¥	Chain of Custo	dy Number: App	px III 60420	03L V
Filter used:			00) / 0.45 µm (8200	MONE		, and a	Chain of Custo	dy Number: App	px IV 60420	60
	r		r				·		uplicate location	
Quantity	Size	Type	Filtered		Preservative	NaOH		Para	ameters	
	40 mL	Glass	Yes No	None HCI						
2	125 mL	Plastic	Yes No	None HCI		NaOH				
2	500 mL S00 mL	Plastic Plastic	No No		None		-	Porc-	Fl Calcium	/
0 1	S00 mL	Plastic	No No		None				, Calcium	
2		FIGSUC			HNO₃		Ch. A		H, TDS, SO ₄ Co, Pb, Hg, Mo,	C. This
2		Dloot!-	NI.o.							
	S00 mL 1000 mL	Plastic Plastic	No No		HNO ₃		SD, AS		6, Radium 228	Se, II, LI



Drainat Name:		MOID/FL:	AED 9 CHURA- "	elu e	Marian 1 1	41	1 4141 2			
Project Name:			A5D & GW Monito	uuk	Monitoring Loca	ation:	MW-3	and the		±1
Project Number	r:	180827			Sample ID:		MBLPS-18-05-N	MW-3(I)		•
Site Location:		Marquette, I			Well Type:		7. 10	CO Salv	v1.24	÷)
Weather/Temp	1:	70,4	oudy		Key Number:		0356			=:
INSPECTION	String of the	riena a r		on, to pay that		Similar same na			and the same	
Label on well?			YES (NO) RE	MEDIED	Is cement pad ir	good repair?			YES / NO / REM	1EDIED ON
Is reference ma	rk visible?		YES NO/ RE		Is protective cas	ing locked and in	good repair?	(YB / NO / REM	1EDIED
Standing water	present?	A	Q) FIND / RE	MEDIED	Is inner cap in p	lace and properly	sealing well?	<	YES NO / REM	IEDIED
Indication of su	rface runoff i	well?	YE5 ANO / RE	MEDIED	Is well casing in	visibly good repai	r?	(YES NO / REM	IEDIED
Repair Notes:										
STATIC WATER	LEVEL	Hample of C	DATE: 5/31	118	TIME: 125	O				
Top of Casing E	levation:	NM	ft		Measured with:		Electronic tape	Chalked tape	/ Other:	
Depth to Wate	r:	0.25	ft		Well depth verif	ied?	YE5 / WO			
Elevation of Wa	ater:	_	ft * PUR	WED CHIVH	Dane 51	D S MAIS	" " " " " " " " " " " " " " " " " " "	To \$78.70	DE ALA	150
WELL PURGING	LINE	E (%)	DATE: 5/31	/18	TIME: 12 '5	4	10 109	3774372	4 1100	DEVIC.
Purge Method:		PERISTALTIC		O BLADDER / OTHER:	1111111	Pump intake @	15	ft from	TOC or I h	ottom
Equipment No.:			52	,		and more G			.00010	ottom
Measured well		ا ٥.٥ د		Screen length:	5	_ft	Depth to scree	n midpoint:	26.51	ft
		Level	Drawdown	Pumping Rate	рН	Temp	5pec Cond	Turbidity	Eh	D _i O.
Time		et)	(feet)	(mL/min)	(5.U.)	(°C)	(µmhos/cm)	(NTU) 🥕	(mV)	(mg/L)
1323	5. E		5.43	100	8.08	14.5	789	20.0	550	0.66
1326	5.		5.71	100	8.08	14.5	493	16.7	547	0.66
1327	6. 3		6.06	100	80.8	14.9	488	18.6	542	0.66
1332	6.0		6.20	100	8.07	15.1	490	18.1	539	0.65
1335	6.6	7	6.37	100	8 05	14.6	496	20.6	538	0.65
1338	6.	12	6.	100	5.07	149	490	ib·L	535	0.63
Volume:	.5	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%
FIELD ANALYSE		DULL BUILD	DATE: 5/31	/17	TIME: 13	10		values >20		
Temperature:		14.9		Carbon Di		. NA	mg/L	HACH CA-DT (R	l = 10 mg/L)	
pH:		8.07	17	5ulfide (5	_	NA NA	mg/L	HACH H5-WR (I		
Specific Conduc	tance:	100	µmhos/cm	Ferrous In		NA NA	mg/L	HACH IR-18C (R		
Eh:		535	• 7	75,7500 N	(, 5 /		1116/ 5	TIACITIN 100 (II	(L = 0.2 mg/ L)	
Dissolved Oxyge	en:	0.62		*DID NOT S	Show Division in the	Ar Ho Min	11			
Turbidity:		14.0		* DIV NOT 5	17 4 6121261	73 77				
SAMPLE COLLE	CTION		DATE: 5/3(118	TIME: 13	11			PIE PER PE	
Sample appeara	ince:		det-			-	Duplicate samp	le collected?		YES / NO
Collection meth	od:	PERISTALTIC		D BLADDER / OTHER:			MS/MSD sampl	le collected?		YES (NO)
Equipment No.:			551			¥	Chain of Custoo	dy Number: App:	XIII 404	2036
Filter used:		0,45 µm (810	00) / 0.45 μm (8200	MONE			Chain of Custoo	dy Number: App		20591
Quantity	5ize	Туре	Filtered		reservative			Parar	meters	
	40 mL	Glass	Yes No	None HCI	HNO ₃ H ₂ 5O ₄	NaOH				
	125 mL	Plastic	Yes No	None HCI	HNO₃ H ₂ 5O ₄	NaOH				
1	SDD mL	Plastic	No		None				FI /	
11	5DD mL	Plastic	No		None			Boron,	Calcium	. 1
1	5DD mL	Plastic	No		HNO ₃			Cl, Fl, pH	, TDS, SO ₄	•
1	500 mL	Plastic	No		HNO ₃		Sb, As,	Ba, Be, Cd, Cr, C	Co, Pb, Hg, Mo, S	Se, Tl, Li 🗸
3	100D mL	Plastic	No		HNŌ₃			Radium 226	, Radium 228	/
	10D0 mL	Glass	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH				
SAMPLING PER	SONNEL									HE WELL
Name (SIGNA	TURE):	5	Λ	Name (SIG	NATURE):					

Project Name:		MBLP/Shiras	ASD & GW Monito	ring	Monitoring Loca		MW-4			
Project Numbe	r:	180827			Sample ID:		MBLPS-18-0S-N	1W-4(I)		-5/ -
Site Location:		Marquette, N	ИІ		Well Type:		Z" PVL F	М		=0
Weather/Temp).	SUN. 65			Key Number:		NONE			= 0.
INSPECTION	SALLIEL.	AKI STUD		TO STANDARD	A PERMIT	TELESCOPE AND THE		- P(0, E)		
Label on well?			VES/NO / RE	MEDIED	Is cement pad in	good repair?		2	YES / NO / REN	MEDIED
Is reference ma	rk visible?		YES / NO / RE	MEDIED	Is protective cas	ing locked and in	good repair?	7	VES NO / REN	MEDIED
Standing water	present?		YES /NO/ RE	MEDIED	Is inner cap in pl	ace and properly	sealing well?	2	YES/ NO / REN	MEDIED
Indication of su	rface runoff ir	well?	YES (NO) RE	MEDIED	Is well casing in	visibly good repa	ir?	(YES/ NO / REN	MEDIED
Repair Notes:										-8
STATIC WATER	LEVEL		DATE: 5/31	118	TIME:1021					
Top of Casing E	levation:		ft		Measured with:		Flectronic tape	/ Chalked tape /	Other:	
Depth to Wate	r:	15.10	ft		Well depth verif	ied?	YES INO			
Elevation of W	ater:	~	ft							
WELL PURGING			DATE: 5/3//	18	TIME: 1022	RUKI ALD		AULT S KONI	gire(o) a	
Purge Method:				O BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC or 👱 b	oottom
Equipment No.:		39	7	9						
Measured well	depth:		ft	Screen length:		_ft	Depth to scree	n midpoint:		_ft
	Water	Level	Drawdown	Pumping Rate	рН	Temp	Spec Cond	Turbidity	Eh	D.O.
Time		et)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1100	24.5		9.48	100	7.61	11.3	1735	13.5	143	0.37
1103	24.80		9.70	100	7.61	11.5	1735	12.5	144	0.84
1106	25.12		10.02	100	7.61	11.4	1728	11-4 (3)	143	0.33
					3.			12.4		
										V
Volume: /	.6	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%
FIELD ANALYSE		1.0	DATE: 5/31	113	TIME: /107		Playersus	values >20		
Temperature:		11.4	°C	/ Carbon D		NA	mg/L	HACH CA-DT (R	L = 10 mg/L)	
pH:			S.U.	Sulfide (S	·²²):	NA NA	mg/L	HACH HS-WR (F		
Specific Conduc	tance:	1739	μmhos/cm	Ferrous I	ron (Fe ⁺²):	NA	mg/L	HACH IR-18C (R	_	
Eh:		144	mV		` '			·	5, ,	
Dissolved Oxyg	en:	0.84		MUDEUM	DID NOT S	TABILIZE /	10 45 MI	, es .		
Turbidity:		11.4	NTU							
SAMPLE COLLE	CTION		DATE: 5/3/	1113	TIME: 1100	/			Tell point	Dhyans
Sample appear	ance:		CLEAR			-:	Duplicate samp	ole collected?		YES
Collection meth	nod:			O BLADDER / OTHER:			MS/MSD samp	le collected?		YES (NO)
Equipment No.		337				4	Chain of Custo	dy Number: App:	x 111 6042	036/
Filter used:		0.45 μm (810	00) / 0.45 μm (8200	NONE			Duplicate samp MS/MSD samp Chain of Custoo Chain of Custoo	dy Number: App	XIV 6042	059
Quantity	Size	Тұре	Filtered		Preservative				meters	
	40 mL	Glass	Yes No	None HCl	HNO ₃ H₂SO ₄	NaOH				
	12S mL	Plastic	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH				,
1	S00 mL	Plastic	No		None				FI •	
1	S00 mL	Plastic	No		None			Boron,	Calcium •	/
1	500 mL	Plastic	No		HNO ₃			Cl, Fl, pH	, TDS, SO ₄	/
1	S00 mL	Plastic	No		HNO ₃		Sb, As	, Ba, Be, Cd, Cr, (Co, Pb, Hg, Mo,	Se, Tl, Li 🗸
3	1000 mL	Plastic	No		HNO ₃			Radium 226	, Radium 228	✓
	1000 mL	Glass	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH				
SAMPLING PER	SONNEL	1			Trade (e to				r zahor	it, its lay
Name (SIGNA	TURE):	XL /	2	Name (SI	GNATURE):					

Project Name:	MBLP/5hira	s A5D & GW Monito	oring	Monitoring Loc	ation:	MW-5			
roject Number:	180827			Sample ID:		MBLP5-18-05-N	лW-5(I)		
ite Location:	Marquette,	МІ		Well Type:		2" PVC			
Weather/Temp:	650	andy		Key Number:					5 6 2
NSPECTION				Harinton.					i i degl
abel on well?		YES NO / RE	MEDIED	Is cement pad in	n good repair?			YES / NO / REM	EDIED
s reference mark visible	?	YES / NO / RE	MEDIED	Is protective cas	sing locked and i	n good repair?		YES⊅NO / REM	EDIED
tanding water present?		YE5 /NØ/ RE	MEDIED	Is inner cap in p	lace and properl	y sealing well?		YES / NO / REM	
ndication of surface run	off in well?	YE5 / NO TRE	MEDIED	Is well casing in	visibly good rep	air?		YES / NO / REM	EDIED
lepair Notes:									2
TATIC WATER LEVEL	i gérési	DATE: 5/3	/18	TIME: 10:2	13				
Top of Casing Elevation:	MM	_ft		Measured with:		Electronic tape	/ Chalked tape	/ Other:	
Depth to Water:	14.78	<u>.</u> ft		Well depth veri	fied?	YES /NO			
Elevation of Water:		_ft							
WELL PURGING		DATE: 5/31	/18	TIME: 10 3	3		N. E. WALL	MI LES	
Purge Method:	PERISTALTA		O BLADDER / OTHER:		Pump intake @	25	_ft_from	TOC orbo	ottom
Equipment No.:		5.2							
Measured well depth:	44.75	_ft	5creen length:	_5	ft	Depth to scree	n midpoint:	42.25	ft
	ater Level	Drawdown (fact)	Pumping Rate	pH (F.LL)	Temp	5pec Cond	Turbidity	Eh (=\tau)	D.O.
Time	(feet)	(feet)	(mL/min)	(5.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1109 1	6.37	159	120	2.47	11. 3	1137	8.79	484.5	3.14
1112 1	6.37	1.59	220	7.47	11.0	11 02	8.17	491.6	3.18
	3.37	1.57	220	7.47	11.1	1103	6.91	443. 2	3.17
1118 11	.37	1.5	220	7.47	11.1	1103	745	494.9	3.19
		-				-			
					-	+			
		1			il .				
/olume: 2.5	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for values >20	±10 mV	±10%
FIELD ANALYSES	All Market	DATE: 5/3	115	TIME: 11 19					
Temperature:	11.0	_*c	Carbon D	ioxide:	NA	_mg/L	HACH CA-DT (F	RL = 10 mg/L)	
oH:	7.47	S.U.	5ulfide (5	⁻²):	NA NA	mg/L	HACH H5-WR (RL = 0.05 mg/L)	
Specific Conductance:	1103	_μmhos/cm	Ferrous I	ron (Fe ⁺²):	NA	mg/L	HACH IR-18C (I	RL = 0.2 mg/L)	
h:	4955	_mV							4
Dissolved Oxygen:	3.19	_mg/L							
Furbidity:	6:76	_NTU							
AMPLE COLLECTION		DATE: 5/31,	115	TIME: 11 1) /			18 58	
Sample appearance:		clew			-	Duplicate samp			YES /
			O BLADDER / OTHER:			MS/MSD samp		1	YES /
	51	52			•	Chain of Custo	dy Number: App	x III 6042	036 V
Equipment No.:		.00) / 0.45 μm (8200	NONE			Chain of Custo	dy Number: App	1 604Z	259
Collection method: Equipment No.: Filter used:									
equipment No.: illter used: Quantity 5ize	0.45 μm (81 Type	Filtered		Preservative			Para	meters	
quipment No.: illter used: Quantity Size 40 m	0.45 μm (81 Type Glass	Yes No	None HCI	HNO ₃ H ₂ 5O ₄			Para	meters	
quipment No.: ilter used: Quantity Size 40 m 125 n	0.45 μm (81 Type L Glass	Yes No Yes No	None HCI	HNO ₃ H ₂ 5O ₄			100		
equipment No.: ilter used: Quantity 5ize 40 m 125 n 1 500 n	0.45 μm (81) Type Glass L Plastic Plastic	Yes No Yes No No	None HCI	HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ None			11	FI /	
Quantity 5ize Quantity 5ize 40 m 125 n 1 500 n 1 500 n	0.45 μm (81) Type Glass L Plastic L Plastic L Plastic	Yes No Yes No No	None HCI	$\begin{array}{cc} \text{HNO}_3 & \text{H}_2\text{5O}_4 \\ \text{HNO}_3 & \text{H}_2\text{5O}_4 \\ \text{None} & \\ \end{array}$			Boron	Fl /	
Quantity Size 40 m 125 n 1 500	O.45 µm (81) Type L Glass L Plastic L Plastic L Plastic L Plastic	Yes No Yes No No No No	None HCI	$\begin{array}{ccc} \text{HNO}_3 & \text{H}_2\text{5O}_4 \\ \text{HNO}_3 & \text{H}_2\text{5O}_4 \\ \\ \text{None} & \\ \text{HNO}_3 & \\ \end{array}$			Boron, Cl, Fl, ph	Fl Calcium A, TDS, SO ₄	Sa Ti U
Quantity Size 40 m 125 n 1 500	O.45 µm (81) Type L Glass L Plastic L Plastic L Plastic L Plastic L Plastic	Yes No Yes No No No No No	None HCI	$\begin{array}{ccc} \text{HNO}_3 & \text{H}_2\text{5O}_4 \\ \text{HNO}_3 & \text{H}_2\text{5O}_4 \\ \\ \text{None} & \\ \text{None} & \\ \text{HNO}_3 & \\ \text{HNO}_3 & \\ \end{array}$		Sb, As	Boron, Cl, Fl, ph	FI Calcium C, TDS, SO ₄ CO, Pb, Hg, Mo, S	Se, Tl, Li
Quantity Size Quantity Size 40 m 125 n 1 500 n 1 500 n 1 500 n 3 1000 n	O.45 µm (81) Type Glass L Plastic	Yes No Yes No No No No No No No	None HCI	HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ None None HNO ₃ HNO ₃	NaOH	Sb, As	Boron, Cl, Fl, ph	Fl Calcium A, TDS, SO ₄	Se, Tl, Li
Quantity Size 40 m 125 n 1 500	O.45 µm (81) Type Glass L Plastic	Yes No Yes No No No No No	None HCI	HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ None None HNO ₃ HNO ₃		Sb, As	Boron, Cl, Fl, ph	FI Calcium C, TDS, SO ₄ CO, Pb, Hg, Mo, S	Se, Tl, Li

EQUIPMENT CALIBRATION FORM

Project Name:	MBLP/Shiras ASE	& GW Monitoring					
Project Number:	180827						41
Date/Time:	9/20118	かつ40					
Initials:	ARS		í			NA = Not	Applicable
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ID Number
	4.00	4805452-062018	S.U.	3.98		3.9 - 4.1	451 P.P.
рН	7.00	4708195-110817	S.U.	7.08	16.3	6.9 - 7.1	#513
	10.00	462804-01117	S.U.	10.10		9.9 - 10.1	,
Cifi-	147	SC180713-1C	μmhos/cm	149		132 - 162	
Specific Conductance	1412	SC180103-20	μmhos/cm	1413	15-8	1342 - 1484] "]
	2765	SL180713-3D	μmhos/cm	2756		2628 - 2905	
Eh	Zobell's solution	20326882-2	mV	435.3	14.5	431-0-451.0	
Dissolved Oxygen	NA	NA	mg/L	10.00	14.5	±10% Theoretical: (0.08)	→
Turbidity	10 NTU	AGZ7Z	NTU	10,23	_	9 - 11	L. 2020 - 146
Notes:		ji.					**************************************

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	9/20/18 1	:53					
Initials:	AO					NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
рН	7.00	same as initial cal.	S.U.	7-10	15-8	6.9 - 7.1	451 PP #513
Specific Conductance	1412	1	μmhos/cm	1408	15.4	1342 - 1484	
Eh	Zobell's solution		mV	434.3	15.2	431.0-451.0	
Dissolved Oxygen	NA	NA	mg/L	9.47	14.7	±10% Theoretical: i 3.08	
Turbidity	10 NTU	4	NTU	10.00	NA	9 - 11	L.M. # 2020 WE 6
Notes:							
					Ð		

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	9/20118 142	5					
Initials:	APS					NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
Н	7.00	SAME AS CNUTCHE	S.U.	7:10	15-9	6.9 - 7.1	451 P.P. #513
Specific Conductance	1412	Car	μmhos/cm	1406	15.3	1342 - 1484	
Eh	Zobell's solution		mV	430.3	15.9	429.7-449.7	
Dissolved Oxygen	NΑ	NA	mg/L	9.70	13.1	±10% Theoretical: /0.54	
Turbidity	10 NTU	4	NTU	9.00	NA	9 - 11	2-2020 4 #C
Notes:							
					<u> </u>		
						- A	
	0.	1					
						-	
		- 1					

Project Name:			s ASD & GW Monit	oring	Monitoring Loc	ation:	MW-1			-	
Project Numbe	er:	180827			Sample ID:		MBLPS-18-09-	MW-1{I /MS/MS	or(I) AR	<u>.</u>	
Site Location:		Marquette,			Well Type:		2" Galv				
Weather/Tem	p:	57,	doudy		Key Number:		356				
INSPECTION								7			
Label on well?			YES / MO/R		ls cement pad in				YES / NO / REM	MEDIED NA	
Is reference ma			YES /NO/ R			sing locked and in	-		NO / REA		
Standing water			(YES) NO / R		Is inner cap in p	Is inner cap in place and properly sealing well?					
Indication of su	ırface runoff	in well?	yes / 100 / R	EMEDIED	Is well casing in	visibly good repa	ir?		YES/NO/REN	NEDIED	
Repair Notes:	-									-0	
STATIC WATER	LEVEL	a L. Kana	DATE: 4/20	119	TIME: 11.	04	Total is a			SALAG	
Top of Casing I	Elevation:	NM	_ft		Measured with:	-	Electronic tap	/ Chalked tape	/ Other:		
Depth to Wate	er:	2.10	ft		Well depth verif	fied?	YES (NO)				
Elevation of W	ater:		ft								
WELL PURGING			DATE: 9/20	114	TIME: 11:0	6		HILLIAN ESTIN	nivers Til		
Purge Method:	144	PERISTALTIC		O BLADDER / OTHER:		Pump intakę @	5	ft from	TOC or 🗸 b	ottom	
Equipment No.	B-,	39	17							'	
Measured well	depth:	21,44	ft	Screen length:	_5_	_ft	Depth to scree	n midpoint:	26.94	ft	
	1	er Level	Drawdown	Pumping Rate	рН	Temp	Spec Cond	Turbidity	Eh	D.O.	
Time		eet)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NXO)	(mV)	(mg/L)	
11:24	٦.	26	2.16	100	7.70	13.8	1358	4302	-	0.15	
11.31		38	2 28	100	7.79	13.8	1358	18.5	430	0.16	
11.34	2.	51	2.51	100	7.79	13.7	1359	17.7	430	0.16	
11.37	2.	57	2.47	100	7.79	13.7	1358	12.4	430	0.16	
11:40	<u> </u>	67	757	100	7.77	13.7	1358	12.9	430	0.16	
11:43	1.	76	2.66	100	7.79	13.7	1351	13.8	430	0.17	
11,46	2.	QU	2.70	100	7.79	13.8	1356	11.7	430	0.17	
11:49	1.	87	12.77	100	7,77	13.7	1357	#10% for	430	0.17	
Volume:	1.0	(Gallons)	41-	Stabilization Criteria:	±0.1	±3%	±3%	values >20	±10 mV	±10%	
FIELD ANALYSE	S		DATE: 9/2		TIME: 115		0.2/01/19/7			- All 1	
Temperature:		13.8	S.U.	Carbon Di		NA	mg/L	HACH CA-DT (F			
oH: Specific Conduc	tancai	327 5232		Sulfide (S	_	NA	mg/L		RL = 0.05 mg/L)		
ърестс сопаис Eh:	tance:	430	μmhos/cm	Ferrous Ir	on (Fe):	NA NA	mg/L	HACH IR-18C (I	RL = 0.2 mg/L)		
-π. Dissolved Oxγge	en:	0.17									
Furbidity:		9.8									
	TION	A CONTRACTOR				1	Albania de la compansión de la compansió				
Sample appeara		clea	DATE: 9/20	/18	TIME: 115		D. II.	P.E.II.,GI	Ally Visible		
Collection meth				O BLADDER / OTHER:		R	Duplicate samp			YES /	
quipment No.:			97	O BLADDER / OTHER:			MS/MSD samp		•	YES / NO	
ilter used:		-	νι τ 00) / 0.45 μm (820)) / A Comb					XIII 60421	35 🖊	
mer useu.		o Ha hiii (ett.	,ω, / υ,45 μπ (820t	אוויטא אווי		8	-Chain-of-Gusto		MAN (A9)	neved M	
Quantity	Size	Туре	Filtered	F	reservative				5/MSD location neters	to Mw	
	40 mL	Glass	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH					
	125 mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH					
	250 mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH				/	
816	250 mL	Plastic	No		HNO ₃			Total	; B, Ca	,	
114	S00 mL	Plastic	No		None			Cl, Fl, pH	, TDS, SO ₄		
	S00 mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH					
	1000 mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH					
			Yes No	None HCI	HNO ₃ H ₂ SO ₄						

Project Name		***************************************	s ASD & GW Monit	oring	Monitoring Lo	cation:	MW-2			
Project Numb		180827			Sample ID:		MBLPS-18-09-	MW-2(I) & (D)	B	=0
Site Location:		Marquette,	was to the		Well Type:		2" Galv			_
Weather/Ten	np:	57,	Joudy		Key Number:		356			_
INSPECTION		5/44					DV / S			21 Auf 100
Label on well			YES / NO / R		Is cement pad i				YES / NO / RE	MEDIED N/A
Is reference n			YES /MOTOR			sing locked and ir			VES / NO / RE	MEDIED
Standing water	10		YES /NO7/ R			lace and properly			YES / NO / RE	
Indication of s Repair Notes:		in well?	YES (NO) R	EMEDIED	Is well casing in	visibly good repa	ir?		YES NO / RE	MEDIED
Repair Notes.	0									-
STATIC WATE	R LEVEL		DATE: 9/2	0/18	TIME: ID 1	2	da Willia		W-184 FLS	71/2 02/9
Top of Casing	Elevation:	NM	_ft		Measured with		Electronic tape	/ Chalked tape	/ Other:	
Depth to Wat	er:	003	_ft		Well depth veri	fied?	YES (NO			
Elevation of V	Vater:	_	_ft							
WELL PURGIN	G		DATE: 9/2	0/18	TIME: /O'	3	راها الما	i je v sti	de la companie de la	
Purge Method	l:			O BLADDER / OTHER:		Pump intake @	2.5	ft from	_TOC or	bottom
Equipment No	u:	39	7	•)					-	
Measured wel	depth:	28.4	<u>/</u> ft	Screen length:	5	_ft	Depth to scree	n midpoint:	26.42	ft -
	1	er Level	Drawdown	Pumping Rate	pH	Temp	Spec Cond	Turbidity	Eh	₩, D.O.
Time		eet)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
10:23	/	F	1.18	100	7.95	13.4	563	5.7	424	0.17
10:37	_	7 9	1.76	100	7.95	13.5	560	4.2	478	015
10:40		02	1.99	100	7.95	13.5	563	3.1	428	0.14
10:43	2.,		2.23	100	7.55	13.1	561	2.5	429	0.11
10,46		50	2.47	100	7.95	13.1	560	1.3	429	0.11
10:49	2.	69	6.66	100	7.95	13./	500	1.7	430	0.11
10:52	2.	96	6 2.5	3 100	7.95	13.0	560	1.7	431	0.09
/olume: /		(Gallons)		Stabilization Celtaria	104			±10% for		
TELD ANALYSI		(Gallolis)	n	Stabilization Criteria:	±0.1	±3%	±3%	values >20	±10 mV	±10%
emperature:	25	13.1	°C	-	TIME: 10:5					
Н;			S.U.	Carbon Di Sulfide (S		NA	mg/L	HACH CA-DT (u . ,	
pecific Condu	ctance.	559	μmhos/cm	Ferrous In		NA	mg/L		RL = 0.0S mg/L	
h:	ctance.	431		infus in reed		NA NA	mg/L	HACH IR-18C (I	RL = 0.2 mg/L	
issolved Oxyg	en:	0.1				bandon				
urbidity:		1.60		Jampann 4	D.o. 40	1 not sta	كاتعر ع	v. C01	~ L/m.n	11 45 M
AMPLE COLLE	CTION		DATE: 9/20	1,5	TIME: 10:	EH of		A STATE OF THE PARTY OF		
ample appear	CONTRACTOR OF THE PARTY OF THE	سماء_		/ 1 8	TIME TO.	7 7	Duplicate sampl	lo selleste 12	NO. NO.	Pleace Infrant
ollection met	hod:			D BLADDER / OTHER:			MS/MSD sample			YES (NO)
quipment No.	:	347		· · · · · · · · · · · · · · · · ·						YES / NO
ilter used:			00) / 0.4S µm (8200	NONE			Chain of Custod		×111 604217	30
		, ,	,, , ,	,,		3	Ghain of Custod		×114 (1	moved
Quantity	Size	Туре	Filtered	P	reservative				plicate location neters	moved.
	40 mL	Glass	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH				
	12S mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH				
	2S0 mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH				,
71	250 mL	Plastic	No		HNO ₃			Total	; B, Ca 🗸	,
710	500 mL	Plastic	No		None				, TDS, SO ₄	
	S00 mL	Plastic	Yes No	None HCl	HNO₃ H₂SO₄	NaOH				
	1000 mL	Plastic	Yes No	None HCI	HNO₃ H₂SO₄	NaOH				
	1000 mL	Glass	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH				

Project Name:		MRI P/Shiras	ASD & GW Monito		Monitoring Loca	tion:	MW-3			
Project Number:		180827			Sample ID:		MBLPS-18-09-MW-3(I)			
Site Location:		Marquette, N	Л I		Well Type:		2" Galv			-
Weather/Temp):		Loudy		Key Number:		356			=:
INSPECTION	Ser Ser			NATO PARE						
Label on well?			YES /(NO)/ RE	MEDIED	Is cement pad in	good repair?			YES / NO / REM	MEDIED NOTA
Is reference ma	rk visible?		YES /(NO) RE	MEDIED	Is protective cas	ing locked and in	good repair?		(YES) NO / REM	
Standing water	present?		YES /(NO)/ RE	MEDIED		ace and properly			YES PNO / REM	
Indication of sui	rface runoff i	in well?	YES (NO) RE	MEDIED	Is well casing in	visibly good repai	ir?		YES NO / REM	MEDIED
Repair Notes:				H						-
STATIC WATER	LEVEL	general many	DATE: 412	718	TIME: 1 0	0			alenkii k	AMERICA II
Top of Casing E	levation:	NM	ft	7	Measured with:		Electronic table	/ Chalked tape	/ Other:	
Depth to Water	r:	0.1	ft		Well depth verif	ied?	YES NO			
Elevation of Wa	ater:		ft							
WELL PURGING		HY. 905	DATE: 9/20	/18	TIME: 9.0	P	and out of the		and the pa	
Purge Method:		PERISTALTIC		O BLADDER / OTHER:	1.0	Pump intake @	2.5	ft from	TOC or t	oottom
Equipment No.:		(47							
Measured well	depth:	29.01	ft	Screen length:	5	ft	Depth to scree	n midpoint:	26.51	_ft
Tierre			(CDrawdown	Pumping Rate	pH	Temp	Spec Cond	Turbidity	Eh	D.O.
Time) (f	eet)	(feet) 2.59	(mL/min)	(S.U.)	13.2	(µmhos/cm)	(NTU)	(mV)	(mg/L)
9.21		69	- 1	100	8.15	13. 2	616	3.0	440	0.35
9:24	2 2	100	2.84	100	8.10	13./	615	1.9	439	0.37
9.2 A	3/2	المراب	3.24	100	8.17	13.1	60 X	2.7	440	0.34
95/	5.5	2	345	100	0.1/	13.2	604	2.3	440	0.33
9.53	3.5	7	3.47	100	8.17	11.5	640	11.4	437	0.38
9:56	3.1	6	3.66	130	8.11	12.4	629		437	0.41
9:59	5.0	11	3.87	120	8.18	12. 9	621	9.7	437	0.39
Volume: () - Ø	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%
FIELD ANALYSE	-		DATE: 9/20	/18	257	30		values >20		
Temperature:		13.0	O- 1	Carbon Di		NA	mg/L	HACH CA-DT (RL = 10 mg/L)	
pH:		8.18	the state of the s	Sulfide (S	⁻²):	NA NA	- _mg/L	HACH HS-WB	(RL = 0.0S mg/L)	
Specific Conduc	tance:	620	μmhos/cm	Ferrous Ir		NA	mg/L	HACH IR-18C (
Eh:		437	mV X	* dawdown	del no	Stabiliz	K D	100 ML	-Imin in	1 45 mi
Dissolved Oxyge	en:	0.34	mg/L			11.11			•	
		9.1	NTU			,				
Turbidity:				1.6	TIME: 10:	- 1		HILL AVEN TO		
the supplementation of	CTION	1715	DATE: 9/20	/ (Y	TIME: 10	010				
SAMPLE COLLEC		معاء			TIME: 10	317	Duplicate samp	le collected?		YES / 🐠
SAMPLE COLLECT	ance:	-	<u> </u>	O BLADDER / OTHER:	TIME: 10	012	Duplicate samp			YES /OF
SAMPLE COLLECTOR Sample appeara	ance: nod: <	PERISTALTIC	BLADDER / MICR		TIME: TO	0 0	MS/MSD samp	le collected?	ox III janu 21	YES /MO
SAMPLE COLLECTOR Sample appears Collection method Equipment No.:	ance: nod: <	PERISTALTIC	BLADDER / MICR	O BLADDER / OTHER:	TIME: 10		MS/MSD samp	le collected? dy Number: App	ox III <i>Ġo42</i> /	YES /MO
SAMPLE COLLECT Sample appears Collection meth Equipment No.: Filter used:	ance: nod:	PERISTALTIC 3 η - 0.45 μm (810	D BLADDER / MICR 7 00) / 0.4S μm (8200	O BLADDER / OTHER:			MS/MSD samp Chain of Custon	le collected? dy Number: App		YES /MO
SAMPLE COLLECTOR Sample appears Collection method Equipment No.:	nod:	PERISTALTIC 3 9 0.4S µm (810	BLADDER / MICR 7 200) / 0.45 μm (8200 Filtered	O BLADDER / OTHER:	Preservative	•	MS/MSD samp Chain of Custon	le collected? dy Number: App dy Number: App		YES /MO
SAMPLE COLLECT SAMPLE appears Collection meth Equipment No.: Filter used:	size 40 mL	PERISTALTIC 3 9 0.4S µm (810 Type Glass	BLADDER / MICR 7 00) / 0.4S μm (8200 Filtered Yes No	O BLADDER / OTHER:	Preservative HNO ₃ H ₂ SO ₄	NaOH	MS/MSD samp Chain of Custon	le collected? dy Number: App dy Number: App	ax_IV	YES /MO
SAMPLE COLLECT Sample appears Collection meth Equipment No.: Filter used:	Size 40 mL 125 mL	PERISTALTIC 3 9 0.4S μm (810 Type Glass Plastic	BLADDER / MICR 7 00) / 0.4S μm (8200 Filtered Yes No Yes No	O BLADDER / OTHER: None HCI None HCI	Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄	NaOH NaOH	MS/MSD samp Chain of Custon	le collected? dy Number: App dy Number: App	ax_IV	YES /MO
SAMPLE COLLECTOR Sample appears Collection meth Equipment No.: Filter used: Quantity	Size 40 mL 125 mL 2S0 mL	PERISTALTIC 3 1 0.4S µm (810 Type Glass Plastic Plastic	BLADDER / MICR 7 200) / 0.4S μm (8200 Filtered Yes No Yes No Yes No	O BLADDER / OTHER:	Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄	NaOH	MS/MSD samp Chain of Custon	ie collected? dy Number: Api ly Number: Api Para	nmeters	YES /MO
SAMPLE COLLECTOR Sample appears Collection meth Equipment No.: Filter used: Ouantity	Size 40 mL 125 mL 250 mL	PERISTALTIC 3 1 0.4S µm (810 Type Glass Plastic Plastic Plastic	BLADDER / MICR 7 700) / 0.45 μm (8200 Filtered Yes No Yes No Yes No No	O BLADDER / OTHER: None HCI None HCI	Preservative HNO ₃ H ₂ SO ₄	NaOH NaOH	MS/MSD samp Chain of Custon	ie collected? dy Number: Api dy Number: Api Para Tota	imeters	YES /MO
SAMPLE COLLECTOR Sample appears Collection meth Equipment No.: Filter used: Quantity	Size 40 mL 125 mL 250 mL 500 mL	PERISTALTIC 3 1 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic	BLADDER / MICR 7 700 / 0.4S μm (8200 Filtered Yes No Yes No Yes No No No	None HCI None HCI	Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ None	NaOH NaOH NaOH	MS/MSD samp Chain of Custon	ie collected? dy Number: Api dy Number: Api Para Tota	nmeters	YES /MO
SAMPLE COLLECTOR Sample appears Collection meth Equipment No.: Filter used: Quantity 1	Size 40 mL 125 mL 250 mL 500 mL	PERISTALTIC 3 9 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic Plastic	BLADDER / MICR 7 200 / 0.45 µm (8200 Filtered Yes No Yes No No No No Yes No	None HCI None HCI	Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ None HNO ₃ H ₂ SO ₄	NaOH NaOH NaOH	MS/MSD samp Chain of Custon	ie collected? dy Number: Api dy Number: Api Para Tota	imeters	YES /MO
SAMPLE COLLECTOR Sample appears Collection meth Equipment No.: Filter used: Quantity 1	Size 40 mL 125 mL 250 mL 250 mL 500 mL 1000 mL	PERISTALTIC 3 9 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic Plastic Plastic Plastic	BLADDER / MICR 7 200 / 0.4S μm (8200 Filtered Yes No Yes No No No Yes No Yes No Yes No	None HCI None HCI None HCI None HCI	Preservative HNO3 H ₂ SO4	NaOH NaOH NaOH NaOH	MS/MSD samp Chain of Custon	ie collected? dy Number: Api dy Number: Api Para Tota	imeters	YES /MO
SAMPLE COLLECTOR Sample appears Collection meth Equipment No.: Filter used: Quantity 1	Size 40 mL 125 mL 250 mL 500 mL 500 mL 1000 mL	PERISTALTIC 3 9 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic Plastic	BLADDER / MICR 7 200 / 0.45 µm (8200 Filtered Yes No Yes No No No No Yes No	None HCI None HCI	Preservative HNO3 H ₂ SO4	NaOH NaOH NaOH NaOH	MS/MSD samp Chain of Custon	ie collected? dy Number: Api dy Number: Api Para Tota	imeters	YES /MO

native Name		MDID/Chicag		ring	Monitoring Loca		MW-4			
Project Name: Project Number		180827	A5D & GW Monito	IIIR	Sample ID:	don.	MBLPS-18-09-M	W-4(1) J. (D	`	
Site Location:		Marquette, M			Well Type:		2" PVC FM			
	-	60° s		-	Key Number:		NA			
Weather/Temp:	•)	60,50	0003		Key Ivalliber.		- IVA			Est months
INSPECTION				Manual Toll 18 180	STORMS AT N	XS(64) 2 2		gyan in limite	~	
Label on well?			YES/ NO / RE		Is cement pad in				YES NO / REM	
Is reference mai	rk visible?		YES NO / RE	MEDIED	Is protective casi			•	PS / NO / REM	
Standing water	present?		YES (NO) RE		Is inner cap in pla	ace and properly	sealing well?	,	PESY NO / REM	
Indication of sur	face runoff in	well?	YES (NG) / RE	MEDIED	Is well casing in v	isibly good repa	ir?	+	YED / NO / REM	IEDIED
Repair Notes:										8
The second second		CLUSION AND	DATE: 61/)	1.0-21.2100/100	THE 112	2	101/01/1 40 = 010	i ka sa na kama		
STATIC WATER			DATE:	118	Measured with:	_	Electronic tape	/ Chalked tage	Other	HIELDSCHOOL SE
Top of Casing E			ft			ad2	YES / NO	/ Chaikeu tape /	Other.	
Depth to Water	-	14.92			Well depth verifi	eur	WEST/ NO			
Elevation of Wa	iter:		ft 							
WELL PURGING		The state of	DATE: 9/20	118	TIME: 133	0	Horney B			A CAVELLE TO
Purge Method:	(PERISTALTIC	BLADDER / MICRO	BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC orb	ottom
Equipment No.:		34-	7							
Measured well	depth:	46.65	ft	Screen length:	_5_	ft	Depth to screer	n midpoint:	44.15	_ft
	Water	Level	Drawdown	Pumping Rate	рН	Temp	Spec Cond	Turbidity	Eh	D.O.
Time	(fee	et)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1353	19	04	4.12	100	7.72	12.2	1875	11.6	78	0-16
1356	14		4.39	100	771	12.3	1871	7.22	77.3	0.14
1355	19.	79	41,87	100	769	12.3	1865	7.26	77.6	0.15
1402	<u>ي</u> د ر		5.26	100	767	12.1	1849	7.35	74.0	0.16
1405	20.	55	5.64	100	7.66	12.)	1837	7.67	78.8	0.14
1408	، حو	91	6.00	[00]	7.65	12.3	1878	9.49	78.3	0.13
1411	21.	20	<u> </u>	100	7.64	12.3	1730	2.18	77.7	0.13
							L	1500/ 504		
Volume:	6-1	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for values >20	±10 mV	±10%
FIELD ANALYSE	s		DATE: 9/2	0/18	TIME: 1412		A SEMENT			
Temperature:		12.3	*c	Carbon D	ioxide:	NA	mg/L	HACH CA-DT (R	L = 10 mg/L)	
pH:		7.65		Sulfide (S	·²):	NA	mg/L	HACH HS-WR (RL = 0.05 mg/L	
Specific Conduc	tance:	1930		Ferrous II	ron (Fe ⁺²):	NA	mg/L	HACH IR-18C (F	RL = 0.2 mg/L	
Eh:		77.5	mV							
Dissolved Oxyge	en:	0.13	mg/L							
Turbidity:		623								
	erron.		01.	01.4	TIME: 141	2./	THE STATE OF	0.00	San San Sala	
Sample appears		.1	DATE: 4	VIX	THATE: 141	5	Duplicate samp	de collected?		YES/NO
tipeses.		DEDIETALTI)	/ DIADDED / MICD	O BLADDER / OTHER:		•	MS/MSD samp			YES (NO)
Collection meth	•		/ BLADDER / WICK	O BLADDEN / OTHER.				dy Number: App	vIII 💋 🙉 .	_
Equipment No.:		3 4 7	00) / 0.45 μm (8200	n / MONIE				dy Number: App	^"	2192
Filter used:		0.45 µm (810	io) / 0.45 μm (8200	17/01/9			CHOIN CO. ISSUE	Tues	1: Corto	
Quantity	Size	Type	Filtered		Preservative			Para	meters	
	40 mL	Glass	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH				
	125 mL	Plastic	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH				
	250 mL	Plastic	Yes No	None HCI		NaOH				
62 2	250 mL	Plastic	No		HNO₃			Tota	l; B, Ca 🖊	
(2)	S00 mL	Plastic	No		None			Cl, Fl, p⊦	I, TDS, SO ₄	
	500 mL	Plastic	Yes No	None HCl	HNO₃ H₂SO₄	NaOH				
	1000 mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ 5O ₄	NaOH				
	1000 mL	Glass	Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH				
SAMPLING PER	SONNEL	SELECTION .				100	A PROPERTY.		STEEL STATE	
		74		Name /El	GNATURE).	10	N			
Name (SIGNA	TOREJ:			Name (5)	GNATURE):	4				

	<u> </u>	MBLP/5hiras A	ASD & GW Monito	ring	Monitoring Locat	ion:	MW-5	7 5		
		80827		Sample ID:		MBLPS-18-09-MW-507 (1/M5/M5D) 2" PVC NA				
		Marquette, M	tte, MI		Well Type:					
Veather/Temp:		58,0	2 · dy		Key Number:					
NSPECTION	E RINNER					100 B				
abel on well?			YES NO / RE		Is cement pad in	good repair?			⊘ / NO / REM	EDIED
reference mar	k visible?		ALES/NOW/ KE	MEDIED	Is protective casi	ng locked and i	n good repair?		(ES)/ NO / REM	EDIED
tanding water p	oresent?		YES / RE		Is inner cap in pla	ace and properl	y sealing well?	(YES / NO / REM	EDIED
ndication of sur	face runoff in	well?	YES (NO) RE	MEDIED	Is well casing in v	isibly good rep	air?		(YES) NO / REM	IEDIED
epair Notes:	REPLA	ies C	" of M.	F						-0
TATIC WATER I	LEVEL		DATE: 9/20	118	TIME: 1235		ar initial ciali			
Top of Casing El	evation:	NH	ft		Measured with: Plectronic table / Chalked tape				Other:	
Depth to Water	7	-1 -	ft		Well depth verifi	ed?	YES / MO			
Elevation of Wa	_	100	ft				_			
	and the same		DATE: 9/20/	-	TIME: 113	7	Valle III v			An Yillia
WELL PURGING				O BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC orb	ottom
Purge Method: Equipment No.:			17	O BEADDERY OTHER.		rump intake e				
Measured well o	depth: 4	4.75	ft	Screen length:	5_	ft	Depth to screer		42.25	
	Water	D 144	Drawdown	Pumping Rate	pH (5.11)	Temp	5pec Cond	Turbidity	Eh (mV)	D.O.
Time	(fee		(feet)	(mL/min)	7.47	(°C)	(µmhos/cm)	(NTU) 2.3	413	(mg/t
1255	16.50		A.1.60	220	1-	11.60		1.3		2.15
1258	16.50	>	1.66	220	7.47	11.6	1138		4110	2.11
1301	16.50	>	1.60	220	7.47	11.6	1/33	1.8	417	1.51
1304	10.50		1.60	220	7.47	11.6	1133	1.2	419	1.44
1307	16.50	>	1.60	220	7.48	11.00	1133	1.1	419	1.38
				Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±109
Volume: /.	5	(Gallons)						values >20		
Volume: /.	ST 855 SU	(Gallons)	DATE: 9/20/		TIME: 1306	A SHERE				ilaiçõe.
CHARGO MARKET	s	(Gallons)	DATE: 9/20/			NA NA	mg/L	HACH CA-DT (F	RL = 10 mg/L)	i i proveb
FIELD ANALYSE	s	3, 197		118	Dioxide:		mg/L mg/L	HACH CA-DT (F	RL = 10 mg/L) (RL = 0.05 mg/L)	
FIELD ANALYSE Temperature:	\$ #1 = 1	11.60	°C S.U. µmhos/cm	Carbon D Sulfide (S Ferrous I	Dioxide: 5 ⁻²): Iron (Fe ⁺²):	NA NA NA	_	HACH CA-DT (F	(RL = 0.05 mg/L)	
FIELD ANALYSE Temperature: pH: Specific Conduc	\$ #1 = 1	11.60 7.48 1134 418	°C S.U. µmhos/cm	Carbon D Sulfide (S	Dioxide: 5 ⁻²): Iron (Fe ⁺²):	NA NA NA	mg/L	HACH CA-DT (F HACH H5-WR ((RL = 0.05 mg/L)	illues t
FIELD ANALYSE Temperature: pH: Specific Conduct Eh:	s:tance:	11.6	°C S.U. µmhos/cm	Carbon D Sulfide (S Ferrous I	Dioxide: 5 ⁻²): Iron (Fe ⁺²):	NA NA NA	mg/L	HACH CA-DT (F HACH H5-WR ((RL = 0.05 mg/L)	
FIELD ANALYSE Temperature: pH: Specific Conduct Eh:	stance:	11.60 7.48 1134 418	°C S.U. µmhos/cm mV	Carbon D Sulfide (S Ferrous I	Dioxide: 5 ⁻²): Iron (Fe ⁺²):	NA NA NA	mg/L	HACH CA-DT (F HACH H5-WR ((RL = 0.05 mg/L)	
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyg	stance:	11.6 7.48 1134 419 1.38	°C S.U. µmhos/cm mV mg/L NTU DATE: 9/20	Carbon D Sulfide (S Ferrous I 乃いおおとモ しい	Dioxide: 5 ⁻²): Iron (Fe ⁺²):	NA NA NA	mg/L	HACH CA-DT (F HACH H5-WR ((RL = 0.05 mg/L)	tralie i i
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity:	s:tance:	11.6 7.48 1134 419 1.38	°C S.U. µmhos/cm mV * mg/L NTU	Carbon D Sulfide (S Ferrous I 乃いおおとモ しい	oloxide: 3 ²): ron (Fe ⁺²): D.C. PRE	NA NA NA	mg/L	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I	(RL = 0.05 mg/L)	tralie i i
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxygo Turbidity: SAMPLE COLLE	stance: en: CTION ance:	11.6 7.48 1134 419 1.38 0.97	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 CUSAR	Carbon D Sulfide (S Ferrous I 乃いおおとましい	oloxide: 3 ²): ron (Fe ⁺²): D.C. PRE	NA NA NA	mg/L mg/L	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I	(RL = 0.05 mg/L)	YE5 / (10
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear. Collection meti	ctance: en: crion ance: hod:	11.6 7.48 1134 419 1.38 0.97	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 / BLADDER / MICE	Carbon D Sulfide (S Ferrous I TSUBBLE UN	oloxide: 3 ²): ron (Fe ⁺²): D.C. PRE	NA NA NA	mg/L mg/L Duplicate samp	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I	(RL = 0.05 mg/L) RL = 0.2 mg/L)	YES / NO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyg Turbidity: SAMPLE COLLE Sample appear Collection metl Equipment No.	ctance: en: ction ance: hod:	11.6 7.48 1134 419 1.38 0.97	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 CUSAR 7/BLADDER / MICE	Carbon D Sulfide (S Ferrous I TSUBBLE UN	oloxide: 3 ²): ron (Fe ⁺²): D.C. PRE	NA NA NA	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I Die collected?	(RL = 0.05 mg/L) RL = 0.2 mg/L)	YES / MO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear. Collection meti	ctance: en: crion ance: hod:	11.6 7.48 1134 418 1.38 0.97	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 // BLADDER / MICE 7 200) / 0.45 µm (820	Carbon D Sulfide (S Ferrous I TSUBBLE UN	Dioxide: 1-2-1: 1-1:	NA NA NA	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App	(RL = 0.05 mg/L) RL = 0.2 mg/L) DX III DX III	YES / MO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyg Turbidity: SAMPLE COLLE Sample appear Collection metl Equipment No.	en: CTION ance: hod:	11.6 7.48 1134 418 1.38 0.97	S.U. µmhos/cm mV mg/L NTU DATE: S / ZO C LS A S / BLADDER / MICH 7 200) / 0.45 µm (820	Carbon D Sulfide (S Ferrous I TSUBBLE UN IB RO BLADDER / OTHER:	Dioxide:	NA NA NA SE	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App	(RL = 0.05 mg/L) RL = 0.2 mg/L) DX III DX III	YES / MO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear Collection meti Equipment No. Filter used:	ctance: en: ction ance: hod: 5ize 40 mL	7.48 1/34 4/8 1.38 0.97 PERISTALTIE 33 0.45 µm (810 Type Glass	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 /BLADDER / MICH 7 00) / 0.45 µm (820 Filtered Yes No	Carbon D Sulfide (S Ferrous I TSV BBLE UN IB RO BLADDER / OTHER: None HC	Preservative I HNO ₃ H ₂ 50 ₄	NA N	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App	(RL = 0.05 mg/L) RL = 0.2 mg/L) DX III DX III	YES / NO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear Collection meti Equipment No. Filter used:	ction ction crion ance: hod: 5ize 40 mL 125 mL	11.6 7.48 1134 415 1.38 0.97 PERISTALTIC 33 0.45 µm (810 Type Glass Plastic	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 // BLADDER / MICH 2 00) / 0.45 µm (820 Filtered Yes No Yes No	Carbon D Sulfide (S Ferrous I TSUBBLE UN NONE HC None HC	Preservative HNO3 H ₂ 50 ₄	NA N	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App	(RL = 0.05 mg/L) RL = 0.2 mg/L) DX III DX III	YES / NO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear Collection meti Equipment No. Filter used:	ctance: en: ction ance: hod: 5ize 40 mL 125 mL 250 mL	11.6 7.46 1134 418 1.38 0.97 PERISTALTIC 33 0.4S µm (810 Type Glass Plastic	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 / BLADDER / MICH 7 00) / 0.45 µm (820 Filtered Yes No Yes No	Carbon D Sulfide (S Ferrous I TSV BBLE UN IB RO BLADDER / OTHER: None HC	Preservative I HNO ₃ H ₂ 5O ₄	NA N	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (II HACH	OX III px.IV	YES / MO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear Collection meti Equipment No. Filter used:	stance: en: CTION ance: hod: 5ize 40 mL 125 mL 250 mL	7.48 1/34 4/5 1/38 0.97 PERISTALHE 33 0.4S µm (810 Type Glass Plastic Plastic	S.U. µmhos/cm mV mg/L NTU DATE: 9/20 // BLADDER / MICH 7 00) / 0.45 µm (820 Filtered Yes No Yes No No	Carbon D Sulfide (S Ferrous I TSUBBLE UN NONE HC None HC	Preservative I HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ HNO ₃	NA N	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App dy Number: App dy Number: App	OX III	YES / MO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear Collection meti Equipment No. Filter used:	Size 40 mL 250 mL 500 mL	7.48 1/34 4/8 1/34 4/8 1/38 0.97 PERISTALTIC 33 0.4S µm (810 Type Glass Plastic Plastic Plastic Plastic	S.U. µmhos/cm mV mg/L NTU DATE: 9 / Zo // BLADDER / MICE 7 DO) / 0.45 µm (820 Filtered Yes No Yes No No No	Carbon D Sulfide (S Ferrous I TSUBBLE UN NONE HC None HC	Preservative I HNO ₃ H ₂ 5O ₄ HNO ₃ None	NA NA NA NA NA NA NA NA NAOH NAOH	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App dy Number: App dy Number: App	OX III px.IV	YES / MO
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FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear Collection meti Equipment No. Filter used:	Size 40 mL 250 mL 500 mL	7.48 1/34 4/8 1/34 4/8 1/38 0.97 PERISTALTIC 33 0.4S µm (810 Type Glass Plastic Plastic Plastic Plastic	S.U. µmhos/cm mV mg/L NTU DATE: 9 / Zo // BLADDER / MICE 7 DO) / 0.45 µm (820 Filtered Yes No Yes No No No	Carbon D Sulfide (S Ferrous I TSUBBLE UN NONE HC None HC	Preservative I HNO ₃ H ₂ 5O ₄	NA NA NA NA NA NA NA NA NAOH NAOH NAOH N	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App dy Number: App dy Number: App	OX III	YES / NO
FIELD ANALYSE Temperature: pH: Specific Conduct Eh: Dissolved Oxyge Turbidity: SAMPLE COLLE Sample appear Collection meti Equipment No. Filter used:	Size 40 mL 125 mL 250 mL 500 mL 500 mL	7.48 1/34 4/7 1/38 0.97 PERISTALTIC 33 0.4S µm (810 Type Glass Plastic Plastic Plastic Plastic Plastic	S.U. µmhos/cm mV mg/L NTU DATE: 9 / ZO // BLADDER / MICE 7 DO) / 0.45 µm (820 Filtered Yes No Yes No No No No Yes No	Carbon D Sulfide (S Ferrous I TSUBBLE UN None HC None HC None HC None HC	Preservative I HNO3 H ₂ 5O ₄ HNO3 None HNO3 H ₂ 5O ₄ HNO3 H ₂ 5O ₄ HNO3 H ₂ 5O ₄	NA NA NA NA NA NA NA NA NAOH NAOH NAOH N	mg/L mg/L Duplicate samp M5/M5D samp Chain of Custo	HACH CA-DT (F HACH H5-WR (HACH IR-18C (I HACH IR-18C (I DIE collected? Ie collected? dy Number: App dy Number: App dy Number: App	OX III	YES / (10) YES) NO 2 2 19 2

Appendix C



Analytical Data Validation Report June 2018

Shiras Steam Plant Marquette, Michigan

Prepared For:
Marquette Board of Light and Power
2200 Wright Street Marquette, Michigan 49855

July 2018 Project No. 180827



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Table 1 Cumulative Analytical Data Summary

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Appendix 1 Laboratory Data Summary Reports



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List of Abbreviations/Acronyms

%R percent recovery °C degrees Celsius

FTCH Fishbeck, Thompson, Carr & Huber, Inc.

ICP-AES inductively coupled plasma-atomic emission spectroscopy

ICP-MS inductively coupled plasma-mass spectrometry

LCS laboratory control sample MDL method detection limit

MS matrix spike

MSD matrix spike duplicate mg/L milligram per liter QC quality control RL reporting limit

RPD relative percent difference

USEPA U.S. Environmental Protection Agency

μg/L micrograms per liter



1.0 Project Information

Site name: Shiras Steam Plant

Project name: Marquette Board of Light and Power/Shiras

Sample collection dates: 05/31/18
Sample matrix: Groundwater

Analytical parameters/methods: Metals 6010C, 6020A, 7470A

General Chemistry 9040B, 9056A, SM2540C Radiological 9315, 9320, Ra226+Ra228

Laboratory: TestAmerica

Sample Delivery Group(s): 240-96519-1, 240-96523-1, 240-96523-2,

240-96524-1, 240-96524-2

Sample Index:

Field ID	Lab ID
MBLPS-18-05-MW-1(I)	240-96519-6
	240-96519-7
	240-96524-3
MBLPS-18-05-MW-2(I)	240-96519-4
	240-96524-1
	240-96524-1
MBLPS-18-05-MW-2(D)	240-96519-5
	240-96524-2
	240-96524-2

Field ID	Lab ID
MBLPS-18-05-MW-3(I)	240-96519-3
	240-96523-3
	240-96523-3
MBLPS-18-05-MW-4(I)	240-96519-1
	240-96523-1
	240-96523-1
MBLPS-18-05-MW-5(I)	240-96519-2
	240-96523-2
	240-96523-2

The laboratory data package was evaluated for compliance with reference to *National Functional Guidelines for Inorganic Superfund Methods Data Review (January, 2017) and Evaluation of Radiochemical Data Usability (April, 1997)*. These guidelines were modified to accommodate the non-CLP methodologies. The following USEPA Region V data qualifier codes may be utilized in this report:

- U The analyte was analyzed for, but not detected above the MDL.
- J Analyte present. Reported value may not be accurate or precise.
- R Result is rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria.



Yes \square No \boxtimes

2.0 Metals Fraction

The laboratory data summary report is provided in Appendix 1. The metals data are summarized in Table 1.

2.1 ICP-AES/ICP-MS Metals

2.1.1 Technical Holding Time and Sample Preservation

ICP-AES or ICP-MS samples were preserved with nitric acid to pH ≤ 2.	Yes ⊠	No □	NA 🗆
ICP-AES or ICP-MS metals were analyzed within the 180-day holding time.	Yes ⊠	No 🗆	NA 🗆
Exceptions: None.			
2.1.2 Blanks			
A method blank was prepared and analyzed as part of each QC batch.		Yes ⊠	No □
The target analytes were detected in the method blanks at concentrations above the RL		Yes □	No ⊠
2.1.2 Blanks A method blank was prepared and analyzed as part of each QC batch.			

The target analytes were detected in the method blanks at concentrations above the MDL but

Exceptions:

below the RL.

None

2.1.3 Laboratory Control Samples

LCS were prepared and analyzed as part of each analytical batch.	Yes ⊠	No 🗆
The LCS were spiked with the target analytes at the same concentration as the matrix spike samples.	Yes ⊠	No 🗆
LCS recoveries were within the specified QC limits.	Yes ⊠	No 🗆

Exceptions:

None.



2.1.4	Matrix Spike/Matrix Spike Duplicate Analysis			
MS/MSD s	samples were analyzed at the required frequency.	,	Yes ⊠	No 🗆
Samples ic	dentified as field blanks or equipment blanks were used for spiked alysis.	,	Yes □	No ⊠
MS/MSD r	ecoveries are within the established QC limits.	,	Yes ⊠	No 🗆
The RPD o	f the concentrations measured for the MS/MSD pairs is within the established	. t	Yes ⊠	No 🗆
Exceptions None.	s:			
2.2	Mercury			
The labora	tory data summary report is provided in Appendix 1. The mercury data are su	ımmarize	ed in Tal	ble 1.
2.2.1	Technical Holding Time and Sample Preservation			
Samples w	vere preserved with nitric acid to pH ≤ 2.	Yes ⊠	No 🗆	NA □
Preserved	samples were analyzed within 28 days of collection.	Yes ⊠	No □	NA 🗆
Exceptions None.	s:			
2.2.2	Blanks			
2.2.2.1	Method Blanks			
A method	blank was prepared and analyzed as part of each QC batch.		Yes ⊠	No 🗆
Mercury v	vas detected in the method blanks at concentrations above the RL.		Yes □	No ⊠

Mercury was detected in the method blanks at concentrations above the MDL but below the

Exceptions:

None.

RL.

Yes \square No \boxtimes



2.2.2.2 Field Blanks

A field blank was included in each mercury sample shipment.	Yes □	No □	NA ⊠
Mercury was detected in the field blank at a concentration >MDL but <rl.< td=""><td>Yes □</td><td>No 🗆</td><td>NA 🗵</td></rl.<>	Yes □	No 🗆	NA 🗵
Mercury was detected in the field blank at a concentration >RL.	Yes □	No 🗆	NA ⊠

2.2.3 Laboratory Control Samples

LCS were prepared and analyzed as part of each analytical batch.	Yes ⊠	No □
The LCS was spiked with mercury at the same concentration as the matrix spike samples.	Yes □	No ⊠
LCS recoveries were within the specified QC limits.	Yes ⊠	No 🗆

Exceptions:

LCS samples were spiked at 5.0 μ g/L and matrix spike samples were spiked at 1.0 μ g/L.

Data Qualification:

None.

2.2.4 Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD samples were analyzed at the required frequency.	Yes ⊠	No □
Samples identified as field blanks or equipment blanks were used for spiked sample analysis.	Yes 🗆	No ⊠
MS/MSD recoveries are within the established QC limits.	Yes □	No ⊠
The RPD of the concentrations measured for the MS/MSD pairs is within the established QC limits.	Yes □	No ⊠

Validation Guidelines:

If MS/MSD recoveries were outside control limits high, detected results were qualified as estimated (J); non-detects were not qualified.

If MS/MSD recoveries were outside control limits low, detected results were qualified as estimated (J); non-detects were qualified as estimated (UJ).

When the original sample concentration was ≥ 4X the spike amount, data was reported unflagged, even if the %R did not meet acceptance criteria.



Exceptions:

		MS	MSD	MS		RPD Control
Sample	Analyte	%R	%R	Control Limits	RPD	Limits
MW-1	Mercury	95	76	80 -1 20	23	20

Data Qualification:

		Lab Result	Qualified Result
Analyte	Sample ID	(μg/L)	(μg/L)
Mercury	MW-1	0.13 U	0.13 UJ



Yes \boxtimes No \square

3.0 General Chemistry Fraction

The laboratory data summary report is provided in Appendix 1. The general chemistry data are summarized in Table 1.

3.1 Technical Holding Time and Sample Preservation			
Samples were received by the laboratory in proper condition with shipping container temperatures at \leq 6°C (but not frozen) upon receipt.	Yes ⊠	No □	NA 🗆
Samples were properly preserved for the requested analyses.	Yes ⊠	No 🗆	NA 🗆
Samples were analyzed within the analyte-specific holding times.	Yes ⊠	No □	NA □
Exceptions: pH is a field parameter with a holding time of 15 minutes. Laboratory analysis performe minute holding time to allow for shipping of samples.	ed outsid	e of the	15
Data Qualification: None.			
3.2 Blanks			
A method blank was prepared and analyzed as part of each QC batch.		Yes ⊠	No □
The target analytes were detected in the method blanks at concentrations above the R	L.	Yes 🗆	No ⊠
The target analytes were detected in the method blanks at concentrations above the Mibelow the RL.	DL but	Yes □	No ⊠
Exceptions: None.			
3.3 Laboratory Control Samples			
LCS were prepared and analyzed as part of each analytical batch.		Yes ⊠	No □
The LCS were spiked with the target analytes at the same concentration as the matrix s	pike	Yes □	No ⊠

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LCS recoveries were within the specified QC limits.

samples.



Exceptions:

LCS samples for Chloride and Sulfate were spiked at 50.0 mg/L and matrix spike samples were spiked at 250 mg/L.

Data Qualification:

None.

3.4 Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD samples were analyzed at the required frequency.	Yes ⊠ No □
Samples identified as field blanks or equipment blanks were used for spiked sample analysis.	Yes □ No ⊠
MS/MSD recoveries are within the established QC limits.	Yes ⊠ No □
The RPD of the concentrations measured for the MS/MSD pairs is within the established QC limits.	Yes ⊠ No □

Exceptions:

None.



4.0 Radiological

The laboratory data summary report is provided in Appendix 1. The radiological data are summarized in Table 1.

4.1	Technical Holding	Time and San	nple Preservation
-----	-------------------	--------------	-------------------

Samples were received by the laboratory in proper condition with shipping container temperatures at \leq 6°C (but not frozen) upon receipt.	Yes ⊠	No 🗆	NA □
Samples were preserved with nitric acid to pH ≤ 2.	Yes ⊠	No 🗆	NA 🗆
Samples were analyzed within the 6-month holding time.	Yes ⊠	No 🗆	NA 🗆

Exceptions:

None.

4.2 Blanks

A method blank was prepared and analyzed as part of each QC batch.	Yes ⊠ No □
The target compounds were detected in the method blanks at concentrations above the RL.	Yes □ No ⊠
The target compounds were detected in the method blanks at concentrations above the MDL but below the RL.	Yes □ No ⊠

Method Blank Exceptions:

None.

4.3 Laboratory Control Samples

LCS were prepared and analyzed as part of each analytical batch.	Yes ⊠ No □
LCS recoveries were within the specified QC limits.	Yes ⊠ No ⊠

Validation Guidelines:

The LCS is the primary demonstration of the laboratory's ability to analyze samples with qualitative and quantitative accuracy. When recovery of the LCS compounds was outside QC limits high, detected results were qualified as estimated (J), biased high; non-detects were not qualified.

When recovery of the LCS compounds was outside QC limits low, results for detected results qualified as estimated (J), biased low; non-detects were rejected (R).



LCS Exceptions:

LCS ID	Compound	%R	%R Control Limits
160-369905/1-A	Radium-228	160	56 - 140

Data Qualification:

Data qualification is not required as Radium-228 was not detected in any of the associated samples.

4.4 Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD samples were analyzed at the required frequency.	Yes ⊠	No □
Samples identified as field blanks or equipment blanks were used for spiked sample analysis.	Yes □	No ⊠
MS/MSD recoveries are within the established QC limits.	Yes ⊠	No □
The RPD of the concentrations measured for the MS/MSD pairs is within the established QC limits.	Yes ⊠	No 🗆

Exceptions:

None.



5.0 Reconciliation with Data Quality Objectives

5.1 Overall Precision and Sample Representativeness

RPD for field duplicates is within the project control limits (± 30%) for at least 75% of the analyses. Yes \boxtimes No \square

			Field	Field		RPD Control
Sample	Analyte	Units	Sample	Duplicate	RPD	Limits
MW-2	Boron	μg/L	74 J	75J	1.3	30
•	Calcium	μg/L	68,000	70,000	2.9	30
	Chloride	mg/L	86	86	0.0	30
	Fluoride	mg/L	0.056	0.057	1.8	30
	Sulfate	mg/L	31	31	0.0	30
	TDS	mg/L	330	330	0.0	30
MW-2	pH (lab)	SU	8.0	8.0	0.0	30
	Antimony	μg/L	ND	ND		
	Arsenic	μg/L	0.84 J	1.0 J	17.4	30
	Barium	μg/L	0.073	0.072	1.4	30
	Beryllium	μg/L	ND	ND		
	Cadmium	μg/L	ND	ND		
	Chromium	μg/L	2.2	1.7 J	26	30
	Cobalt	μg/L	0.38 J	0.38 J	0.0	30
	Fluoride	mg/L	0.055	0.055	0.0	30
	Lead	μg/L	ND	ND		
	Lithium	μg/L	5.9 J	6.0 J	1.7	30
	Mercury	μg/L	ND	ND		
	Molybdenum	μg/L	1.1 J	ND		
	Rad226 & Rad228	pCi/L	0.519	ND		
	Radium 226	pCi/L	ND	0.193		
	Radium 228	pCi/L	ND	ND		
	Selenium	μg/L	ND	ND		
	Thallium	μg/L	ND	ND		

5.2 Overall Accuracy/Bias

LCS recoveries were met for all samples.	Yes 🗆	No ⊠
MS/MSD recoveries were met for 75% of the samples.	Yes ⊠	No □

96% of the LCS recoveries, and 96% of the MS/MSD recoveries acceptable.



5.3 Overall Completeness

Total data points generated		120
Data points available for use		120
At least 90% of the data are determined to be valid.	Yes ⊠	No 🗆

The completeness objective for the task was met and sufficient data are available to support decision-making.

5.4 Data Limitations and Actions

U-qualified results may not be usable when greater than a screening level.

UJ-qualified results are usable as non-detects with the understanding that the quantitation limit is estimated and may be higher; caution should be used when evaluating against screening levels.

J-qualified data are usable as detects at the reported concentration with the understanding that the result is estimated.

Tables

Table 1 - Cumulative Analytical Data Summary

Marquette Board of Light and Power

Shiras Steam Plant

September 2018

Lab Suite:	2010			CCR Appendix III															CCR Appendix IV												
Parameter:				Boron	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 228 Combined	Radium 226	Radium 228	Selenium	Thallium				
I to the				/1	/1	/1	/1	/1	(TDS)	CII	/1	/1	/1	/1	/1	/1	/1	/1		/1	/1	/1	C: /I	C: /I	C: /I	/1	/1				
Units: U.S. EPA MCL:		μg/L	μg/L	mg/L	mg/L	mg/L	mg/L	SU	μg/L	μg/L	mg/L	μg/L 4.0	μg/L	μg/L	μg/L	mg/L	μg/L	μg/L	μg/L	μg/L <i>NE</i>	pCi/L 5.0	pCi/L	pCi/L	μg/L	μg/L 2.0						
U.S. EPA IVI	UL:	Collection		NE	NE	NE	4.0	NE	NE	NE	6.0	10	2.0	4.0	5.0	100	NE	4.0	15	NE	2.0	INE	5.0	NE	NE	50	2.0				
Location	Well ID	Collection Date	Duplicate																												
	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				
	10100 1	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	Х	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	Х	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			-								ı										
	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	Х	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				
ent		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				
adi		05/31/18	Х	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				
ngu -	B 4147 2	09/20/18		55 J	64,000	85	0.058	29	310	8.0				1011						10.11			4.00.11	1.00.11	1.00.11						
NO O	MW-3	07/19/17		300 U	68,000	98	0.38 U	49 36	360 440	8.00 7.86	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U 10 U	20 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 5.0 U	2.0 U 2.0 U				
_		07/24/17 08/23/17		300 U 300 U	69,000 75,000	89 95	0.38 U 0.10 U	44	300	7.80	2.0 U 2.0 U	5.0 U 5.0 U	0.23 0.10 U	1.0 U 1.0 U	1.0 U 1.0 U	10 U	20 U		3.0 U 3.0 U	10 U	0.20 U 0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U 1.00 U	1.00 U 1.00 U	5.0 U	2.0 U				
		08/23/17		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	Х	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											-										
l l	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	Х	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	Х	110	130,000	450	0.23	42	1,000	7.7																					
	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	Х	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	ν.	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				
Ę		08/23/17	Х	300 U	110,000	190	0.10 U	19	620 750	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				
gdie		08/29/17 09/06/17		300 U 300 U	110,000	190 190	0.10 U	18 18	750 660	6.76 7.43	2.0 U 2.0 U	5.0 U 5.0 U	0.12	1.0 U 1.0 U	1.0 U 1.0 U	10 U 10 U	20 U 20 U		3.0 U 3.0 U	10 U	0.20 U 0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U 1.00 U	1.00 U	5.0 U	2.0 U 2.0 U				
)gra			v		100,000		0.10 U			ļ	2.0 U		0.11								0.20 U				1.00 U	5.0 U	2.0 U				
ų		09/06/17 09/14/17	Х	300 U 300 U	96,000	190 200	0.10 U 0.10 U	18 19	730 720	7.43 7.51	2.0 U	5.0 U 5.0 U	0.11	1.0 U 1.0 U	1.0 U 1.0 U	10 U 10 U	20 U 20 U		3.0 U 3.0 U	10 U	0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U 1.00 U	1.00 U 1.00 U	5.0 U	2.0 U				
1 1		09/14/17		300 U	120,000	190	0.10 U	19	2,300	7.51	2.0 U	5.0 U	0.11 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 5.0 U	2.0 U				
		10/05/17		300 U	120,000	190	0.10 U	18	700	7.54	2.0 U	5.0 U	0.11	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	0.10 U	19	640	7.45	2.0 U	5.0 U	0.12	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			120,000	220	0.043 J 0.031 J	22	630	7.6	2.0 0	5.0 0	0.095	1.0 0	1.0 0	1.5 J	U.25 J	0.046 J	1.0 0	7.0 J	0.20 0		0.470	0.272	0.198 0	5.0 0					
		03/20/18		39 J	120,000	220	U.U31 J		050	7.0							ı						ı								

Table 1 - Cumulative Analytical Data Summary

Marquette Board of Light and Power

Shiras Steam Plant September 2018

Septembe						CD Annandiu	111			CCR Appendix IV																
Lab Suite:						CCR Appendix	III .						•					сск аррепа	IX IV							
Paramete	r:		Boron	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids (TDS)	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 228 Combined	Radium 226	Radium 228	Selenium	Thallium
Units:			μg/L	μg/L	mg/L	mg/L	mg/L	mg/L	SU	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	6.0	10	2.0	4.0	5.0	100	NE	4.0	15	NE	2.0	NE	5.0	NE	NE	50	2.0
Location	Well ID	Collection Date Duplicat	e																							
	Equipment	07/20/17	300 U	1,000 U	10 U	0.38 U	2.5 U	10 U	8.05	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	1.24	1.00 U	1.24	5.0 U	2.0 U
	Blank	07/24/17	300 U	1,000 U	10 U	0.38 U	2.5 U	10 U	7.94	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	1.03	1.00 U	1.03	5.0 U	2.0 U
		08/29/17	300 U	1,000 U	10 U	0.10 U	1 U	10 U	NA	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
gc		09/06/17	300 U	1,000 U	10 U	0.10 U	1 U	10	NA	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	1,000 U	10 U	0.10 U	1 U	10 U	NA	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	1,000 U	10 U	0.10 U	1 U	10	NA	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	1,000 U	10 U	0.10 U	1 U	18	NA	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

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

Appendix 1



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720 Tel: (330)497-9396

TestAmerica Job ID: 240-96519-1

Client Project/Site: CCR-MBLP Shiras Steam Plant

For:

Fishbeck Thompson Carr & Huber Inc 1515 Arboretum Drive SE Grand Rapids, Michigan 49546

Attn: Penni Mahler

Hus Brooks
Authorized for release by:

6/19/2018 4:48:46 PM

Kris Brooks, Project Manager II (330)966-9790

kris.brooks@testamericainc.com

.....LINKS

Review your project results through Total Access

Have a Question?



Visit us at: www.testamericainc.com This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Definitions/Glossary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDI	Estimated Detection Limit (Diovin)

EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radi

MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDI	Mothod Dotaction Limit

MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

ND	Not Detected at the reporting limit (or MDL or EDL if shown)

PQL	Practical Quantitation	Limit

QC Quality Control

RER Relative Error Ratio (Radiochemistry)

RL Reporting Limit or Requested Limit (Radiochemistry)

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin)
TEQ Toxicity Equivalent Quotient (Dioxin)

TestAmerica Canton

Page 3 of 30 6/19/2018

Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Job ID: 240-96519-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Fishbeck Thompson Carr & Huber Inc

Project: CCR-MBLP Shiras Steam Plant

Report Number: 240-96519-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 6/5/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.3° C.

TOTAL RECOVERABLE METALS (ICP)

Samples MBLPS-18-05-MW-4 (I) (240-96519-1), MBLPS-18-05-MW-5 (I) (240-96519-2), MBLPS-18-05-MW-3 (I) (240-96519-3), MBLPS-18-05-MW-2 (I) (240-96519-4), MBLPS-18-05-MW-2 (D) (240-96519-5) and MBLPS-18-05-MW-1 (I) (240-96519-6) were analyzed for total recoverable metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 06/05/2018 and analyzed on 06/06/2018.

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

TOTAL RECOVERABLE METALS (ICPMS)

Sample MBLPS-18-05-MW-1 (I) (240-96519-7) was analyzed for total recoverable metals (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were prepared on 06/05/2018 and analyzed on 06/06/2018.

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

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Job ID: 240-96519-1 (Continued)

Laboratory: TestAmerica Canton (Continued)

TOTAL MERCURY

Sample MBLPS-18-05-MW-1 (I) (240-96519-7) was analyzed for total mercury in accordance with EPA SW-846 Methods 7470A. The samples were prepared on 06/05/2018 and analyzed on 06/06/2018.

Mercury failed the recovery criteria low for the MSD of sample MBLPS-18-05-MW-1 (I)MSD (240-96519-7) in batch 240-330440. Mercury exceeded the RPD limit. Refer to the QC report for details.

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

TOTAL DISSOLVED SOLIDS

Samples MBLPS-18-05-MW-4 (I) (240-96519-1), MBLPS-18-05-MW-5 (I) (240-96519-2), MBLPS-18-05-MW-3 (I) (240-96519-3), MBLPS-18-05-MW-2 (I) (240-96519-4), MBLPS-18-05-MW-2 (D) (240-96519-5) and MBLPS-18-05-MW-1 (I) (240-96519-6) were analyzed for total dissolved solids in accordance with SM 2540C. The samples were analyzed on 06/07/2018.

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

PH

Samples MBLPS-18-05-MW-4 (I) (240-96519-1), MBLPS-18-05-MW-5 (I) (240-96519-2), MBLPS-18-05-MW-3 (I) (240-96519-3), MBLPS-18-05-MW-2 (I) (240-96519-4), MBLPS-18-05-MW-2 (D) (240-96519-5) and MBLPS-18-05-MW-1 (I) (240-96519-6) were analyzed for pH in accordance with EPA SW-846 Method 9040B. The samples were analyzed on 06/05/2018.

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

ANIONS

Samples MBLPS-18-05-MW-4 (I) (240-96519-1), MBLPS-18-05-MW-5 (I) (240-96519-2), MBLPS-18-05-MW-3 (I) (240-96519-3), MBLPS-18-05-MW-2 (I) (240-96519-4), MBLPS-18-05-MW-2 (D) (240-96519-5), MBLPS-18-05-MW-1 (I) (240-96519-6) and MBLPS-18-05-MW-1 (I) (240-96519-7) were analyzed for anions in accordance with EPA SW-846 Method 9056A. The samples were analyzed on 06/15/2018 and 06/18/2018.

Samples MBLPS-18-05-MW-4 (I) (240-96519-1)[10X], MBLPS-18-05-MW-5 (I) (240-96519-2)[5X] and MBLPS-18-05-MW-1 (I) (240-96519-6)[5X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

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

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Method Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CAN
6020A	Metals (ICP/MS)	SW846	TAL CAN
7470A	Mercury (CVAA)	SW846	TAL CAN
9040B	pH	SW846	TAL CAN
9056A	Anions, Ion Chromatography	SW846	TAL CAN
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CAN
7470A	Preparation, Mercury	SW846	TAL CAN

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

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Sample Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-96519-1	MBLPS-18-05-MW-4 (I)	Water	05/31/18 11:08	06/05/18 09:30
240-96519-2	MBLPS-18-05-MW-5 (I)	Water	05/31/18 11:20	06/05/18 09:30
240-96519-3	MBLPS-18-05-MW-3 (I)	Water	05/31/18 13:41	06/05/18 09:30
240-96519-4	MBLPS-18-05-MW-2 (I)	Water	05/31/18 15:07	06/05/18 09:30
240-96519-5	MBLPS-18-05-MW-2 (D)	Water	05/31/18 15:07	06/05/18 09:30
240-96519-6	MBLPS-18-05-MW-1 (I)	Water	05/31/18 16:29	06/05/18 09:30
240-96519-7	MBLPS-18-05-MW-1 (I)	Water	05/31/18 16:29	06/05/18 09:30

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-05-MW-4 (I)

TestAmerica Job ID: 240-96519-1

Lab Sample ID: 240-96519-1

Lab Sample ID: 240-96519-2

Lab Sample ID: 240-96519-3

Lab Sample ID: 240-96519-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac [Method	Prep Type
Boron	120	-	100	23	ug/L		6010C	Total
								Recoverable
Calcium	130000		5000	310	ug/L	1	6010C	Total
								Recoverable
рН	7.8	HF	0.1	0.1	SU	1	9040B	Total/NA
Chloride	450		10	2.8	mg/L	10	9056A	Total/NA
Fluoride	0.23		0.050	0.024	mg/L	1	9056A	Total/NA
Sulfate	42		1.0	0.35	mg/L	1	9056A	Total/NA
Total Dissolved Solids	1000		20	16	mg/L	1	SM 2540C	Total/NA

Client Sample ID: MBLPS-18-05-MW-5 (I)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D N	Method	Prep Type
Boron	42	J	100	23	ug/L	1	_ 6	6010C	Total
									Recoverable
Calcium	100000		5000	310	ug/L	1	6	6010C	Total
									Recoverable
pН	7.6	HF	0.1	0.1	SU	1	g	9040B	Total/NA
Chloride	210		5.0	1.4	mg/L	5	9	9056A	Total/NA
Fluoride	0.043	J	0.050	0.024	mg/L	1	9	9056A	Total/NA
Sulfate	19		1.0	0.35	mg/L	1	9	9056A	Total/NA
Total Dissolved Solids	640		10	7.8	mg/L	1		SM 2540C	Total/NA

Client Sample ID: MBLPS-18-05-MW-3 (I)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Me	thod	Prep Type
Boron	45	J	100	23	ug/L	1	60	10C	Total
									Recoverable
Calcium	55000		5000	310	ug/L	1	60	10C	Total
									Recoverable
pH	8.2	HF	0.1	0.1	SU	1	904	40B	Total/NA
Chloride	67		1.0	0.28	mg/L	1	908	56A	Total/NA
Fluoride	0.067		0.050	0.024	mg/L	1	90	56A	Total/NA
Sulfate	20		1.0	0.35	mg/L	1	90	56A	Total/NA
Total Dissolved Solids	290		10	7.8	mg/L	1	SM	1 2540C	Total/NA

Client Sample ID: MBLPS-18-05-MW-2 (I)

	. ,					<u> </u>	
Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
74	J	100	23	ug/L	1	6010C	Total
							Recoverable
68000		5000	310	ug/L	1	6010C	Total
							Recoverable
8.0	HF	0.1	0.1	SU	1	9040B	Total/NA
86		1.0	0.28	mg/L	1	9056A	Total/NA
0.056		0.050	0.024	mg/L	1	9056A	Total/NA
31		1.0	0.35	mg/L	1	9056A	Total/NA
330		10	7.8	mg/L	1	SM 2540C	Total/NA
	74 68000 8.0 86 0.056 31	Result Qualifier 74 J 68000 8.0 HF 86 0.056 31	Result Qualifier RL 74 J 100 68000 5000 8.0 HF 0.1 86 1.0 0.056 0.050 31 1.0	Result Qualifier RL MDL 74 J 100 23 68000 5000 310 8.0 HF 0.1 0.1 86 1.0 0.28 0.056 0.050 0.024 31 1.0 0.35	Result Qualifier RL MDL Unit 74 J 100 23 ug/L 68000 5000 310 ug/L 8.0 HF 0.1 0.1 SU 86 1.0 0.28 mg/L 0.056 0.050 0.024 mg/L 31 1.0 0.35 mg/L	Result Qualifier RL MDL Unit Dil Fac 74 J 100 23 ug/L 1 68000 5000 310 ug/L 1 8.0 HF 0.1 0.1 SU 1 86 1.0 0.28 mg/L 1 0.056 0.050 0.024 mg/L 1 31 1.0 0.35 mg/L 1	Result Qualifier RL MDL Unit Dil Fac D Method 74 J 100 23 ug/L 1 6010C 68000 5000 310 ug/L 1 6010C 8.0 HF 0.1 0.1 SU 1 9040B 86 1.0 0.28 mg/L 1 9056A 0.056 0.050 0.024 mg/L 1 9056A 31 1.0 0.35 mg/L 1 9056A

Client Sample ID: MBLPS-18-05-MW-2 (D)

Lab Sample ID: 240-96519-5

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-05-MW-2 (D) (Continued)

TestAmerica Job ID: 240-96519-1

Lab Sample ID: 240-96519-5

Lab Sample ID: 240-96519-6

Lab Sample ID: 240-96519-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	75	J	100	23	ug/L		_	6010C	Total
									Recoverable
Calcium	70000		5000	310	ug/L	1		6010C	Total
									Recoverable
pH	8.0	HF	0.1	0.1	SU	1		9040B	Total/NA
Chloride	86		1.0	0.28	mg/L	1		9056A	Total/NA
Fluoride	0.057		0.050	0.024	mg/L	1		9056A	Total/NA
Sulfate	31		1.0	0.35	mg/L	1		9056A	Total/NA
Total Dissolved Solids	330		10	7.8	mg/L	1		SM 2540C	Total/NA

Client Sample ID: MBLPS-18-05-MW-1 (I)

-									
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D M	ethod	Prep Type
Boron	66	J	100	23	ug/L	1	_ ₆₀)10C	Total
Calcium	110000		5000	310	ug/L	1	60)10C	Recoverable Total
рН	7.8	HF	0.1	0.1	SU	1	90	040B	Recoverable Total/NA
Chloride	310		5.0	1.4	mg/L	5	90)56A	Total/NA
Fluoride	0.046	J	0.050	0.024	mg/L	1	90)56A	Total/NA
Sulfate	25		5.0	1.7	mg/L	5	90)56A	Total/NA
Total Dissolved Solids	770		10	7.8	mg/L	1	SI	M 2540C	Total/NA

Client Sample ID: MBLPS-18-05-MW-1 (I)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	150		5.0	2.2	ug/L	1	_	6020A	Total
									Recoverable
Cobalt	0.77	J	1.0	0.19	ug/L	1		6020A	Total
									Recoverable
Chromium	2.1		2.0	0.98	ug/L	1		6020A	Total
									Recoverable
Molybdenum	1.6	J	5.0	1.1	ug/L	1		6020A	Total
									Recoverable
Lithium	12		8.0	1.7	ug/L	1		6020A	Total
									Recoverable
Fluoride	0.042	J	0.050	0.024	mg/L	1		9056A	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Fluoride

Sulfate

Total Dissolved Solids

TestAmerica Job ID: 240-96519-1

06/18/18 10:15

06/18/18 10:15

06/07/18 10:44

Client Sample ID: MBLPS-18-05-MW-4 (I)

Lab Sample ID: 240-96519-1 Date Collected: 05/31/18 11:08 **Matrix: Water**

Date Received: 06/05/18 09:30

0.23

1000

42

Method: 6010C - Metals (IC	CP) - Total Reco	overable							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	120		100	23	ug/L		06/05/18 15:00	06/06/18 22:15	1
Calcium	130000		5000	310	ug/L		06/05/18 15:00	06/06/18 22:15	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.8	HF	0.1	0.1	SU			06/05/18 14:37	1
Chloride	450		10	2.8	mg/L			06/18/18 10:35	10

0.050

1.0

20

0.024 mg/L

0.35 mg/L

16 mg/L

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-5 (I)

Lab Sample ID: 240-96519-2 Date Collected: 05/31/18 11:20

Matrix: Water

06/07/18 10:44

Date Received: 06/05/18 09:30

Total Dissolved Solids

Method: 6010C - Metals (IC	CP) - Total Reco	overable							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	42	J	100	23	ug/L		06/05/18 15:00	06/06/18 22:20	1
Calcium	100000		5000	310	ug/L		06/05/18 15:00	06/06/18 22:20	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.6	HF	0.1	0.1	SU			06/05/18 14:43	1
Chloride	210		5.0	1.4	mg/L			06/18/18 11:17	5
Fluoride	0.043	J	0.050	0.024	mg/L			06/18/18 10:56	1
Sulfate	19		1.0	0.35	mg/L			06/18/18 10:56	1

10

640

7.8 mg/L

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-3 (I)

Date Collected: 05/31/18 13:41 Date Received: 06/05/18 09:30 Lab Sample ID: 240-96519-3 Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable Analyte Result Qualifier RL **MDL** Unit D Analyzed Dil Fac Prepared 100 06/05/18 15:00 06/06/18 22:26 Boron 45 J 23 ug/L 5000 06/05/18 15:00 06/06/18 22:26 **Calcium** 55000 310 ug/L

General Chemistry Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	8.2	HF	0.1	0.1	SU			06/05/18 14:49	1
Chloride	67		1.0	0.28	mg/L			06/15/18 21:54	1
Fluoride	0.067		0.050	0.024	mg/L			06/15/18 21:54	1
Sulfate	20		1.0	0.35	mg/L			06/15/18 21:54	1
Total Dissolved Solids	290		10	7.8	mg/L			06/07/18 10:44	1

2

3

5

6

8

9

10

11

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-2 (I)

Lab Sample ID: 240-96519-4 Date Collected: 05/31/18 15:07

Matrix: Water

Date Received: 06/05/18 09:30

Method: 6010C - Metals (IC Analyte	,	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	74	J	100	23	ug/L		06/05/18 15:00	06/06/18 22:31	1
Calcium	68000		5000	310	ug/L		06/05/18 15:00	06/06/18 22:31	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	8.0	HF	0.1	0.1	SU			06/05/18 14:55	1
Chloride	86		1.0	0.28	mg/L			06/15/18 22:15	1
Fluoride	0.056		0.050	0.024	mg/L			06/15/18 22:15	1
Sulfate	31		1.0	0.35	mg/L			06/15/18 22:15	1
Total Dissolved Solids	330		10	7.8	mg/L			06/07/18 10:44	1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-2 (D)

Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

Sulfate

Total Dissolved Solids

Lab Sample ID: 240-96519-5

Matrix: Water

06/15/18 22:36

06/07/18 10:44

Analyte	,	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	75	J	100	23	ug/L		06/05/18 15:00	06/06/18 22:36	1
Calcium	70000		5000	310	ug/L		06/05/18 15:00	06/06/18 22:36	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	8.0	HF	0.1	0.1	SU			06/05/18 15:00	1
Chloride	86		1.0	0.28	mg/L			06/15/18 22:36	1
Fluoride	0.057		0.050	0.024	mg/L			06/15/18 22:36	1

1.0

10

330

0.35 mg/L

7.8 mg/L

9

10

11

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-1 (I)

Date Collected: 05/31/18 16:29 Date Received: 06/05/18 09:30 Lab Sample ID: 240-96519-6

Matrix: Water

Analyte	Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	66 J	100	23	ug/L		06/05/18 15:00	06/06/18 21:41	1
Calcium	110000	5000	310	ug/L		06/05/18 15:00	06/06/18 21:41	1
Conoral Chamiatas								

Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
7.8	HF	0.1	0.1	SU			06/05/18 15:06	1
310		5.0	1.4	mg/L			06/15/18 22:56	5
0.046	J	0.050	0.024	mg/L			06/18/18 12:19	1
25		5.0	1.7	mg/L			06/15/18 22:56	5
770		10	7.8	mg/L			06/07/18 10:44	1
	7.8 310 0.046 25	0.046 J 25	7.8 HF 0.1 310 5.0 0.046 J 0.050 25 5.0	7.8 HF 0.1 0.1 310 5.0 1.4 0.046 J 0.050 0.024 25 5.0 1.7	7.8 HF 0.1 0.1 SU 310 5.0 1.4 mg/L 0.046 J 0.050 0.024 mg/L 25 5.0 1.7 mg/L	7.8 HF 0.1 0.1 SU 310 5.0 1.4 mg/L 0.046 J 0.050 0.024 mg/L 25 5.0 1.7 mg/L	7.8 HF 0.1 0.1 SU 310 5.0 1.4 mg/L 0.046 J 0.050 0.024 mg/L 25 5.0 1.7 mg/L	7.8 HF 0.1 0.1 SU 06/05/18 15:06 310 5.0 1.4 mg/L 06/15/18 22:56 0.046 J 0.050 0.024 mg/L 06/18/18 12:19 25 5.0 1.7 mg/L 06/15/18 22:56

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Lab Sample ID: 240-96519-7

Matrix: Water

Client Sample ID: MBLPS-18-05-MW-1 (I)

Date Collected: 05/31/18 16:29 Date Received: 06/05/18 09:30

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.75	U	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 15:40	1
Barium	150		5.0	2.2	ug/L		06/05/18 15:00	06/06/18 15:40	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 15:40	1
Cadmium	0.21	Ü	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 15:40	1
Cobalt	0.77	J	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 15:40	1
Chromium	2.1		2.0	0.98	ug/L		06/05/18 15:00	06/06/18 15:40	1
Molybdenum	1.6	J	5.0	1.1	ug/L		06/05/18 15:00	06/06/18 15:40	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 15:40	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 15:40	1
Selenium	0.89	Ü	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 15:40	1
Lithium	12		8.0	1.7	ug/L		06/05/18 15:00	06/06/18 15:40	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 15:40	1
Method: 7470A - Mercury (C	VAA)								
Analyte	•	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U F1 F2	0.20	0.13	ug/L		06/05/18 15:00	06/06/18 15:02	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.042	J	0.050	0.024	ma/L			06/15/18 23:59	1

6/19/2018

TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-1 (I)

Prep Type: Total Recoverable

Client Sample ID: Method Blank Prep Type: Total Recoverable

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 240-330141/1-A

Matrix: Water

Analysis Batch: 330488

Client Sample ID: Method Blank **Prep Type: Total Recoverable Prep Batch: 330141** MB MB

Analyte Result Qualifier RL **MDL** Unit Prepared Analyzed Dil Fac 100 Boron 23 U 23 ug/L 06/05/18 15:00 06/06/18 21:31 310 ug/L Calcium 310 U 5000 06/05/18 15:00 06/06/18 21:31

Lab Sample ID: LCS 240-330141/2-A Client Sample ID: Lab Control Sample **Matrix: Water Prep Type: Total Recoverable Analysis Batch: 330488 Prep Batch: 330141** LCS LCS Spike %Rec. Analyte Added Result Qualifier Unit %Rec Limits Boron 1000 1050 ug/L 105 80 - 120 Calcium 50000 49200 ug/L 98 80 - 120

Lab Sample ID: 240-96519-6 MS Client Sample ID: MBLPS-18-05-MW-1 (I) **Matrix: Water Prep Type: Total Recoverable Analysis Batch: 330488 Prep Batch: 330141** Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier D %Rec Limits Unit Boron 66 1000 1100 ug/L 103 75 - 125 Calcium 110000 50000 94 75 - 125 159000 ug/L

Lab Sample ID: 240-96519-6 MSD **Matrix: Water**

Analysis Batch: 330488

Sample Sample Spike MSD MSD Analyte Result Qualifier Added Result Qualifier Unit D %Rec Boron 66 J 1000 1100 ug/L 104

Prep Batch: 330141 %Rec. **RPD** Limits RPD Limit 75 - 125 20 0 Calcium 110000 50000 157000 ug/L 75 - 125 20

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 240-330141/1-A

Matrix: Water

Analysis Batch: 330498								Prep Batch:	330141
-	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.75	U	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 15:31	1
Barium	2.2	U	5.0	2.2	ug/L		06/05/18 15:00	06/06/18 15:31	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 15:31	1
Cadmium	0.21	U	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 15:31	1
Cobalt	0.19	U	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 15:31	1
Chromium	0.98	U	2.0	0.98	ug/L		06/05/18 15:00	06/06/18 15:31	1
Molybdenum	1.1	U	5.0	1.1	ug/L		06/05/18 15:00	06/06/18 15:31	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 15:31	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 15:31	1
Selenium	0.89	U	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 15:31	1
Lithium	1.7	U	8.0	1.7	ug/L		06/05/18 15:00	06/06/18 15:31	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 15:31	1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

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

Lab Sample ID: LCS 240-330141/3-A

Matrix: Water

Analysis Batch: 330498

Client Sample ID: Lab Control Sample

Prep Type: Total Recoverable

Prep Batch: 330141

Analysis Batch. 330430	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Arsenic	1000	947		ug/L		95	80 - 120
Barium	1000	969		ug/L		97	80 - 120
Beryllium	1000	961		ug/L		96	80 - 120
Cadmium	1000	1060		ug/L		106	80 - 120
Cobalt	1000	979		ug/L		98	80 - 120
Chromium	1000	964		ug/L		96	80 - 120
Molybdenum	100	94.4		ug/L		94	80 - 120
Lead	1000	1060		ug/L		106	80 - 120
Antimony	100	93.0		ug/L		93	80 - 120
Selenium	1000	947		ug/L		95	80 - 120
Thallium	250	263		ug/L		105	80 - 120

Lab Sample ID: 240-96519-7 MS

Client Sample ID: MBLPS-18-05-MW-1 (I)

Matrix: Water

Prep Type: Total Recoverable

Analysis Batch: 330498

Sample Sample Spike MS MS

Prep Batch: 330141

%Rec.

,	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Arsenic	0.75	U	1000	1030		ug/L		103	75 - 125
Barium	150		1000	1130		ug/L		98	75 ₋ 125
Beryllium	0.31	U	1000	1000		ug/L		100	75 ₋ 125
Cadmium	0.21	U	1000	1060		ug/L		106	75 ₋ 125
Cobalt	0.77	J	1000	952		ug/L		95	75 ₋ 125
Chromium	2.1		1000	968		ug/L		97	75 - 125
Molybdenum	1.6	J	100	103		ug/L		102	75 ₋ 125
Lead	0.45	U	1000	1040		ug/L		104	75 ₋ 125
Antimony	0.57	U	100	97.9		ug/L		98	75 ₋ 125
Selenium	0.89	Ü	1000	984		ug/L		98	75 - 125
Thallium	0.20	U	250	253		ua/L		101	75 - 125

Lab Sample ID: 240-96519-7 MSD

Client Sample ID: MBLPS-18-05-MW-1 (I)

Matrix: Water

Prep Type: Total Recoverable

Analysis Batch: 330498 Prep Batch: 330141

Alialysis Datell. 330430									i ieb De	aton. J	/U I T I
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.75	U	1000	1030		ug/L		103	75 - 125	0	20
Barium	150		1000	1160		ug/L		101	75 - 125	3	20
Beryllium	0.31	U	1000	1030		ug/L		103	75 - 125	3	20
Cadmium	0.21	Ú	1000	1080		ug/L		108	75 - 125	1	20
Cobalt	0.77	J	1000	969		ug/L		97	75 - 125	2	20
Chromium	2.1		1000	973		ug/L		97	75 - 125	1	20
Molybdenum	1.6	J	100	103		ug/L		102	75 - 125	0	20
Lead	0.45	U	1000	1050		ug/L		105	75 - 125	1	20
Antimony	0.57	U	100	99.4		ug/L		99	75 - 125	2	20
Selenium	0.89	U	1000	984		ug/L		98	75 - 125	0	20
Thallium	0.20	U	250	255		ug/L		102	75 - 125	1	20

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Client Sample ID: Method Blank

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 240-330150/1-A

Matrix: Water

Analysis Batch: 330440

MB MB

Analyte Result Qualifier RL

0.13 U

MDL Unit 0.13 ug/L

Prepared

Analyzed 06/05/18 15:00 06/06/18 15:23

Prep Batch: 330150

Dil Fac

Prep Type: Total/NA

Lab Sample ID: LCS 240-330150/2-A

Matrix: Water

Mercury

Analysis Batch: 330440

Analyte Mercury

Spike Added

5.00

0.20

LCS LCS Result Qualifier 4.35

Unit %Rec ug/L

Limits 87

Client Sample ID: Lab Control Sample

Prep Batch: 330150 %Rec.

80 - 120

Prep Type: Total/NA

Lab Sample ID: 240-96519-7 MS

Matrix: Water

Analysis Batch: 330440

Analyte Mercury

Sample Sample Result Qualifier

0.13 U F1 F2

Spike Added 1.00

MS MS Result Qualifier 0.954

Unit D %Rec 95 ug/L

Client Sample ID: MBLPS-18-05-MW-1 (I)

Client Sample ID: Lab Control Sample

97 - 103

Client Sample ID: MBLPS-18-05-MW-1 (I)

Prep Batch: 330150 %Rec.

Prep Type: Total/NA

Prep Type: Total/NA

Prep Batch: 330150

Limits 80 - 120

Lab Sample ID: 240-96519-7 MSD

Matrix: Water

Analyte

Mercury

pН

Analysis Batch: 330440

Sample Sample Result Qualifier

Spike Added 0.13 U F1 F2 1.00

MSD MSD Result Qualifier 0.757 F1 F2

Unit %Rec ug/L

%Rec. Limits **RPD** 76 80 - 120

Limit 20 23

RPD

Method: 9040B - pH

Lab Sample ID: LCS 240-330127/2

Matrix: Water

Analysis Batch: 330127

Analyte

Spike Added 9.19

LCS LCS Result Qualifier 9.2

DU DU

7.8 HF

Result Qualifier

MDL Unit

Unit SU

Unit

SU

%Rec 100

D

D

%Rec. Limits

Prep Type: Total/NA

Lab Sample ID: 240-96519-6 DU

Matrix: Water

Analysis Batch: 330127

Sample Sample Analyte Result Qualifier 7.8 HF Hq

Client Sample ID: MBLPS-18-05-MW-1 (I)

Prepared

Prep Type: Total/NA

RPD RPD Limit 0.1 20

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-331676/3

Matrix: Water

Analysis Batch: 331676

MB MB

Analyte Result Qualifier Chloride 0.28 U Fluoride 0.024 U Sulfate 0.35 U

1.0 0.28 mg/L 0.050 0.024 mg/L 1.0 0.35 mg/L

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

> Analyzed Dil Fac 06/18/18 00:34

06/18/18 00:34

06/18/18 00:34

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RL

Client Sample ID: MBLPS-18-05-MW-1 (I)

Prep Type: Total/NA

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Lab Sample ID: LCS 240-331676/4

Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA Analysis Batch: 331676 Spike LCS LCS %Rec.

Analyte Added Result Qualifier Unit D %Rec Limits Chloride 50.0 mg/L 90 - 110 51.4 103 Fluoride 2.50 2.64 mg/L 90 - 110 106 Sulfate 50.0 51.5 mg/L 103 90 - 110

Lab Sample ID: 240-96519-6 MS

Matrix: Water

Analysis Batch: 331676

Sample Sample Spike MS MS %Rec. Added Analyte Result Qualifier Result Qualifier D %Rec Limits Unit 2.50 Fluoride 0.046 J 2.79 110 80 - 120 mg/L

Lab Sample ID: 240-96519-6 MSD Client Sample ID: MBLPS-18-05-MW-1 (I) Prep Type: Total/NA

Matrix: Water

Analysis Batch: 331676

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Analyte Result Qualifier Unit D %Rec Limits RPD Limit Fluoride 0.046 J 2.50 2.74 mg/L 108 80 - 120 2

Lab Sample ID: MB 240-331714/3 **Client Sample ID: Method Blank** Prep Type: Total/NA

Matrix: Water

Analysis Batch: 331714

MB MB

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.28	U	1.0	0.28	mg/L			06/15/18 21:13	1
Fluoride	0.024	U	0.050	0.024	mg/L			06/15/18 21:13	1
Sulfate	0.35	U	1.0	0.35	ma/L			06/15/18 21:13	1

Lab Sample ID: LCS 240-331714/4 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA

Matrix: Water

Analysis Batch: 331714

•	Spike	LCS	LCS				%Rec.		
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Chloride	50.0	51.4		mg/L		103	90 - 110		_
Fluoride	2.50	2.64		mg/L		106	90 - 110		
Sulfate	50.0	51.4		mg/L		103	90 - 110		

Lab Sample ID: 240-96519-6 MS Client Sample ID: MBLPS-18-05-MW-1 (I) Prep Type: Total/NA

Matrix: Water

Analysis Batch: 331714

Analysis Datch. 331714	Comple	Comple	Cnika	MS	Me				%Rec.		
	•	Sample	Spike	_	_						
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Chloride	310		250	542		mg/L		93	80 - 120		-
Sulfate	25		250	278		mg/L		101	80 - 120		

Lab Sample ID: 240-96519-6 MSD Client Sample ID: MBLPS-18-05-MW-1 (I) Prep Type: Total/NA

Matrix: Water

Analysis Batch: 331714

, ,	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	310		250	537		mg/L		91	80 - 120	1	15
Sulfate	25		250	278		mg/L		101	80 - 120	0	15

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6/19/2018

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

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

Lab Sample ID: 240-96519-7 MS Client Sample ID: MBLPS-18-05-MW-1 (I) **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 331714

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits 2.50 Fluoride 0.042 J 2.74 mg/L 108 80 - 120

Lab Sample ID: 240-96519-7 MSD Client Sample ID: MBLPS-18-05-MW-1 (I) Prep Type: Total/NA

Matrix: Water

Analysis Batch: 331714

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Limits Analyte Result Qualifier Unit **RPD** Limit %Rec Fluoride 0.042 J 2.50 2.75 mg/L 108 80 - 120 15

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

Lab Sample ID: MB 240-330503/1 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 330503

MB MB Analyte Result Qualifier RL **MDL** Unit Prepared Analyzed Dil Fac **Total Dissolved Solids** 7.8 U 10 7.8 mg/L 06/07/18 10:44

Lab Sample ID: LCS 240-330503/2 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 330503

LCS LCS Spike %Rec. Added Result Qualifier Limits Unit %Rec Total Dissolved Solids 626 627 100 80 - 120 mg/L

Lab Sample ID: 240-96519-6 DU Client Sample ID: MBLPS-18-05-MW-1 (I) Prep Type: Total/NA

Matrix: Water

Analysis Batch: 330503

DU DU RPD Sample Sample Analyte Result Qualifier Result Qualifier Unit RPD Limit D Total Dissolved Solids 770 760 20 mg/L

6/19/2018

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Metals

Prep Batch: 330141

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batcl
240-96519-1	MBLPS-18-05-MW-4 (I)	Total Recoverable	Water	3005A	_
240-96519-2	MBLPS-18-05-MW-5 (I)	Total Recoverable	Water	3005A	
240-96519-3	MBLPS-18-05-MW-3 (I)	Total Recoverable	Water	3005A	
240-96519-4	MBLPS-18-05-MW-2 (I)	Total Recoverable	Water	3005A	
240-96519-5	MBLPS-18-05-MW-2 (D)	Total Recoverable	Water	3005A	
240-96519-6	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	3005A	
240-96519-7	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	3005A	
MB 240-330141/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-330141/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-330141/3-A	Lab Control Sample	Total Recoverable	Water	3005A	
240-96519-6 MS	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	3005A	
240-96519-6 MSD	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	3005A	
240-96519-7 MS	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	3005A	
240-96519-7 MSD	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	3005A	

Prep Batch: 330150

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-7	MBLPS-18-05-MW-1 (I)	Total/NA	Water	7470A	
MB 240-330150/1-A	Method Blank	Total/NA	Water	7470A	
LCS 240-330150/2-A	Lab Control Sample	Total/NA	Water	7470A	
240-96519-7 MS	MBLPS-18-05-MW-1 (I)	Total/NA	Water	7470A	
240-96519-7 MSD	MBLPS-18-05-MW-1 (I)	Total/NA	Water	7470A	

Analysis Batch: 330440

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-7	MBLPS-18-05-MW-1 (I)	Total/NA	Water	7470A	330150
MB 240-330150/1-A	Method Blank	Total/NA	Water	7470A	330150
LCS 240-330150/2-A	Lab Control Sample	Total/NA	Water	7470A	330150
240-96519-7 MS	MBLPS-18-05-MW-1 (I)	Total/NA	Water	7470A	330150
240-96519-7 MSD	MBLPS-18-05-MW-1 (I)	Total/NA	Water	7470A	330150

Analysis Batch: 330488

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-1	MBLPS-18-05-MW-4 (I)	Total Recoverable	Water	6010C	330141
240-96519-2	MBLPS-18-05-MW-5 (I)	Total Recoverable	Water	6010C	330141
240-96519-3	MBLPS-18-05-MW-3 (I)	Total Recoverable	Water	6010C	330141
240-96519-4	MBLPS-18-05-MW-2 (I)	Total Recoverable	Water	6010C	330141
240-96519-5	MBLPS-18-05-MW-2 (D)	Total Recoverable	Water	6010C	330141
240-96519-6	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	6010C	330141
MB 240-330141/1-A	Method Blank	Total Recoverable	Water	6010C	330141
LCS 240-330141/2-A	Lab Control Sample	Total Recoverable	Water	6010C	330141
240-96519-6 MS	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	6010C	330141
240-96519-6 MSD	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	6010C	330141

Analysis Batch: 330498

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-7	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	6020A	330141
MB 240-330141/1-A	Method Blank	Total Recoverable	Water	6020A	330141
LCS 240-330141/3-A	Lab Control Sample	Total Recoverable	Water	6020A	330141
240-96519-7 MS	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	6020A	330141
240-96519-7 MSD	MBLPS-18-05-MW-1 (I)	Total Recoverable	Water	6020A	330141

TestAmerica Canton

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QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

General Chemistry

Analysis Batch: 330127

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	9040B	
240-96519-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	9040B	
240-96519-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	9040B	
240-96519-4	MBLPS-18-05-MW-2 (I)	Total/NA	Water	9040B	
240-96519-5	MBLPS-18-05-MW-2 (D)	Total/NA	Water	9040B	
240-96519-6	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9040B	
LCS 240-330127/2	Lab Control Sample	Total/NA	Water	9040B	
240-96519-6 DU	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9040B	

Analysis Batch: 330503

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	SM 2540C	
240-96519-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	SM 2540C	
240-96519-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	SM 2540C	
240-96519-4	MBLPS-18-05-MW-2 (I)	Total/NA	Water	SM 2540C	
240-96519-5	MBLPS-18-05-MW-2 (D)	Total/NA	Water	SM 2540C	
240-96519-6	MBLPS-18-05-MW-1 (I)	Total/NA	Water	SM 2540C	
MB 240-330503/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 240-330503/2	Lab Control Sample	Total/NA	Water	SM 2540C	
240-96519-6 DU	MBLPS-18-05-MW-1 (I)	Total/NA	Water	SM 2540C	

Analysis Batch: 331676

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	9056A	_
240-96519-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	9056A	
240-96519-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	9056A	
240-96519-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	9056A	
240-96519-6	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	
MB 240-331676/3	Method Blank	Total/NA	Water	9056A	
LCS 240-331676/4	Lab Control Sample	Total/NA	Water	9056A	
240-96519-6 MS	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	
240-96519-6 MSD	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	

Analysis Batch: 331714

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96519-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	9056A	
240-96519-4	MBLPS-18-05-MW-2 (I)	Total/NA	Water	9056A	
240-96519-5	MBLPS-18-05-MW-2 (D)	Total/NA	Water	9056A	
240-96519-6	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	
240-96519-7	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	
MB 240-331714/3	Method Blank	Total/NA	Water	9056A	
LCS 240-331714/4	Lab Control Sample	Total/NA	Water	9056A	
240-96519-6 MS	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	
240-96519-6 MSD	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	
240-96519-7 MS	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	
240-96519-7 MSD	MBLPS-18-05-MW-1 (I)	Total/NA	Water	9056A	

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-05-MW-4 (I)

Lab Sample ID: 240-96519-1

Matrix: Water

Date Collected: 05/31/18 11:08 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	330488	06/06/18 22:15	KLC	TAL CAN
Total/NA	Analysis	9040B		1	330127	06/05/18 14:37	BLW	TAL CAN
Total/NA	Analysis	9056A		1	331676	06/18/18 10:15	LKG	TAL CAN
Total/NA	Analysis	9056A		10	331676	06/18/18 10:35	LKG	TAL CAN
Total/NA	Analysis	SM 2540C		1	330503	06/07/18 10:44	MMM	TAL CAN

Client Sample ID: MBLPS-18-05-MW-5 (I) Lab Sample ID: 240-96519-2

Date Collected: 05/31/18 11:20 **Matrix: Water**

Date Received: 06/05/18 09:30

Prep Type Total Recoverable Total Recoverable	Batch Type Prep Analysis	Batch Method 3005A 6010C	Run	Dilution Factor 1	8atch Number 330141 330488	Prepared or Analyzed 06/05/18 15:00 06/06/18 22:20		Lab TAL CAN TAL CAN
Total/NA Total/NA	Analysis Analysis	9040B 9056A		1 1	330127 331676	06/05/18 14:43 06/18/18 10:56		TAL CAN TAL CAN
Total/NA Total/NA	Analysis Analysis	9056A SM 2540C		5 1	331676 330503	06/18/18 11:17 06/07/18 10:44	LKG MMM	TAL CAN TAL CAN

Client Sample ID: MBLPS-18-05-MW-3 (I) Lab Sample ID: 240-96519-3

Date Collected: 05/31/18 13:41 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	330488	06/06/18 22:26	KLC	TAL CAN
Total/NA	Analysis	9040B		1	330127	06/05/18 14:49	BLW	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/15/18 21:54	JWW	TAL CAN
Total/NA	Analysis	SM 2540C		1	330503	06/07/18 10:44	MMM	TAL CAN

Client Sample ID: MBLPS-18-05-MW-2 (I) Lab Sample ID: 240-96519-4

Date Collected: 05/31/18 15:07 **Matrix: Water** Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	330488	06/06/18 22:31	KLC	TAL CAN
Total/NA	Analysis	9040B		1	330127	06/05/18 14:55	BLW	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/15/18 22:15	JWW	TAL CAN
Total/NA	Analysis	SM 2540C		1	330503	06/07/18 10:44	MMM	TAL CAN

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Matrix: Water

TestAmerica Canton

Lab Chronicle

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-2 (D)

Lab Sample ID: 240-96519-5 Date Collected: 05/31/18 15:07 **Matrix: Water**

Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	330488	06/06/18 22:36	KLC	TAL CAN
Total/NA	Analysis	9040B		1	330127	06/05/18 15:00	BLW	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/15/18 22:36	JWW	TAL CAN
Total/NA	Analysis	SM 2540C		1	330503	06/07/18 10:44	MMM	TAL CAN

Lab Sample ID: 240-96519-6 Client Sample ID: MBLPS-18-05-MW-1 (I)

Date Collected: 05/31/18 16:29 **Matrix: Water**

Date Received: 06/05/18 09:30

Prep Type Total Recoverable Total Recoverable	Batch Type Prep Analysis	Batch Method 3005A 6010C	Run	Dilution Factor 1	8atch Number 330141 330488	Prepared or Analyzed 06/05/18 15:00 06/06/18 21:41	Analyst MBB KLC	Lab TAL CAN TAL CAN
Total/NA	Analysis	9040B		1	330127	06/05/18 15:06	BLW	TAL CAN
Total/NA	Analysis	9056A		5	331714	06/15/18 22:56	JWW	TAL CAN
Total/NA	Analysis	9056A		1	331676	06/18/18 12:19	LKG	TAL CAN
Total/NA	Analysis	SM 2540C		1	330503	06/07/18 10:44	MMM	TAL CAN

Client Sample ID: MBLPS-18-05-MW-1 (I) Lab Sample ID: 240-96519-7

Date Collected: 05/31/18 16:29 **Matrix: Water**

Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6020A		1	330498	06/06/18 15:40	DSH	TAL CAN
Total/NA	Prep	7470A			330150	06/05/18 15:00	MBB	TAL CAN
Total/NA	Analysis	7470A		1	330440	06/06/18 15:02	AJC	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/15/18 23:59	JWW	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96519-1

Laboratory: TestAmerica Canton

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

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-19
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-18 *
Illinois	NELAP	5	200004	07-31-18 *
Kansas	NELAP	7	E-10336	01-31-19
Kentucky (UST)	State Program	4	58	02-23-19
Kentucky (WW)	State Program	4	98016	12-31-18
Minnesota	NELAP	5	039-999-348	12-31-18
Minnesota (Petrofund)	State Program	1	3506	07-31-18 *
Nevada	State Program	9	OH-000482008A	07-31-18 *
New Jersey	NELAP	2	OH001	06-30-18 *
New York	NELAP	2	10975	03-31-19
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-19
Pennsylvania	NELAP	3	68-00340	08-31-18 *
Texas	NELAP	6	T104704517-17-9	08-31-18 *
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-18 *
Washington	State Program	10	C971	01-12-19
West Virginia DEP	State Program	3	210	12-31-18

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

TestAmerica Canton

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REMARKS 유 X 🗆 METHOD OF SHIPMENT/BILL OF LADING DATE DUE RUSH TAT STD TAT PACE NUMBER OF CONTAINERS SUBMITTED REQUIRED ANALYSES PRESERVATIVE DATE RELINQUISHED BY - STATE 'md' 12'10 NONYGUEOUS LIQUID MATRIX TYPE ΑiV SOFID/SEMI-SOFID MBIPS - 18 - 05 - MW - 1/ILIMDHSD 341 MALPS-18-05-MW 301X EMAILTCCOMODE 160 Flats TOLX BOLLOW . NOT MBUS 18-15-1W-20) からいと なった かりょう これ をはると、まないととなっかった ECEIVED BY PHONE 2 69 - 544. SAMPLE IDENTIFICATION RELINOUAS SAMPLER(S) NAME PROJECT NO DATE THAT LOSS MBP/4188 ASS+463 がからなるないないできまっている。 PROJECT LOCATION 1507 3 8 RELINQUISHED BY TIME 5121/18 1/08 PROJECT NAME SAMPLE DATE

Invoice to Cartery or ...

Reference 24019997

Lab Quote

Email pd monier 2+tch. com

Email Copy to

Report to Penni Mah

4.2/4.3 Fishbeck, Thompson, Carr & Huber, Inc. Address 3515 Arborchum Dr. BE Sarand Rapids, MI 49546

CHAIN OF CUSTODY RECORD

Phone 616. 575. 3824

YELLOW Copy — field Fite / Project Documentation

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SAMPLE

N V S DATE

Trad marine Carton Caranta Donata Paran Novantina	Login # : 96519
TestAmerica Canton Sample Receipt Form/Narrative Canton Facility	Login # : (2) 1 1
Client Site Name	Somer unpacked by:
	- 1977
FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Co Receipt After-hours: Drop-off Date/Time Storage Loc	
	ner
COOLANT: (Wet Ice -) Blue Ice Dry Ice Water None	
1 Cooler temperature upon receipt 1. A See Multiple 6	Cooler Form
IR GUN# IR-8 (CF +0.1 °C) Observed Cooler Temp. °C Corrected C	Cooler Temp. 4.3 °C
IR GUN #36 (CF +0.3°C) Observed Cooler Temp°C Corrected Cooler	oler Temp°C
	o ler Temp°C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity	(Yes) No
-Were the seals on the outside of the cooler(s) signed & dated?	Yes No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes (No
-Were tamper/custody seals intact and uncompromised?	YES NO NA
3. Shippers' packing slip attached to the cooler(s)?	(Yes) No
4. Did custody papers accompany the sample(s)?	Tests that are not
5. Were the custody papers relinquished & signed in the appropriate place?	Yes No checked for pH by
6. Was/were the person(s) who collected the samples clearly identified on the COC	Yes No Receiving:
7. Did all bottles arrive in good condition (Unbroken)?	Yes No
8. Could all bottle labels be reconciled with the COC?	Yes No VOAs Oil and Grease
9. Were correct bottle(s) used for the test(s) indicated?	TOC
10. Sufficient quantity received to perform indicated analyses?	Yes No
11. Are these work share samples?	Yes No.
If yes. Questions 12-16 have been checked at the originating laboratory.	(F)
12. Were all preserved sample(s) at the correct pH upon receipt?13. Were VOAs on the COC?	Yes No VA pH Strip Lot# HC740840
14. Were air bubbles >6 mm in any VOA vials? Larger than this.	Yes No NA
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #	
16. Was a LL Hg or Me Hg trip blank present?	Yeé No
Contacted PM Date by via V	erbal Voice Mail Other
Concerning	
Concerning	
	Samples processed by:
17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES	⇒ D
	L
	700000000000000000000000000000000000000
18. SAMPLE CONDITION	
Sample(s) were received after the recommend	ded holding time had expired.
Sample(s) were	received in a broken container.
Sample(s) were received with bubble	
19. SAMPLE PRESERVATION	
,	
Sample(s)	were further preserved in the laboratory.
Time preserved: Preservative(s) added/Lot number(s):	

MBLPS-18-05-MW-1 (I)

MBLPS-18-05-MW-1 (I) MBLPS-18-05-MW-1 (I)

MBLPS-18-05-MW-1 (I)

MBLPS-18-05-MW-1 (1)

Login Container Summary Report

240-96519

Temperature readings. Container Preservative Added (mis) Client Sample ID Lab ID Container Type рH Lot # <2 Plastic 500ml - with Nitric Acid MBLPS-18-05-MW-4(I) 240-96519-B-1 Plastic 500ml - with Nitric Acid <2 MBLPS-18-05-MW-5 (I) 240-96519-B-2 Plastic 500ml - with Nitric Acid MBLPS-18-05-MW-3 (1) <2 240-96519-B-3 Plastic 500ml - with Nitric Acid MBLPS-18-05-MW-2 (I) 240-96519-B-4 <2 Plastic 500ml - with Nitric Acid <2 MBLPS-18-05-MW-2 (D) 240-96519-B-5 Plastic 500ml - with Nitric Acid <2 MBLPS-18-05-MW-1 (1) 240-96519-D-6

240-96519-E-6

240-96519-F-6

240-96519-D-7

240-96519-E-7

240-96519-F-7

Plastic 500ml - with Nitric Acid

<2

<2

<2

<2

<2



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720 Tel: (330)497-9396

TestAmerica Job ID: 240-96523-2

Client Project/Site: CCR-MBLP Shiras Steam Plant

For:

Fishbeck Thompson Carr & Huber Inc 1515 Arboretum Drive SE Grand Rapids, Michigan 49546

Attn: Penni Mahler

Patrick O'Mears

Authorized for release by: 7/9/2018 3:36:40 PM

Patrick O'Meara, Manager of Project Management

(330)966-5725

patrick.omeara@testamericainc.com

Designee for

Kris Brooks, Project Manager II (330)966-9790

kris.brooks@testamericainc.com

.....LINKS

Review your project results through Total Access

Have a Question?



Visit us at: www.testamericainc.com This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Definitions/Glossary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

> Toxicity Equivalent Factor (Dioxin) Toxicity Equivalent Quotient (Dioxin)

TestAmerica Job ID: 240-96523-2

Qualifiers

Rad

TEF

TEQ

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
U	Result is less than the sample detection limit.

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

TestAmerica Canton

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Job ID: 240-96523-2

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Fishbeck Thompson Carr & Huber Inc

Project: CCR-MBLP Shiras Steam Plant

Report Number: 240-96523-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The 9315 Radium-226, 9320 Radium-228, and Ra226Ra228 Combined Radium-226 and Radium-228 analyses were performed at the TestAmerica St. Louis laboratory.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 6/5/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5° C.

RADIUM-226

Samples MBLPS-18-05-MW-4 (I) (240-96523-1), MBLPS-18-05-MW-5 (I) (240-96523-2) and MBLPS-18-05-MW-3 (I) (240-96523-3) were analyzed for Radium-226 in accordance with SW846 Method 9315. The samples were prepared on 06/11/2018 and analyzed on 07/03/2018.

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

RADIUM-228 (GFPC)

Samples MBLPS-18-05-MW-4 (I) (240-96523-1), MBLPS-18-05-MW-5 (I) (240-96523-2) and MBLPS-18-05-MW-3 (I) (240-96523-3) were analyzed for Radium-228 (GFPC) in accordance with SW846 Method 9320. The samples were prepared on 06/11/2018 and analyzed on 07/02/2018.

The laboratory control sample (LCS) recovery (160%) associated with the following samples is outside the upper QC limit of 140% indicating a potential positive bias for that analyte. This analyte was not observed above the RL in the associated samples; therefore the

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Job ID: 240-96523-2 (Continued)

Laboratory: TestAmerica Canton (Continued)

sample data is not adversely affected by this excursion. The data have been reported with this narrative.

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

COMBINED RADIUM 226 AND RADIUM 228

Samples MBLPS-18-05-MW-4 (I) (240-96523-1), MBLPS-18-05-MW-5 (I) (240-96523-2) and MBLPS-18-05-MW-3 (I) (240-96523-3) were analyzed for Combined Radium 226 and Radium 228 in accordance with Ra226_Ra228. The samples were analyzed on 07/08/2018.

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

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Method Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Method	Method Description	Protocol	Laboratory
9315	Radium-226 (GFPC)	SW846	TAL SL
9320	Radium-228 (GFPC)	SW846	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

None = None

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

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

TestAmerica Canton

7/9/2018

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Sample Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Lab Sample ID	Client Sample ID	Matrix	Collected Received	d
240-96523-1	MBLPS-18-05-MW-4 (I)	Water	05/31/18 11:08 06/05/18 09	:30
240-96523-2	MBLPS-18-05-MW-5 (I)	Water	05/31/18 11:20 06/05/18 09	:30
240-96523-3	MBLPS-18-05-MW-3 (I)	Water	05/31/18 13:41 06/05/18 09):30

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Detection Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant	TestAmerica Job ID: 240-96523-2
Client Sample ID: MBLPS-18-05-MW-4 (I)	Lab Sample ID: 240-96523-1
No Detections.	
Client Sample ID: MBLPS-18-05-MW-5 (I)	Lab Sample ID: 240-96523-2
No Detections.	
Client Sample ID: MBLPS-18-05-MW-3 (I)	Lab Sample ID: 240-96523-3

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No Detections.

Client Sample Results

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Client Sample ID: MBLPS-18-05-MW-4 (I)

Lab Sample ID: 240-96523-1

Date Collected: 05/31/18 11:08 Date Received: 06/05/18 09:30

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.400		0.206	0.209	1.00	0.245	pCi/L	06/11/18 13:02	07/03/18 06:00	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.8		40 - 110					06/11/18 13:02	07/03/18 06:00	1

Method: 9320 - I	Radium-228 (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.240	U *	0.246	0.247	1.00	0.400	pCi/L	06/11/18 13:56	07/02/18 14:36	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.8		40 - 110					06/11/18 13:56	07/02/18 14:36	1
Y Carrier	91.2		40 - 110					06/11/18 13:56	07/02/18 14:36	1

Method: Ra226_Ra	228 - Con	nbined Rad	dium-226 a	nd Radiun	n- 22 8					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.639		0.321	0.324	5.00	0.400	pCi/L		07/08/18 16:47	1

Matrix: Water

Client Sample Results

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Lab Sample ID: 240-96523-2

Matrix: Water

Client	Sample	ID: MBLPS-	18-05-MW-5 (I)

Date Collected: 05/31/18 11:20 Date Received: 06/05/18 09:30

Method: 9315 - F	Radium-226 ((GFPC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.272		0.174	0.176	1.00	0.223	pCi/L	06/11/18 13:02	07/03/18 06:00	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	86.4		40 - 110					06/11/18 13:02	07/03/18 06:00	1

Method: 9320 -	Radium-228 ((GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.198	U *	0.234	0.234	1.00	0.385	pCi/L	06/11/18 13:56	07/02/18 14:36	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	86.4		40 - 110					06/11/18 13:56	07/02/18 14:36	1
Y Carrier	90.5		40 - 110					06/11/18 13:56	07/02/18 14:36	1

Method: Ra226_Ra	228 - Con	nbined Ra	dium-226 a	nd Radiun	n- 228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.470		0.292	0.293	5.00	0.385	pCi/L		07/08/18 16:47	1

Client Sample Results

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Lab Sample ID: 240-96523-3

Matrix: Water

Client Sample	ID:	MBLPS-18-05-MW-3	(l)

Date Collected: 05/31/18 13:41 Date Received: 06/05/18 09:30

Method: 9315 - Ra	dium-226 ((GFPC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.199	U	0.160	0.161	1.00	0.234	pCi/L	06/11/18 13:02	07/03/18 06:01	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.9		40 - 110					06/11/18 13:02	07/03/18 06:01	1

Method: 9320 - I	Radium-228 ((GFPC)	Count	Total						
		_	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0711	U *	0.196	0.196	1.00	0.367	pCi/L	06/11/18 13:56	07/02/18 14:37	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.9		40 - 110					06/11/18 13:56	07/02/18 14:37	1
Y Carrier	91.2		40 - 110					06/11/18 13:56	07/02/18 14:37	1

	228 - Con	nbined Ra	adium-226 a	nd Radiur	m-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226	0.128	U	0.253	0.254	5.00	0.367	pCi/L		07/08/18 16:47	1

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7/9/2018

Tracer/Carrier Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Method: 9315 - Radium-226 (GFPC)

Matrix: Water Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ba Carrier	
Lab Sample ID	Client Sample ID	(40-110)	
240-96523-1	MBLPS-18-05-MW-4 (I)	88.8	
240-96523-2	MBLPS-18-05-MW-5 (I)	86.4	
240-96523-3	MBLPS-18-05-MW-3 (I)	92.9	
LCS 160-369900/1-A	Lab Control Sample	88.8	
MB 160-369900/23-A	Method Blank	92.6	
Tracer/Carrier Legen	d		
Ba Carrier = Ba Carrie	ſ		

Method: 9320 - Radium-228 (GFPC)

Matrix: Water Prep Type: Total/NA

				Percent Yield (Acceptance Limits)
		Ba Carrier	Y Carrier	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
240-96523-1	MBLPS-18-05-MW-4 (I)	88.88	91.2	
240-96523-2	MBLPS-18-05-MW-5 (I)	86.4	90.5	
240-96523-3	MBLPS-18-05-MW-3 (I)	92.9	91.2	
LCS 160-369905/1-A	Lab Control Sample	88.8	92.7	
MB 160-369905/23-A	Method Blank	92.6	92.0	
Tracer/Carrier Legen	d			

Ba Carrier = Ba Carrier
Y Carrier = Y Carrier

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-369900/23-A **Matrix: Water**

Analysis Batch: 373831

Client Sample ID: Method Blank Prep Type: Total/NA **Prep Batch: 369900** Count Total

MB MB Uncert. Uncert. **Analyte** Result Qualifier $(2\sigma + / -)$ $(2\sigma + / -)$ RL **MDC** Unit Prepared Analyzed Dil Fac Radium-226 -0.006681 U 0.0929 0.0929 1.00 0.207 pCi/L 06/11/18 13:02 07/03/18 09:43

MB MB Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 92.6 40 - 110 06/11/18 13:02 07/03/18 09:43

Lab Sample ID: LCS 160-369900/1-A

Matrix: Water

Analysis Batch: 373830

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

Prep Batch: 369900

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Total Spike LCS LCS %Rec. Uncert. Analyte Added Result Qual $(2\sigma + / -)$ RL**MDC** Unit %Rec Limits Radium-226 11.8 12.31 1.46 1.00 0.231 pCi/L 104 68 - 137

LCS LCS Carrier %Yield Qualifier Limits Ba Carrier 88.8 40 - 110

Method: 9320 - Radium-228 (GFPC)

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-0.07828

Lab Sample ID: MB 160-369905/23-A Client Sample ID: Method Blank **Matrix: Water**

0.198

Prep Type: Total/NA **Analysis Batch: 373662 Prep Batch: 369905** Count Total MB MB Uncert. Uncert. Analyte Result Qualifier $(2\sigma + / -)$ RL **MDC** Unit $(2\sigma + / -)$ Prepared Analyzed Dil Fac

1.00

0.372 pCi/L

MR MR Dil Fac Carrier %Yield Qualifier Limits Prepared Analyzed Ba Carrier 92.6 40 - 110 06/11/18 13:56 07/02/18 14:40 06/11/18 13:56 07/02/18 14:40 Y Carrier 92.0 40 - 110

0.198

Lab Sample ID: LCS 160-369905/1-A

Matrix: Water

Radium-228

Analysis Batch: 373489

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

06/11/18 13:56 07/02/18 14:40

Prep Batch: 369905

Total LCS LCS Spike Uncert. %Rec. Analyte Added RL **MDC** Unit %Rec Result Qual $(2\sigma + / -)$ Limits Radium-228 8.18 13.10 1.44 1.00 0.418 pCi/L 160 56 - 140

LCS LCS Carrier %Yield Qualifier Limits 40 - 110 Ba Carrier 88.8 Y Carrier 92.7 40 - 110

TestAmerica Canton

7/9/2018

QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Rad

Prep Batch: 369900

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method Pr	rep Batch
240-96523-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	PrecSep-21	
240-96523-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	PrecSep-21	
240-96523-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	PrecSep-21	
MB 160-369900/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-369900/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 369905

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96523-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	PrecSep_0	
240-96523-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	PrecSep_0	
240-96523-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	PrecSep_0	
MB 160-369905/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-369905/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

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Lab Chronicle

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-05-MW-4 (I)

TestAmerica Job ID: 240-96523-2

Lab Sample ID: 240-96523-1

Matrix: Water

Date Collected: 05/31/18 11:08 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			369900	06/11/18 13:02	JLC	TAL SL
Total/NA	Analysis	9315		1	373831	07/03/18 06:00	RTM	TAL SL
Total/NA	Prep	PrecSep_0			369905	06/11/18 13:56	JLC	TAL SL
Total/NA	Analysis	9320		1	373488	07/02/18 14:36	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	374405	07/08/18 16:47	RTM	TAL SL

Lab Sample ID: 240-96523-2 Client Sample ID: MBLPS-18-05-MW-5 (I)

Date Collected: 05/31/18 11:20 **Matrix: Water**

Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			369900	06/11/18 13:02	JLC	TAL SL
Total/NA	Analysis	9315		1	373831	07/03/18 06:00	RTM	TAL SL
Total/NA	Prep	PrecSep_0			369905	06/11/18 13:56	JLC	TAL SL
Total/NA	Analysis	9320		1	373488	07/02/18 14:36	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	374405	07/08/18 16:47	RTM	TAL SL

Lab Sample ID: 240-96523-3 Client Sample ID: MBLPS-18-05-MW-3 (I)

Date Collected: 05/31/18 13:41 **Matrix: Water**

Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			369900	06/11/18 13:02	JLC	TAL SL
Total/NA	Analysis	9315		1	373831	07/03/18 06:01	RTM	TAL SL
Total/NA	Prep	PrecSep_0			369905	06/11/18 13:56	JLC	TAL SL
Total/NA	Analysis	9320		1	373488	07/02/18 14:37	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	374405	07/08/18 16:47	RTM	TAL SL

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Laboratory: TestAmerica Canton

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

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-19
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-19
Illinois	NELAP	5	200004	07-31-18 *
Kansas	NELAP	7	E-10336	01-31-19
Kentucky (UST)	State Program	4	58	02-23-19
Kentucky (WW)	State Program	4	98016	12-31-18
Minnesota	NELAP	5	039-999-348	12-31-18
Minnesota (Petrofund)	State Program	1	3506	07-31-18 *
Nevada	State Program	9	OH-000482008A	07-31-18 *
New Jersey	NELAP	2	OH001	06-30-19
New York	NELAP	2	10975	03-31-19
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-19
Pennsylvania	NELAP	3	68-00340	08-31-18 *
Texas	NELAP	6	T104704517-17-9	08-31-18 *
USDA	Federal		P330-16-00404	12-28-19
√irginia	NELAP	3	460175	09-14-18 *
Washington	State Program	10	C971	01-12-19
West Virginia DEP	State Program	3	210	12-31-18

Laboratory: TestAmerica St. Louis

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska	State Program	10	MO00054	06-30-18 *
ANAB	DoD ELAP		L2305	04-06-19
Arizona	State Program	9	AZ0813	12-08-18
California	State Program	9	2886	06-30-19
Connecticut	State Program	1	PH-0241	03-31-19
Florida	NELAP	4	E87689	06-30-19
Illinois	NELAP	5	200023	11-30-18
lowa	State Program	7	373	12-01-18
Kansas	NELAP	7	E-10236	10-31-18
Kentucky (DW)	State Program	4	90125	12-31-18
Louisiana	NELAP	6	04080	06-30-19
Louisiana (DW)	NELAP	6	LA180017	12-31-18
Maryland	State Program	3	310	09-30-18
Michigan	State Program	5	9005	06-30-18 *
Missouri	State Program	7	780	06-30-18 *
Nevada	State Program	9	MO000542018-1	07-31-18 *
New Jersey	NELAP	2	MO002	06-30-19
New York	NELAP	2	11616	03-31-19
North Dakota	State Program	8	R207	06-30-18 *
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-18 *
Pennsylvania	NELAP	3	68-00540	02-28-19
South Carolina	State Program	4	85002001	06-30-18 *
Texas	NELAP	6	T104704193-17-11	07-31-18
US Fish & Wildlife	Federal		058448	07-31-18

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

TestAmerica Canton

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Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-2

Laboratory: TestAmerica St. Louis (Continued)

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

Authority	Program	EPA Region	Identification Number	Expiration Date
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542016-8	07-31-18 *
Virginia	NELAP	3	460230	06-14-19
Washington	State Program	10	C592	08-30-18
West Virginia DEP	State Program	3	381	08-31-18 *

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

Invoice to Alcourt Parkhot Email Activity & Fright Con Lab Duote Reference 24019587	PAGE OT	STD TAT XI CATE DUE:	PEMARKS	* METHE SENA BORY						METHOD OF SHIPMENTIBILL OF LADING FALS TILS - TIGR - 722	ORLABO DATE THATE
Report to Pent Mariex Email polimented for the Cox Coby to	REQUIRED ANALYSES	SECE MARCHE	1	NUMBER OF CONTAINERS SUBMITTED	240-9652	3 Chain o	Custody			DATE. TIME	DATE TIME RECEIVED
Fishbeck Thompson, Carr & Huber. Inc. Address / S. Ig. 7 Phrist Carr & Huber. Inc. Address / S. Ig. 7 Phrist Carr & Huber. Inc. Address / S. Ig. 7 Phrist Carr & Huber. Inc. Address / S. Ig. 7 Phrist Carr & Huber. Inc. Phone Carr & Agray	MATRIX TYPE	27+74/47 GIOS-IM3 GIOS-I	s/anos	NO X CONTROL	X (I)					10 ps Chare Inve	RECEIVED BY DATE THATE RECEIVED BY YELLOW Copy — field File / Project Documentation.
CHANGE CH	MILLP / SHOWS AD LOW (S DE 20)	\$ P S	15/	573/1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	4 1947 MALPS 18-05 MW-3						Process By Stored 16:30 By With E Coly Leading with the Coly Leadi

Past Amarina Cantan &	imple Receipt Form/Narrative		Login#	4-6	578
Canton Facility	imple Receipt Korm/Narrative		wogm n	4	
Client FTC &H.	Site Nam	<i>e</i> 1 :		Coeler unp	packed by:
	5/16 Opened of				
	UPS FAS Clipper Client Dro		ica Courier O	har .	· · · · · · · · · · · · · · · · · · ·
Receipt After-hours: Dro			e Location	######################################	
TestAmerica Cooler#		121)	Other	**************************************	entleteennesses (table)
	d: Bubble Wrap Foam Plan	Charles of the Control of the Contro	Other		
COOLANT	Wei lee Blue Ice Dry Ice		and the second s	ing the same of th	
1. Cooler temperature up			hipte Cooler Form	7 10	
	+0.1 °C) Observed Cooler Temp.		ted Cooler Tem	p. <u>2,2 °</u> °	C
10 CUN # 607 (CI	+0.3°C) Observed Cooler Temp -1.3°C) Observed Cooler Temp	C Correcte	d Cooler Temp.		
			£	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	seals on the outside of the cooler(s			No: No: NA	
	he outside of the cooler(s) signed & dy seals on the bottle(s) or bottle ki		Yes		
	dy seals intact and uncompromised			No NA	
3. Shippers' packing slip		hayan birinin	Yes?	No.	
4. Did custody papers ac			Yes		Transaction of the second
	ers relinquished & signed in the ap	propriate place?	Yes		Tests that are not checked for pH by
	s) who collected the samples clearl	y identified on the t	COC? (YE)		Receiving:
	n good condition (Unbroken)?		Yes	No.	U.A.
	be reconciled with the COC?	The second second			VOAs Oil and Grease
(used for the test(s) indicated?		YES!		TOC
11. Are these work share	eived to perform indicated analyse	5	Yes		
	6 have been checked at the origina	ting laboratory.	- 4. s. (4. <u>-</u>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	mple(s) at the correct pH upon rece		(Yes)	No NA pl	H.Strip.Lot# HC740840
13. Were VOAs on the Co	OC?	•	YesQ		
	nm in any VOA yials? 🙋 🍅 🖰			No. 0129	
	present in the cooler(s)? Trip Bla	nk Lot#	Yes Yes		
16. Was a LL Hg or Me F	ig trip triank present?	·	Yes (1	302	
Contacted PM	Dateby		yia Verbal Voic	e Mail Oth	er
Concerning			,,,		
				Samples	processed by:
17. CHAIN OF CUSTO	DY & SAMPLE DISCREPANCE	ES		· waterpray	TR
			ļ		<u> </u>
	No				
18. SAMPLE CONDITI	ON	······································	······································		
	were recei	ved after the recom	mended holding	time had ex	cpired.
Sample(s)	**************************************	·	were received in	a broken co	ontainer.
Sample(s)	₩¢	re received with bu	bble≥6 mm in d	liameter. (N	otify PM)
19. SAMPLE PRESERV	ATION				
	er ber eine eine gegenge				
Sample(s)			were further	er preserved	in the laboratory.
Time preserved:	Preservative(s) added/Lot nu	mber(s):			

Login Container Summary Report

240-96523

Temperature readings:				
Client Sample ID	Lab ID	Container Type	Container pH	Preservative Added (mls) Lot #
	240-96523-B-1	Plastic 500ml - with Nitric Acid	≤2	
	240-96523-C-1	Plastic 1 liter - Nitric Acid	<2	. The first control of the fir
	240-96523-D-1	Plastic 1 liter - Nitric Acid	sQ:	· · · · · · · · · · · · · · · · · · ·
The first transfer of the first of the first	240-96523-E-1	Plastic 1 liter - Nitric Acid	<2	
	240-96523-B-2	Plastic 500ml - with Nitric Acid	Q	
	240-96523-C-2	Plastic 1 liter - Nitric Acid		
	240-96523-D-2	Plastic 1 liter - Nitric Acid	:<2 ,	
	240-96523-E-2	Plastic 1 liter - Nitric Acid	<2	
	240-96523-B-3	Plastic 500ml - with Nitric Acid	<2	
	240-96523-C-3	Plastic 1 liter - Nitric Acid	\$2	- I Address
	240-96523-D-3	Plastic 1 liter - Nitric Acid	≪2	
en e	240-96523-E-3	Plastic I liter - Nitric Acid	····· <2, i.e.,	The second secon
The state of the s				

TestAmerica Canton 4101 Shuffet Street NW North Canton, OH 44720 Phone (330) 497-8336 Fax (330) 497-0772	Chain of Custody Record	ustody R		STATE OF THE PARTY	
Client Information (Sub Contract Lab)	Sangpler:	Eab PW. Brooks		Canier Tracking Np(s)	COC No.
Shipping/Receiving	Phene.	E-Mari		State of Origin	Z4U-87735.1 Page:
Company TestAmerica Laboratories, Inc.		D'ette	Acciedate Reguled (See note).	nigan	Page 1 of 1
Address: 13715 Rider Trail North,	Due Date Requisited: 6/7/2018		**************************************		240-96523-1 Preservation Codes
City: Earth City	TAT Requested (days):		Analysis Requested	ted	
State, Z.p.: MO, 63045			***************************************		B. NaOH N. None CZr Acetate O. AshaQ2 D. Minc Add P. Na2O3S
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	70 ft.		445) 9		
Entad.	WO #:		zz-wn {o		**
ochsme. R-MBL P Shiras Steam Plant	Project #. 24020283		M 10 2 lbsR T	Sigui	4 - DI Water K - EDTA 1 - EDV
Site:	SSOW#.		g dəş: g dəş:	8,000	
	Sample	Matrix	S beneating S bene	10 19dm	
Sample Identification - Client ID (Lab ID)		(Manato, Susolis) Convertation Olytopie, Asha)	Perforn 8.15.Ee 9. dec 9.05EE	Misto	
	X	tion Code:		μ)2 	Special Instructions/Note:
MBLPS-18-05-MW-4 (I) (240-96523-1)	5/31/18 11:08 Eastern	Water	XXX		
MBLPS-18-05-MW-5 (I) (240-96523-2)	5/31/18 11.20 Fastern	Water	×××	200 00	
MBLPS-16-05-MW-3 (l) (240-96523-3)	5/31/18 13:41 Eastern	Water	×	2 3.5	
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The state of the s					
701.11.1					
The state of the s					
NVB: Since taboratory accreditations are surfaced to change a Tartemore a					
currently maintain acceptation in the State of Origin isked above for analysis letter, analysis letter, and the state of the state of Origin isked above for analysis letter, an	arollos, art., places the comership of method. a dafinators beligg bralyzed, the samples must l of to date, tetum the signed Chain of Custod;	insiyle & accreditation e shipped back to the attesting to said com	Contribiance upon out subcontrat laboratories. This Testkarerios laboratory or other instructions will be pineauciete by:	sample stepment is forwarded i rovided. Any disanges to accrea	This sample shapment is torwarded under chain-of-custody. If the lateratory does not be provided. Any changes to accuediation status shausd be brought to TessAmerica.
Possible Hazard Identification			Sample Disposal / A fee may he accom	- J.	
Unconfirmed Deliverable Requested 1 11 11 N CHARLOW			Return To Client Disposal By Lah	Disposal By Lah	etamed longer (han 1 month)
	rfinlary Deliverable Rank; 2		Requirer		WOOD STATE
	Date:			Method of Shiproem;	
Reinguished by	6-5-18 (5:19)	240	"Thirdon Prom	Dalertoge:	1950 Company SH
Reinquished by	Date3ine	6.04	received by.	Date/Time.	Company
sci: Custody Seal No.:		Annahan A	Hecewest by.	Date/Tane:	Constany
			Cories Temperature(s) 'C and Other Remarks:		

Login Sample Receipt Checklist

Client: Fishbeck Thompson Carr & Huber Inc Job Number: 240-96523-2

List Source: TestAmerica St. Louis
List Number: 2

List Source: TestAmerica St. Louis
List Creation: 06/06/18 02:01 PM

Creator: Press, Nicholas B

Question Answer Comment

Radioactivity wasn't checked or is </= background as measured by a survey meter.

The cooler's custody seal, if present, is intact.

Sample custody seals, if present, are intact.

The cooler or samples do not appear to have been compromised or tampered with.

Samples were received on ice.

Cooler Temperature is acceptable.

Cooler Temperature is recorded.

COC is present.

COC is filled out in ink and legible.

COC is filled out with all pertinent information.

Is the Field Sampler's name present on COC?

There are no discrepancies between the containers received and the COC.

Samples are received within Holding Time (excluding tests with immediate HTs)

Sample containers have legible labels.

Containers are not broken or leaking.

Sample collection date/times are provided.

Appropriate sample containers are used.

Sample bottles are completely filled.

Sample Preservation Verified.

There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs

Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").

Multiphasic samples are not present.

Samples do not require splitting or compositing.

Residual Chlorine Checked.

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THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720 Tel: (330)497-9396

TestAmerica Job ID: 240-96523-1

Client Project/Site: CCR-MBLP Shiras Steam Plant

For:

Fishbeck Thompson Carr & Huber Inc 1515 Arboretum Drive SE Grand Rapids, Michigan 49546

Attn: Penni Mahler

Hus Brooks
Authorized for release by:

6/19/2018 4:42:40 PM

Kris Brooks, Project Manager II (330)966-9790

kris.brooks@testamericainc.com

.....LINKS

Review your project results through Total Access

Have a Question?



Visit us at: www.testamericainc.com This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Definitions/Glossary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Qualifiers

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
1	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
.OD	Limit of Detection (DoD/DOE)
.OQ	Limit of Quantitation (DoD/DOE)
ИDA	Minimum Detectable Activity (Radiochemistry)
ИDC	Minimum Detectable Concentration (Radiochemistry)

MDL Method Detection Limit Minimum Level (Dioxin) ML

NC Not Calculated

ND Not Detected at the reporting limit (or MDL or EDL if shown)

PQL Practical Quantitation Limit

QC **Quality Control**

RER Relative Error Ratio (Radiochemistry)

Reporting Limit or Requested Limit (Radiochemistry) RL

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin) **TEQ** Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Job ID: 240-96523-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Fishbeck Thompson Carr & Huber Inc

Project: CCR-MBLP Shiras Steam Plant

Report Number: 240-96523-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 6/5/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5° C.

TOTAL RECOVERABLE METALS (ICPMS)

Samples MBLPS-18-05-MW-4 (I) (240-96523-1), MBLPS-18-05-MW-5 (I) (240-96523-2) and MBLPS-18-05-MW-3 (I) (240-96523-3) were analyzed for total recoverable metals (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were prepared on 06/05/2018 and analyzed on 06/06/2018.

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

TOTAL MERCURY

Samples MBLPS-18-05-MW-4 (I) (240-96523-1), MBLPS-18-05-MW-5 (I) (240-96523-2) and MBLPS-18-05-MW-3 (I) (240-96523-3) were analyzed for total mercury in accordance with EPA SW-846 Methods 7470A. The samples were prepared on 06/05/2018 and analyzed on 06/06/2018.

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

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Job ID: 240-96523-1 (Continued)

Laboratory: TestAmerica Canton (Continued)

ANIONS

Samples MBLPS-18-05-MW-4 (I) (240-96523-1), MBLPS-18-05-MW-5 (I) (240-96523-2) and MBLPS-18-05-MW-3 (I) (240-96523-3) were analyzed for anions in accordance with EPA SW-846 Method 9056A. The samples were analyzed on 06/16/2018.

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

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Method Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Method	Method Description	Protocol	Laboratory
6020A	Metals (ICP/MS)	SW846	TAL CAN
7470A	Mercury (CVAA)	SW846	TAL CAN
9056A	Anions, Ion Chromatography	SW846	TAL CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CAN
7470A	Preparation, Mercury	SW846	TAL CAN

Protocol References:

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

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

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Sample Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Lab Sample ID	Client Sample ID	Matrix	Collected Received
240-96523-1	MBLPS-18-05-MW-4 (I)	Water	05/31/18 11:08 06/05/18 09:30
240-96523-2	MBLPS-18-05-MW-5 (I)	Water	05/31/18 11:20 06/05/18 09:30
240-96523-3	MBLPS-18-05-MW-3 (I)	Water	05/31/18 13:41 06/05/18 09:30

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Lab Sample ID: 240-96523-2

Lab Sample ID: 240-96523-1

Client Sample ID: MBLPS-18-05-MW-4 (I)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	1.4	J	5.0	0.75	ug/L	1	_	6020A	Total
									Recoverable
Barium	110		5.0	2.2	ug/L	1		6020A	Total
									Recoverable
Cadmium	0.24	J	1.0	0.21	ug/L	1		6020A	Total
									Recoverable
Cobalt	0.48	J	1.0	0.19	ug/L	1		6020A	Total
		_							Recoverable
Chromium	1.2	J	2.0	0.98	ug/L	1		6020A	Total
									Recoverable
Molybdenum	16		5.0	1.1	ug/L	1		6020A	Total
									Recoverable
Lead	0.50	J	1.0	0.45	ug/L	1		6020A	Total
Austine auto	4.0		0.0	0.57	/1	4		C000A	Recoverable
Antimony	1.0	J	2.0	0.57	ug/L	1		6020A	Total
Lithium	0.0		0.0	17	/I	4		60204	Recoverable
Lithium	9.8		8.0	1.7	ug/L	1		6020A	Total
Eluorido	0.22		0.050	0.024	ma/l			00564	Recoverable
Fluoride	0.23		0.050	0.024	IIIg/L	ı		9056A	Total/NA

Client Sample ID: MBLPS-18-05-MW-5 (I)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	95		5.0	2.2	ug/L		_	6020A	Total
									Recoverable
Cobalt	0.25	J	1.0	0.19	ug/L	1		6020A	Total
									Recoverable
Chromium	1.5	J	2.0	0.98	ug/L	1		6020A	Total
									Recoverable
Molybdenum	7.1		5.0	1.1	ug/L	1		6020A	Total
									Recoverable
Lithium	7.6	J	8.0	1.7	ug/L	1		6020A	Total
									Recoverable
Fluoride	0.046	J	0.050	0.024	mg/L	1		9056A	Total/NA

Client Sample ID: MBLPS-18-05-MW-3 (I)

Client Sample ID: M	BLPS-18-05-MV		Lab Sa	mple ID:	240-96523-3			
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac D	Method	Prep Type
Arsenic	1.5	J	5.0	0.75	ug/L		6020A	Total
								Recoverable
Barium	66		5.0	2.2	ug/L	1	6020A	Total
								Recoverable
Cobalt	0.32	J	1.0	0.19	ug/L	1	6020A	Total
								Recoverable
Chromium	2.4		2.0	0.98	ug/L	1	6020A	Total
								Recoverable
Molybdenum	1.2	J	5.0	1.1	ug/L	1	6020A	Total
								Recoverable
Lithium	4.9	J	8.0	1.7	ug/L	1	6020A	Total
								Recoverable
Fluoride	0.065		0.050	0.024	mg/L	1	9056A	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Canton

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Client Sample ID: MBLPS-18-05-MW-4 (I)

Lab Sample ID: 240-96523-1

Date Collected: 05/31/18 11:08 Matrix: Water

Date Received: 06/05/18 09:30

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.4	J	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 16:02	1
Barium	110		5.0	2.2	ug/L		06/05/18 15:00	06/06/18 16:02	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 16:02	1
Cadmium	0.24	J	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 16:02	1
Cobalt	0.48	J	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 16:02	1
Chromium	1.2	J	2.0	0.98	ug/L		06/05/18 15:00	06/06/18 16:02	1
Molybdenum	16		5.0	1.1	ug/L		06/05/18 15:00	06/06/18 16:02	1
Lead	0.50	J	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 16:02	1
Antimony	1.0	J	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 16:02	1
Selenium	0.89	U	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 16:02	1
Lithium	9.8		8.0	1.7	ug/L		06/05/18 15:00	06/06/18 16:02	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 16:02	1
Method: 7470A - Mercury (CVAA)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U	0.20	0.13	ug/L		06/05/18 15:00	06/06/18 15:13	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.23		0.050	0.024	mg/L			06/16/18 01:42	

6/19/2018

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Lab Sample ID: 240-96523-2

Matrix: Water

Client Sample ID: MBLPS-18-05-MW-5 (I)

Date Collected: 05/31/18 11:20 Date Received: 06/05/18 09:30

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.75	U	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 16:07	1
Barium	95		5.0	2.2	ug/L		06/05/18 15:00	06/06/18 16:07	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 16:07	1
Cadmium	0.21	U	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 16:07	1
Cobalt	0.25	J	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 16:07	1
Chromium	1.5	J	2.0	0.98	ug/L		06/05/18 15:00	06/06/18 16:07	1
Molybdenum	7.1		5.0	1.1	ug/L		06/05/18 15:00	06/06/18 16:07	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 16:07	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 16:07	1
Selenium	0.89	U	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 16:07	1
Lithium	7.6	J	8.0	1.7	ug/L		06/05/18 15:00	06/06/18 16:07	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 16:07	1
Method: 7470A - Mercury (CVAA)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U –	0.20	0.13	ug/L		06/05/18 15:00	06/06/18 15:15	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.046		0.050	0.024	mg/L			06/16/18 02:03	1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Lab Sample ID: 240-96523-3

Client Sample ID: MBLPS-18-05-MW-3 (I)

Date Collected: 05/31/18 13:41 **Matrix: Water**

Date Received: 06/05/18 09:30

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.5	J	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 16:20	1
Barium	66		5.0	2.2	ug/L		06/05/18 15:00	06/06/18 16:20	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 16:20	1
Cadmium	0.21	U	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 16:20	1
Cobalt	0.32	J	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 16:20	1
Chromium	2.4		2.0	0.98	ug/L		06/05/18 15:00	06/06/18 16:20	1
Molybdenum	1.2	J	5.0	1.1	ug/L		06/05/18 15:00	06/06/18 16:20	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 16:20	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 16:20	1
Selenium	0.89	U	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 16:20	1
Lithium	4.9	J	8.0	1.7	ug/L		06/05/18 15:00	06/06/18 16:20	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 16:20	1
Method: 7470A - Mercury (CVAA)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U -	0.20	0.13	ug/L		06/05/18 15:00	06/06/18 15:17	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.065		0.050	0.024	mg/L			06/16/18 02:24	1

TestAmerica Job ID: 240-96523-1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 240-330141/1-A

Matrix: Water

Matrix: Water

Analysis Batch: 330498

Client Sample ID: Method Blank Prep Type: Total Recoverable Prep Batch: 330141

	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.75	U –	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 15:31	1
Barium	2.2	U	5.0	2.2	ug/L		06/05/18 15:00	06/06/18 15:31	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 15:31	1
Cadmium	0.21	U	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 15:31	1
Cobalt	0.19	U	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 15:31	1
Chromium	0.98	U	2.0	0.98	ug/L		06/05/18 15:00	06/06/18 15:31	1
Molybdenum	1.1	U	5.0	1.1	ug/L		06/05/18 15:00	06/06/18 15:31	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 15:31	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 15:31	1
Selenium	0.89	U	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 15:31	1
Lithium	1.7	U	8.0	1.7	ug/L		06/05/18 15:00	06/06/18 15:31	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 15:31	1

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

Analysis Batch: 330498	Spike	LCS	LCS				Prep Batch: 330141 %Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Arsenic	1000	947		ug/L		95	80 - 120
Barium	1000	969		ug/L		97	80 - 120
Beryllium	1000	961		ug/L		96	80 - 120
Cadmium	1000	1060		ug/L		106	80 - 120
Cobalt	1000	979		ug/L		98	80 - 120
Chromium	1000	964		ug/L		96	80 - 120
Molybdenum	100	94.4		ug/L		94	80 - 120
Lead	1000	1060		ug/L		106	80 - 120
Antimony	100	93.0		ug/L		93	80 - 120
Selenium	1000	947		ug/L		95	80 - 120
Thallium	250	263		ug/L		105	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: LCS 240-330141/3-A

Lab Sample ID: MB 240-330150/1-A

Matrix: Water

Analysis Batch: 330440

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 330150

-	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U	0.20	0.13	ug/L		06/05/18 15:00	06/06/18 15:23	1

LCS LCS

4.35

Result Qualifier Unit

ug/L

Lab Sample ID: LCS 240-330150/2-A

Matrix: Water

Analysis Batch: 330440

	Spike
Analyte	Added
Mercury	 5.00

Client Sample ID: Lab Control Sample

Prep Type: Total/NA **Prep Batch: 330150** %Rec.

Limits 80 - 120

TestAmerica Canton

6/19/2018

QC Sample Results

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-331714/3

Matrix: Water

Client Sample ID: Method Blank

Prep Type: Total/NA

Analysis Batch: 331714

 Analyte
 Result Fluoride
 Qualifier 0.024
 RL U 0.050
 MDL 0.024
 Unit mg/L
 D mg/L
 Prepared 0.0/15/18 21:13
 Analyzed 0.0/15/18 21:13
 D mg/L

Lab Sample ID: LCS 240-331714/4

Matrix: Water

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

Analysis Batch: 331714

 Analyte
 Added Fluoride
 Result Qualifier Pluoride
 Unit mg/L
 D v/Rec | Limits | 106 | 90 - 110 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 |

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QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Metals

Prep Batch: 330141

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96523-1	MBLPS-18-05-MW-4 (I)	Total Recoverable	Water	3005A	
240-96523-2	MBLPS-18-05-MW-5 (I)	Total Recoverable	Water	3005A	
240-96523-3	MBLPS-18-05-MW-3 (I)	Total Recoverable	Water	3005A	
MB 240-330141/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-330141/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

Prep Batch: 330150

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96523-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	7470A	_
240-96523-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	7470A	
240-96523-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	7470A	
MB 240-330150/1-A	Method Blank	Total/NA	Water	7470A	
LCS 240-330150/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 330440

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96523-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	7470A	330150
240-96523-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	7470A	330150
240-96523-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	7470A	330150
MB 240-330150/1-A	Method Blank	Total/NA	Water	7470A	330150
LCS 240-330150/2-A	Lab Control Sample	Total/NA	Water	7470A	330150

Analysis Batch: 330498

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96523-1	MBLPS-18-05-MW-4 (I)	Total Recoverable	Water	6020A	330141
240-96523-2	MBLPS-18-05-MW-5 (I)	Total Recoverable	Water	6020A	330141
240-96523-3	MBLPS-18-05-MW-3 (I)	Total Recoverable	Water	6020A	330141
MB 240-330141/1-A	Method Blank	Total Recoverable	Water	6020A	330141
LCS 240-330141/3-A	Lab Control Sample	Total Recoverable	Water	6020A	330141

General Chemistry

Analysis Batch: 331714

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96523-1	MBLPS-18-05-MW-4 (I)	Total/NA	Water	9056A	<u> </u>
240-96523-2	MBLPS-18-05-MW-5 (I)	Total/NA	Water	9056A	
240-96523-3	MBLPS-18-05-MW-3 (I)	Total/NA	Water	9056A	
MB 240-331714/3	Method Blank	Total/NA	Water	9056A	
LCS 240-331714/4	Lab Control Sample	Total/NA	Water	9056A	

Lab Chronicle

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Date Collected: 05/31/18 11:08

Date Received: 06/05/18 09:30

Client Sample ID: MBLPS-18-05-MW-4 (I)

TestAmerica Job ID: 240-96523-1

Lab Sample ID: 240-96523-1

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6020A		1	330498	06/06/18 16:02	DSH	TAL CAN
Total/NA	Prep	7470A			330150	06/05/18 15:00	MBB	TAL CAN
Total/NA	Analysis	7470A		1	330440	06/06/18 15:13	AJC	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/16/18 01:42	JWW	TAL CAN

Client Sample ID: MBLPS-18-05-MW-5 (I) Lab Sample ID: 240-96523-2

Date Collected: 05/31/18 11:20 **Matrix: Water**

Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6020A		1	330498	06/06/18 16:07	DSH	TAL CAN
Total/NA	Prep	7470A			330150	06/05/18 15:00	MBB	TAL CAN
Total/NA	Analysis	7470A		1	330440	06/06/18 15:15	AJC	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/16/18 02:03	JWW	TAL CAN

Client Sample ID: MBLPS-18-05-MW-3 (I) Lab Sample ID: 240-96523-3

Date Collected: 05/31/18 13:41 **Matrix: Water**

Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6020A		1	330498	06/06/18 16:20	DSH	TAL CAN
Total/NA	Prep	7470A			330150	06/05/18 15:00	MBB	TAL CAN
Total/NA	Analysis	7470A		1	330440	06/06/18 15:17	AJC	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/16/18 02:24	JWW	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96523-1

Laboratory: TestAmerica Canton

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

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-19
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-18 *
Illinois	NELAP	5	200004	07-31-18 *
Kansas	NELAP	7	E-10336	01-31-19
Kentucky (UST)	State Program	4	58	02-23-19
Kentucky (WW)	State Program	4	98016	12-31-18
Minnesota	NELAP	5	039-999-348	12-31-18
Minnesota (Petrofund)	State Program	1	3506	07-31-18 *
Nevada	State Program	9	OH-000482008A	07-31-18 *
New Jersey	NELAP	2	OH001	06-30-18 *
New York	NELAP	2	10975	03-31-19
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-19
Pennsylvania	NELAP	3	68-00340	08-31-18 *
Texas	NELAP	6	T104704517-17-9	08-31-18 *
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-18 *
Washington	State Program	10	C971	01-12-19
West Virginia DEP	State Program	3	210	12-31-18

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

TestAmerica Canton

invoice to Alegant Parket

Email primater Prenda

Lab Quote ZHO(3587	PAGE OF OF	STD TAY XX RUSH TAT C.	*KENAAPKS	* METHUS SOM BOY	TO GO OF MAY 1000 Se							METHOD OF SHIPMENT/BILL OF LADING	Mad For Lab. Soll Min 5/5/8/950
Coby to	REQUIRED ANALYSES	FRE UMARY FRE WHENER FREAMS.	RESURVATIVE REPORT AND THE SERVATIVE REPORT OF CONTAINERS SERVATIVED		240-	96523 Ch	of C	usiody				D BY DATE TIME	RECEIVED BY DATE TIME RECE
RECORD Phone City-525-3624	PROJECT NAME PROJECT NO. PROJECT NAME PROJECT NO. PROJECT NO.	중 기업동	s/qnos	X (3) + M-30-81-20-31/4/2	X (276 MW 20 - Ve - V							TIME RELINQUISHED BY TOATE IN 16.30	PEGENTEAN SYNDAGO 1914E BREENED BY DATE THAT REG

(3)

Part America Canton &	imple Receipt Form/Narrative		Login #	-46	578
Canton Facility	imple Receipt Korm/Narrative		nogm n	4	
Client FTC &H.	Site Nam	e 1 :		Coeler unp	packed by:
	5/16 Opened o				
	UPS FAS Clipper Client Dro		ica Courier O	har .	· · · · · · · · · · · · · · · · · · ·
Receipt After-hours: Dro			e Location	#110-1	
TestAmerica Cooler#		29)	Other	anitalistikisteksistyseejijssees	exteles was a second of the se
	d: Bubble Wrap Foam Plas	Marie Company of the	Other		
COOLANT	Wei lee Blue Ice Dry Ice		and the second of the second	in the second second	
1. Cooler temperature up			hipte Cooler Form	7	
	+0.1 °C) Observed Cooler Temp.		ted Cooler Tem	р. <u>Э.Э.</u> "	C
10 CUN # 607 (CI	+0.3°C) Observed Cooler Temp -1.3°C) Observed Cooler Temp	C Correcte	ed Cooler Temp.		
	seals on the outside of the cooler(s			No: No:NA	
	he outside of the cooler(s) signed & dy seals on the bottle(s) or bottle ki		Yes	المتحدد	
	dy seals intact and uncompromised			No NA	
3. Shippers' packing slip		hayan Kibanii,	Yess!	No	
4. Did custody papers ac			Yes		
	ers relinquished & signed in the ap	propriate place?	(Yes)		Tests that are not checked for pH by
	s) who collected the samples clearl	y identified on the	COC? (YZ)		Receiving:
	n good condition (Unbroken)?		Yes	No.	U.A.
	be reconciled with the COC?	The second second	75.00		VOAs Oil and Grease
(used for the test(s) indicated?		Yes Yes		TOC
11. Are these work share	eived to perform indicated analyse	S .	Yes		
	6 have been checked at the original	ting laboratory.	3 1 to 12 to 1		
	mple(s) at the correct pH upon rece		(Yes)	No NA p	H.Strip.Lot# HC740840
13. Were VOAs on the Co	OC?	•	YesQ		
	nm in any VOA yials? 🙋 🍎			No. 01727	
	present in the cooler(s)? Trip Bla	nk Lot#	Yes Y		
16. Was a LL Hg or Me F	ig trip blank present?	· · · · · · · · · · · · · · · · · · ·	Yes Q	302	
Contacted PM	Date by	·	yia Verbal Voic	ce Mail Oth	er
Concerning					
				Samples	processed by:
17. CHAIN OF CUSTO	DY & SAMPLE DISCREPANCE	ES.		. astrony	TR
			ļ		
				·	
* ************************************	· · · · · · · · · · · · · · · · · · ·				
18. SAMPLE CONDITI	ON		······································	***************************************	
	were recei	ved after the recom	mended holding	time had ex	cpired.
Sample(s)	4107-14-	·	were received in	i a broken co	ontainer.
Sample(s)	w¢.	re received with bu	bble ≥6 mm in d	liameter. (N	otify PM)
19. SAMPLE PRESERV	ATION		······································		
	and the second of the second o				
Sample(s)			were further	er preserved	in the laboratory.
Time preserved:	Preservative(s) added/Lot nu	mber(s):			
					i i

Login Container Summary Report

Client Sample ID	<u>Lab ID</u>	Container Type	Container pH	Preservative Added (mls)	<u>Lot #</u>
	240-96523-B-1	Plastic 500ml - with Nitric Acid	<u><2</u>		
	240-96523-C-1	Plastic I liter - Nitric Acid	~2	. ,,,,,	
	240-96523-D-1	Plastic 1 liter - Nitric Acid	<2		· .
e filosoficio de la compania de la c	240-96523-E-1	Plastic I liter - Nitric Acid	<2		
	240-96523-B-2	Plastic 500ml - with Nitric Acid	4	· ·	·
	240-96523-C-2	Plastic 1 liter - Nitric Acid	<2		
	240-96523-D-2	Plastic 1 liter - Nitric Acid	<2,		in isian inisiana araba araa.
	240-96523-E-2	Plastic 1 liter - Nitric Acid	<2		
	240-96523-B-3	Plastic 500ml - with Nitric Acid	<2		·
	240-96523-C-3	Plastic 1 liter - Nitric Acid	<2	·	- National Management
	240-96523-D-3	Plastic 1 liter - Nitric Acid	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
and the property of the second se	240-96523-E-3	Plastic 1 liter - Nitric Acid	<2	· . ·	· · · · · · · · · · · · · · · · · · ·



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720 Tel: (330)497-9396

TestAmerica Job ID: 240-96524-2

Client Project/Site: CCR-MBLP Shiras Steam Plant

For:

Fishbeck Thompson Carr & Huber Inc 1515 Arboretum Drive SE Grand Rapids, Michigan 49546

Attn: Penni Mahler

Patrick O'Meara

Authorized for release by: 7/9/2018 3:39:00 PM

Patrick O'Meara, Manager of Project Management

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

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Definitions/Glossary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

> Toxicity Equivalent Factor (Dioxin) Toxicity Equivalent Quotient (Dioxin)

TestAmerica Job ID: 240-96524-2

Qualifiers

Rad

TEF

TEQ

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
U	Result is less than the sample detection limit.

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

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Job ID: 240-96524-2

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Fishbeck Thompson Carr & Huber Inc

Project: CCR-MBLP Shiras Steam Plant

Report Number: 240-96524-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The 9315 Radium-226, 9320 Radium-228, and Ra226Ra228 Combined Radium-226 and Radium-228 analyses were performed at the TestAmerica St. Louis laboratory.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 6/5/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5° C.

RADIUM-226

Samples MBLPS-18-05-MW-2 (I) (240-96524-1), MBLPS-18-05-MW-2 (D) (240-96524-2) and MBLPS-18-05-MW-1 (I) (240-96524-3) were analyzed for Radium-226 in accordance with SW846 Method 9315. The samples were prepared on 06/11/2018 and analyzed on 07/03/2018.

Method PrecSep-21: Radium 226 Prep Batch 160-369900: Sample aliquots reduced due to potential matrix interference. Samples were brown, murky, and contained sediment.

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

RADIUM-228 (GFPC)

Samples MBLPS-18-05-MW-2 (I) (240-96524-1), MBLPS-18-05-MW-2 (D) (240-96524-2) and MBLPS-18-05-MW-1 (I) (240-96524-3) were analyzed for Radium-228 (GFPC) in accordance with SW846 Method 9320. The samples were prepared on 06/11/2018 and analyzed on 07/02/2018.

TestAmerica Canton

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Job ID: 240-96524-2 (Continued)

Laboratory: TestAmerica Canton (Continued)

The laboratory control sample (LCS) recovery (160%) associated with the following samples is outside the upper QC limit of 140% indicating a potential positive bias for that analyte. This analyte was not observed above the RL in the associated samples; therefore the sample data is not adversely affected by this excursion. The data have been reported with this narrative.

Method PrecSep_0: Radium 228 Prep Batch 160-369905: Sample aliquots reduced due to potential matrix interference. Samples were brown, murky, and contained sediment.

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

COMBINED RADIUM 226 AND RADIUM 228

Samples MBLPS-18-05-MW-2 (I) (240-96524-1), MBLPS-18-05-MW-2 (D) (240-96524-2) and MBLPS-18-05-MW-1 (I) (240-96524-3) were analyzed for Combined Radium 226 and Radium 228 in accordance with Ra226_Ra228. The samples were analyzed on 07/08/2018.

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

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Method Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Method	Method Description	Protocol	Laboratory
9315	Radium-226 (GFPC)	SW846	TAL SL
9320	Radium-228 (GFPC)	SW846	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

None = None

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

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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7/9/2018

Sample Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Lab Sample ID	Client Sample ID	Matrix	Collected Received
240-96524-1	MBLPS-18-05-MW-2 (I)	Water	05/31/18 15:07 06/05/18 09:30
240-96524-2	MBLPS-18-05-MW-2 (D)	Water	05/31/18 15:07 06/05/18 09:30
240-96524-3	MBLPS-18-05-MW-1 (I)	Water	05/31/18 16:29 06/05/18 09:30

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Detection Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant	TestAmerica Job ID: 240-96524-2
Client Sample ID: MBLPS-18-05-MW-2 (I)	Lab Sample ID: 240-96524-1
No Detections.	
Client Sample ID: MBLPS-18-05-MW-2 (D)	Lab Sample ID: 240-96524-2
No Detections.	
Client Sample ID: MBLPS-18-05-MW-1 (I)	Lab Sample ID: 240-96524-3

No Detections.

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Date Collected: 05/31/18 15:07

Date Received: 06/05/18 09:30

Analyte

226 + 228

Combined Radium

Client Sample ID: MBLPS-18-05-MW-2 (I)

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Result Qualifier

0.519

Count

Uncert.

(2σ+/-)

0.268

TestAmerica Job ID: 240-96524-2

Lab Sample ID: 240-96524-1 **Matrix: Water**

Dil Fac

Method: 9315 -	Radium-226 ((GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.204	U	0.154	0.155	1.00	0.212	pCi/L	06/11/18 13:02	07/03/18 06:02	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
									07/00/10 00 00	
Ba Carrier Method: 9320 -	92.6 Radium-228 ((GFPC)	40 - 110					06/11/18 13:02	07/03/18 06:02	
-		(GFPC)	Count	Total				06/11/18 13:02	07/03/18 06:02	1
Method: 9320 -	Radium-228 ((GFPC) Qualifier		Total Uncert. (2σ+/-)	RL	MDC	Unit	06/11/18 13:02	0//03/18 06:02	Dil Fac
-	Radium-228 (Qualifier	Count Uncert.	Uncert.	RL 1.00	MDC 0.337				Dil Fac
Method: 9320 -	Radium-228 (Result 0.315	Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)				Prepared	Analyzed	1
Method: 9320 - Analyte Radium-228	Radium-228 (Result 0.315	Qualifier	Count Uncert. (2σ+/-) 0.219	Uncert. (2σ+/-)				Prepared 06/11/18 13:56	Analyzed 07/02/18 14:37	Dil Fac

Total

MDC Unit

0.337 pCi/L

Prepared

Analyzed

07/08/18 16:47

RL

5.00

Uncert.

(2σ+/-)

0.270

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-05-MW-2 (D)

TestAmerica Job ID: 240-96524-2

Lab Sample ID: 240-96524-2

Matrix: Water

Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

Method: 9315 - F	Kaululli-226 (GFPC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.193		0.144	0.145	1.00	0.189	pCi/L	06/11/18 13:02	07/03/18 06:02	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	91.2	-	40 - 110					06/11/18 13:02	07/03/18 06:02	

Method: 9320 - I	Naululli-220 ((GIFC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.106	U *	0.209	0.209	1.00	0.357	pCi/L	06/11/18 13:56	07/02/18 14:37	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	91.2		40 - 110					06/11/18 13:56	07/02/18 14:37	1
Y Carrier	96.1		40 - 110					06/11/18 13:56	07/02/18 14:37	1

Method: Ra226_Ra	228 - Con	nbined Ra	adium-226 a	and Radiu	m-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226	0.299	U	0.254	0.254	5.00	0.357	pCi/L		07/08/18 16:47	1

+ 228

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Client Sample ID: MBLPS-18-05-MW-1 (I)

Lab Sample ID: 240-96524-3 Date Collected: 05/31/18 16:29 **Matrix: Water**

Date Received: 06/05/18 09:30

adium-226 ((GFPC)								
		Count Uncert.	Total Uncert.						
Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
0.409		0.224	0.227	1.00	0.264	pCi/L	06/11/18 13:02	07/03/18 09:40	1
%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
91.7		40 - 110					06/11/18 13:02	07/03/18 09:40	1
	Result 0.409 %Yield	%Yield Qualifier	Count Uncert.	Count Uncert. Uncert.	Count Total Uncert. Uncert. Uncert. Count Uncert. Uncert. Count Uncert. Uncert. Count Count	Count Total Uncert. Uncert. Uncert. O.409 Uncert O.224 O.227 O.264	Count Total Uncert. Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit O.409 O.224 O.227 1.00 O.264 pCi/L	Count Total Uncert. Uncert. Uncert. Uncert. Uncert. O.409 O.224 O.227 O.227 O.264 PCi/L Prepared O.264 Prepared O.264 O.264 O.264 O.264 O.264 O.266 O.2	Count Uncert. Uncert. Uncert. Variety V

Method: 9320 - I	Radium-228 ((GFPC)								
Analyte	Posult	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte	Result	Qualifier	(20+/-)	(20+/-)	KL	MIDC	Onit	Prepareu	Analyzeu	DII Fac
Radium-228	0.107	U *	0.265	0.265	1.00	0.458	pCi/L	06/11/18 13:56	07/02/18 14:37	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	91.7		40 - 110					06/11/18 13:56	07/02/18 14:37	1
Y Carrier	94.6		40 - 110					06/11/18 13:56	07/02/18 14:37	1

Method: Ra226_Ra	228 - Con	nbined Ra	dium-226 a	nd Radiur	n-228					
_			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.516		0.347	0.349	5.00	0.458	pCi/L		07/08/18 16:47	1

Tracer/Carrier Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant TestAmerica Job ID: 240-96524-2

Method: 9315 - Radium-226 (GFPC)

Matrix: Water Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ba Carrier	
ab Sample ID	Client Sample ID	(40-110)	
40-96524-1	MBLPS-18-05-MW-2 (I)	92.6	
40-96524-2	MBLPS-18-05-MW-2 (D)	91.2	
40-96524-3	MBLPS-18-05-MW-1 (I)	91.7	
40-96524-3 MS	MBLPS-18-05-MW-1 (I)	89.4	
40-96524-3 MSD	MBLPS-18-05-MW-1 (I)	88.2	
CS 160-369900/1-A	Lab Control Sample	88.8	
1B 160-369900/23-A	Method Blank	92.6	
Tracer/Carrier Legend	i		

Method: 9320 - Radium-228 (GFPC)

Matrix: Water Prep Type: Total/NA

				Percent Yield (Acceptance Limits)
		Ba Carrier	Y Carrier	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
240-96524-1	MBLPS-18-05-MW-2 (I)	92.6	92.3	
240-96524-2	MBLPS-18-05-MW-2 (D)	91.2	96.1	
240-96524-3	MBLPS-18-05-MW-1 (I)	91.7	94.6	
240-96524-3 MS	MBLPS-18-05-MW-1 (I)	89.4	90.8	
240-96524-3 MSD	MBLPS-18-05-MW-1 (I)	88.2	91.2	
LCS 160-369905/1-A	Lab Control Sample	88.8	92.7	
MB 160-369905/23-A	Method Blank	92.6	92.0	

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

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TestAmerica Job ID: 240-96524-2

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Type: Total/NA

Prep Batch: 369900

Prep Batch: 369900

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-369900/23-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 373831 Prep Batch: 369900**

MB MB Uncert. Uncert. **Analyte** Result Qualifier $(2\sigma + / -)$ $(2\sigma + / -)$ RL **MDC** Unit Prepared Analyzed Dil Fac Radium-226 -0.006681 U 0.0929 0.0929 1.00 0.207 pCi/L 06/11/18 13:02 07/03/18 09:43

Total

Count

MB MB %Yield Carrier Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 06/11/18 13:02 07/03/18 09:43 92.6 40 - 110

Lab Sample ID: LCS 160-369900/1-A

Matrix: Water Analysis Batch: 373830

Prep Batch: 369900 Total Spike LCS LCS %Rec. Uncert. Analyte Added Result Qual $(2\sigma + / -)$ RL**MDC** Unit %Rec Limits Radium-226 11.8 12.31 1.46 1.00 0.231 pCi/L 104 68 - 137

LCS LCS Carrier %Yield Qualifier Limits Ba Carrier 88.8 40 - 110

Lab Sample ID: 240-96524-3 MS Client Sample ID: MBLPS-18-05-MW-1 (I)

Matrix: Water

Analysis Batch: 373831

Total Sample Sample Spike MS MS Uncert. %Rec. Analyte Result Qual Added Result Qual $(2\sigma + / -)$ RL **MDC** Unit %Rec Limits Radium-226 1.00 0.409 1.74 0.248 pCi/L 89 75 - 138 15.7 14.46

MS MS Carrier %Yield Qualifier Limits Ba Carrier 89.4 40 - 110

Lab Sample ID: 240-96524-3 MSD Client Sample ID: MBLPS-18-05-MW-1 (I) Prep Type: Total/NA

Matrix: Water

Analysis Batch: 373831

Total Sample Sample Spike MSD MSD Uncert. %Rec. **RER** Added $(2\sigma + / -)$ RL Analyte Result Qual Result Qual **MDC** Unit %Rec Limits Limit RER Radium-226 0.409 15.7 14.73 1.78 1.00 0.259 pCi/L 91 75 - 138 0.08

MSD MSD Carrier %Yield Qualifier Limits Ba Carrier 88.2 40 - 110

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TestAmerica Job ID: 240-96524-2

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

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Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-369905/23-A

Matrix: Water

Analysis Batch: 373662

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

Prep Batch: 369905

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.07828	U	0.198	0.198	1.00	0.372	pCi/L	06/11/18 13:56	07/02/18 14:40	1
	MB	МВ								
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.6	-	40 - 110					06/11/18 13:56	07/02/18 14:40	1

40 - 110

Lab Sample ID: LCS 160-369905/1-A

92.0

Matrix: Water

Y Carrier

Analysis Batch: 373489

Client Sample ID: Lab Control Sample

06/11/18 13:56 07/02/18 14:40

Prep Type: Total/NA

Prep Batch: 369905

				Total				
	Spike	LCS	LCS	Uncert.				%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC Unit	%Rec	Limits
Radium-228	8.18	13.10	*	1.44	1.00	0.418 pCi/L	160	56 - 140

 Carrier
 %Yield Plant
 Qualifier Plant
 Limits Plant

 Ba Carrier
 88.8
 40 - 110

 Y Carrier
 92.7
 40 - 110

Lab Sample ID: 240-96524-3 MS

Matrix: Water

Analysis Batch: 373488

Client Sample ID: MBLPS-18-05-MW-1 (I)
Prep Type: Total/NA

Deep Details 000005

Prep Batch: 369905

_					Total					
	Sample Sample	Spike	MS	MS	Uncert.					%Rec.
Analyte	Result Qual	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
Radium-228	0.107 U *	10.9	10.50		1.28	1.00	0.457	pCi/L	95	45 - 150
	MS MS									
Carrier	%Yield Qualifier	Limits								
Ba Carrier	89.4	40 - 110								

Lab Sample ID: 240-96524-3 MSD

90.8

40 - 110

Matrix: Water

Y Carrier

Analysis Batch: 373488

Client Sample ID: MBLPS-18-05-MW-1 (I)

Prep Type: Total/NA

Prep Batch: 369905

						Total							
	Sample	Sample	Spike	MSD	MSD	Uncert.					%Rec.		RER
Analyte	Result	Qual	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Radium-228	0.107	U *	10.9	12.07		1.44	1.00	0.549	pCi/L	110	45 - 150	0.58	1

	MSD	MSD	
Carrier	%Yield	Qualifier	Limits
Ba Carrier	88.2		40 - 110
Y Carrier	91.2		40 - 110

TestAmerica Canton

QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Rad

Prep Batch: 369900

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96524-1	MBLPS-18-05-MW-2 (I)	Total/NA	Water	PrecSep-21	
240-96524-2	MBLPS-18-05-MW-2 (D)	Total/NA	Water	PrecSep-21	
240-96524-3	MBLPS-18-05-MW-1 (I)	Total/NA	Water	PrecSep-21	
MB 160-369900/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-369900/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
240-96524-3 MS	MBLPS-18-05-MW-1 (I)	Total/NA	Water	PrecSep-21	
240-96524-3 MSD	MBLPS-18-05-MW-1 (I)	Total/NA	Water	PrecSep-21	

Prep Batch: 369905

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96524-1	MBLPS-18-05-MW-2 (I)	Total/NA	Water	PrecSep_0	
240-96524-2	MBLPS-18-05-MW-2 (D)	Total/NA	Water	PrecSep_0	
240-96524-3	MBLPS-18-05-MW-1 (I)	Total/NA	Water	PrecSep_0	
MB 160-369905/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-369905/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
240-96524-3 MS	MBLPS-18-05-MW-1 (I)	Total/NA	Water	PrecSep_0	
240-96524-3 MSD	MBLPS-18-05-MW-1 (I)	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-05-MW-2 (I)

TestAmerica Job ID: 240-96524-2

Lab Sample ID: 240-96524-1

. Matrix: Water

Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			369900	06/11/18 13:02	JLC	TAL SL
Total/NA	Analysis	9315		1	373831	07/03/18 06:02	RTM	TAL SL
Total/NA	Prep	PrecSep_0			369905	06/11/18 13:56	JLC	TAL SL
Total/NA	Analysis	9320		1	373488	07/02/18 14:37	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	374405	07/08/18 16:47	RTM	TAL SL

Client Sample ID: MBLPS-18-05-MW-2 (D)

Lab Sample ID: 240-96524-2

Date Collected: 05/31/18 15:07

Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			369900	06/11/18 13:02	JLC	TAL SL
Total/NA	Analysis	9315		1	373831	07/03/18 06:02	RTM	TAL SL
Total/NA	Prep	PrecSep_0			369905	06/11/18 13:56	JLC	TAL SL
Total/NA	Analysis	9320		1	373488	07/02/18 14:37	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	374405	07/08/18 16:47	RTM	TAL SL

Client Sample ID: MBLPS-18-05-MW-1 (I)

Lab Sample ID: 240-96524-3

Date Collected: 05/31/18 16:29 Matrix: Water

Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			369900	06/11/18 13:02	JLC	TAL SL
Total/NA	Analysis	9315		1	373831	07/03/18 09:40	RTM	TAL SL
Total/NA	Prep	PrecSep_0			369905	06/11/18 13:56	JLC	TAL SL
Total/NA	Analysis	9320		1	373488	07/02/18 14:37	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	374405	07/08/18 16:47	RTM	TAL SL

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

TestAmerica Canton

Page 16 of 25

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Laboratory: TestAmerica Canton

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

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-19
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-19
Illinois	NELAP	5	200004	07-31-18 *
Kansas	NELAP	7	E-10336	01-31-19
Kentucky (UST)	State Program	4	58	02-23-19
Kentucky (WW)	State Program	4	98016	12-31-18
Minnesota	NELAP	5	039-999-348	12-31-18
Minnesota (Petrofund)	State Program	1	3506	07-31-18 *
Nevada	State Program	9	OH-000482008A	07-31-18 *
New Jersey	NELAP	2	OH001	06-30-19
New York	NELAP	2	10975	03-31-19
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-19
Pennsylvania	NELAP	3	68-00340	08-31-18 *
Texas	NELAP	6	T104704517-17-9	08-31-18 *
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-18 *
Washington	State Program	10	C971	01-12-19
West Virginia DEP	State Program	3	210	12-31-18

Laboratory: TestAmerica St. Louis

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska	State Program	10	MO00054	06-30-18 *
ANAB	DoD ELAP		L2305	04-06-19
Arizona	State Program	9	AZ0813	12-08-18
California	State Program	9	2886	06-30-19
Connecticut	State Program	1	PH-0241	03-31-19
Florida	NELAP	4	E87689	06-30-19
Illinois	NELAP	5	200023	11-30-18
lowa	State Program	7	373	12-01-18
Kansas	NELAP	7	E-10236	10-31-18
Kentucky (DW)	State Program	4	90125	12-31-18
Louisiana	NELAP	6	04080	06-30-19
Louisiana (DW)	NELAP	6	LA180017	12-31-18
Maryland	State Program	3	310	09-30-18
Michigan	State Program	5	9005	06-30-18 *
Missouri	State Program	7	780	06-30-18 *
Nevada	State Program	9	MO000542018-1	07-31-18 *
New Jersey	NELAP	2	MO002	06-30-19
New York	NELAP	2	11616	03-31-19
North Dakota	State Program	8	R207	06-30-18 *
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-18 *
Pennsylvania	NELAP	3	68-00540	02-28-19
South Carolina	State Program	4	85002001	06-30-18 *
Texas	NELAP	6	T104704193-17-11	07-31-18
US Fish & Wildlife	Federal		058448	07-31-18

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

TestAmerica Canton

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Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-2

Laboratory: TestAmerica St. Louis (Continued)

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

Authority	Program	EPA Region	Identification Number	Expiration Date
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542016-8	07-31-18 *
Virginia	NELAP	3	460230	06-14-19
Washington	State Program	10	C592	08-30-18
West Virginia DEP	State Program	3	381	08-31-18 *

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

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METHOD OF SHIPMENT/BILL OF LADING

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DATE

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RELINOUISHED BY 歌山 GONN DAY DE MI 49542 Address 1515 Arthur DC > E MONYOGEONALINGRID MATRIX TYPE ä₽∀ Phone 614 - 573 - XVI

240-96524 Chain of Custody

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1629 HBBS-18-05-HW LJANSIASI

MBLPS 18-05-MW 2 (2)

MBL 7 - 18-0 - HW-2 / I

15.02

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SAMPLE

SAMPLE IDENTIFICATION

* Hetals . Su, As Ba Be

NUMBER OF CONTAINERS SUBMITTED

PK.

PRESERVATIVE

CHOSHWES/CHOS

Aduledus (Water)

ENALL TOTAL COMPANIE POR PHONE 21 ST ST JAY BY

ADDITIONAL INFORMATION

SAMPLER(S) NAME
APS, AD 180827

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PROJECT NAME

PROJECT LOCATION

PROJECT MANAGER

RENARKS

DATE DUE RUSH TAT STUTAT

CALCI CO, PO, MY, MA

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Email Lab Guote Reference

Emisil pulmer of DAHALON

Report to Renie

3.4/3.5 Fishbeck, Thompson, Carr & Huber, Inc.

CHAINOL AGOLSOD RUCOAD Ö

PAGE

RECUIRED ANALYSES

Email Copy to

Involce to Accounts Payable

YELLOW Copy --- field F46 / Project Documentation

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MOX TEINED BY

TestAmerica Canton Sample Rece Canton Facility	ipt Form/Narrative	Login # : 46524	***************************************
Client FTC L H	Site Name 1 4	Cooler unpacked by:	
Cooler Received on 15 18	Opened on 6/5/18		~····
FedEx: 1° Grd Exp UPS FAS Receipt After-hours Drop-off Date/		tAmerica Courier Other Storage Location	
Packing material used: Bubble COOLANT: Wei Ice 1. Cooler temperature upon receipt IR GUN# IR-8 (CF +0.1°C) (IR GUN# 1627 (CF +1.3°C) Ob IR GUN# 627 (CF +1.3°C) Ob 2. Were tamper/custody seals on the -Were the seals on the outside o -Were tamper/custody seals inta 3. Shippers' packing slip attached to 4. Did custody papers accompany th 5. Were the custody papers relinquis 6. Was/were the person(s) who colle 7. Did all bottles arrive in good conc 8. Could all bottle labels be reconcil 9. Were correct bottle(s) used for the 10. Sufficient quantity received to per 11. Are these work share samples?	Foam Box Client Cooler Box Wrap Foam Plastic Bag No Blue Ice Dry Ice Water No Disserved Cooler Temp. Street Cooler Temp. C C C Cooler Temp. C C C C C C C C C C C C C C C C C C C	Sox Other None Other None See Multiple Cooler Form Corrected Cooler Temp. Coo	
Contacted PM Date	by	via Verbal. Voice Mail. Other	
Concerning			
17. CHAIN OF CUSTODY & SAM	PLE DISCREPANCIES	Samples processed by:	
Sample(s)		recommended holding time had expired. were received in a broken container, with bubble >6 mm in diameter. (Notify PM)	<u></u>
19. SAMPLE PRESERVATION			
Sample(s)Preser	vative(s) added/Lot number(s):	were further preserved in the laboratory.	

Temperature readings:

MBLPS-18-05-MW-2 (I)

MBLPS-18-05-MW-2 (1)

MBLPS-18-05-MW-2 (1)

MBLPS-18-05-MW-2 (1)

MBLPS-18-05-MW-2 (D)

MBLPS-18-05-MW-2 (D)

MBLPS-18-05-MW-2 (D)

MBLPS-18-05-MW-2 (D)

MBLPS-18-05-MW-1 (1)

MBLPS-18-05-MW-1 (I)

MBLPS-18-05-MW-1 (1)

MBLPS-18-05-MW-1 (1) MBLPS-18-05-MW-1 (1)

MBLPS-18-05-MW-1 (I) MBLPS-18-05-MW-1 (I)

MBLPS-18-05-MW-1 (1)

MBLPS-18-05-MW-1 (I)

Client Sample ID

Login Container Summary Report

Plastic I liter - Nitric Acid

240-96524-1-3

Container Preservative Added (mls) Lab ID Container Type pH Lot # 240-96524-B-I Plastic 500ml - with Nitric Acid 52: Plastic 1 liter - Nitric Acid 240-96524-C-1 52 Plastic 1 liter - Nitric Acid 240-96524-D-1 ≤ 2 240-96524-E-1 Plastic 1 liter - Nitric Acid <2 Plastic 500ml - with Nitric Acid 240-96524-B-2 <2 Plastic 1 liter - Nitric Acid 240-96524-C-2 240-96524-D-2 Plastic I liter - Nitric Acid 42. Plastic I liter - Nitric Acid 240-96524-E-2 ≤ 2 240-96524-A-3 Plastic I liter - Nitric Acid <2. 240-96524-B-3 Plastic I liter - Nitric Acid ≤ 2 240-96524-C-3 Plastic I liter - Nitric Acid <2 240-96524-D-3 Plastic 1 liter - Nitric Acid <2 240-96524-E-3 Plastic I liter - Nitric Acid <2: 240-96524-F-3 Plastic Litter - Nitric Acid <2 240-96524-G-3 Plastic Lliter - Nitric Acid <2 Plastic Eliter - Nitric Acid 240-96524-11-3: < 2.

<2

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720	ฉิ	Chain of Custody Record	Custo	dy Re	cord						7,000	Z Z Z	BstAmerico	731
7-9396 Fax (330) 497-0772		:									***************************************	S145 2,640 CR	encarata en entroprograma el como	့. [
Client Information (Sub Contract Lab)	Sampler:			Lab PM. Brooks	tab PM Brooks, Kris M				Carrier Tracking Not8)	cking Nots).		COC No: 240-87735.1		
	Рһъпе:			E-Mail: kris.br	E-Mait: kris.brooks@testamericainc.com	damerica	япс.сот		State of Origin Michigan	July .		Page Page 1 of 1		T
Company: TestAmerica Laboratories, Inc.				ζ	Accrediations Roquinat (See nols):	s Nequires	(See role					Job #. 240-96524~		
Adrees: 13715 Rider Trail North.	Due Date Requested: 6/7/2018						Analysis		Requested			Preservation Codes	ode	
City: World Oct	TAT Requested (days)	:(s										E. NaOH		
State, 29: WO 53945		,			z - ().	(5						D - National		
Phone. 314-298-8566(Tel) 314-298-8757(Fex)	PO #.					442) 8			******	······································		F - MeOH G - Anchloi H - Acristic Acid	(R - Na2S203 (S - H2SQ4 (F - TSP Dodoshudists	
Eligil	WO#,				(0)	22-mu							Li Acetone V MCAA	
Project Name. CCR-MBLP Shiras Steam Plant	Project #. 24020283				10 ST	0 Radi					ionisi	K · EDJA L · EDA	W - bH 4-8 7 - other (specify)	
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Samolo Idaniffication - Client ID (1 als ID)	Samnie Date	Sample (C	Sample Type (w:: (C=comp, '	Matrix (www.es.besold	ield Filtered Zerlora <u>r MS/M</u> 1315_ReZZ6Pri 1919 decay	3320_Ra228Fr					todmuN leto		or W. Taroni de la Constanti d	
	X	V			X	i							of Historical Miscrotte.	
MBLPS-18-05-MW-2 (i) (240-96524-1)	5/31/18	15:07 Eastern		Water	×	×								
MBLPS-18-05-MW-2 (D) (240-96524-2)	5/31/18	15:07 Fastern		Water	×	×					00			
MBLPS-18-05-MW-1 (I) (240-96524-3)	5/31/18	16:29 Eastern		Water	×	×				-	92			
											112134			Ţ <u>-</u>
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eals Intact: Custody Seaf No.:						aden Yenga	ratuxe(s) 4	end Othe	Cooler Temperature(s) *C and Other Remarks .					
			***************************************	***************************************								***************************************	Ver. 09.20.20th	

TestAmerica Canton 4101 Shuffel Street NW North Canlon, 'OH 44720 Phone (330) 497-9396 Fax (330) 497-0772	Chain of Custody Record	ody Record	AND		Boshmerican Statement Control of the
Client Information (Sub Contract Lab)	Sangler:	Lab PM Brooks, Kris M	Certi	Ceruer Tracking Nats):	COC No:
	Phone:	E-1434 kris brooks@lestame		State of Origin	Page:
Company: TestAmerica Laboratories, Inc.		Accedations Required (See note)			Job #: 240,06624.4
Address 13715 Rider Trail North,	Due Dale Requested: 6/7/2018		Analysis Requested	ited	8
City. Earth City State Zb: MO 53145.	TAT Requested (days):				
Phone: 314-298-8666(Tel) 314-298-8757(Fax)	PO#.	439) 9 7			F - MeOH R - Na25203 G - América S - H2504
	WO#:	(o) (2-/m/)			11 - Astrodak Acid 5 - Ice 3 - Dt Waler
Project Name: CCR-WBL P Shiras Steam Plant	Project #, 24020283) ខេង ខេង ខេ		180(18)	K-EDTA 1.EDA
Site;	SSOWF;	dəşpə	Od-3		Other:
Samula Identification Citat II at II)	Sample Type	Matrix Orwani, Sizole Britain MSM middle Fillered Britain MSM middle Fillered Britain MSM middle Fillered Britain MSM middle Ferzellere	D_8556A3525	redmuV lerc	
complete total mental of the total	Somple Date 11114 O-grap Historicase, Art		8	**************************************	Special Instructions/Note:
MBLPS-18-05-MW-f (I) (240-96524-3MS)		Water × X	×		
MBLPS-18-05-MW-1 (1) (240-96524-3MSD)	5/34/18 16:29 NISD Eastern	Water X X	×		
Note: Since labraloty actrediators one subject to change. Test/merica Laboratories, Inc. places the ownership of method, analyte & accrediators out subcontract absoratories. This sample shapened to dispersionally shaped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accrediation in the State above to analysis/rests/metric being analysis/rests/metric be supped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accrediations are current to date, return the signed Chan of Custody altesting to said completance to TestAmerica Laboratories, Inc.	ratories, Inc. places the ownership of method, analy ostamatrix being analyzed. The samples trust be stri text to date, return the signed Chain of Custody alter	te & accreditation compdance upor tipped back to the TestAmetica Jahr sting to said civitiplicance to TestAr	n out subcontract taboratories. The oratory or other instructions will be mexical, aboratories, Inc.	is sample shipment is forwarded provided. Any changes to active	This sample shipmant is forwarded under chair-tel-custody. If the laboratory roose not the provided. Any changes to accreditation tailus should be brought to TestAmmenta.
Possible Hazard Identification		Sample Disp	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)	ssed if samples are retain	ned longer than 1 month)
Unconfirmed		Return	Return To Cirent - Dispo	Disposal By Lab Archive For	ive For Months
Deliverable Requested: 1, If, IV, Other (specify)	Primary Deliverable Rank; 2	Special Instr	Special Instructions/QC Requirements:		
inquis	Date:	Time:		Method of Shipment:	
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Retractive hearth by .	Date/Tkbe:	Company Received by	:%c	Date/Time.	Company
Custody Seals Intact: Custody Seal No.		Cooler Ten	Cooler Temperature(s) "C and Oliner Remarks		
,					Nove 69 24 20 K

Login Sample Receipt Checklist

Client: Fishbeck Thompson Carr & Huber Inc Job Number: 240-96524-2

List Source: TestAmerica St. Louis
List Number: 2

List Source: TestAmerica St. Louis
List Creation: 06/06/18 02:01 PM

Creator: Press, Nicholas B

Question Answer Comment

Radioactivity wasn't checked or is </= background as measured by a survey

meter.

The cooler's custody seal, if present, is intact.

Sample custody seals, if present, are intact.

The cooler or samples do not appear to have been compromised or

tampered with.

Samples were received on ice.

Cooler Temperature is acceptable.

Cooler Temperature is recorded.

COC is present.

COC is filled out in ink and legible.

COC is filled out with all pertinent information.

Is the Field Sampler's name present on COC?

There are no discrepancies between the containers received and the COC.

Samples are received within Holding Time (excluding tests with immediate

HTs)

Sample containers have legible labels.

Containers are not broken or leaking.

Sample collection date/times are provided.

Appropriate sample containers are used.

Sample bottles are completely filled.

Sample Preservation Verified.

There is sufficient vol. for all requested analyses, incl. any requested

MS/MSDs

Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").

Multiphasic samples are not present.

Samples do not require splitting or compositing.

Residual Chlorine Checked.

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Login Sample Receipt Checklist

Job Number: 240-96524-2 Client: Fishbeck Thompson Carr & Huber Inc

Login Number: 96524 List Source: TestAmerica St. Louis List Number: 3 List Creation: 06/09/18 12:45 PM

Creator: McKinney, Gerrod E

Comment **Answer** Question

Radioactivity wasn't checked or is </= background as measured by a survey

meter.

The cooler's custody seal, if present, is intact.

Sample custody seals, if present, are intact.

The cooler or samples do not appear to have been compromised or

tampered with.

Samples were received on ice.

Cooler Temperature is acceptable.

Cooler Temperature is recorded.

COC is present.

COC is filled out in ink and legible.

COC is filled out with all pertinent information.

Is the Field Sampler's name present on COC?

There are no discrepancies between the containers received and the COC.

Samples are received within Holding Time (excluding tests with immediate

HTs)

Sample containers have legible labels.

Containers are not broken or leaking.

Sample collection date/times are provided.

Appropriate sample containers are used.

Sample bottles are completely filled.

Sample Preservation Verified.

There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs

Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").

Multiphasic samples are not present.

Samples do not require splitting or compositing.

Residual Chlorine Checked.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720 Tel: (330)497-9396

TestAmerica Job ID: 240-96524-1

Client Project/Site: CCR-MBLP Shiras Steam Plant

For:

Fishbeck Thompson Carr & Huber Inc 1515 Arboretum Drive SE Grand Rapids, Michigan 49546

Attn: Penni Mahler

Hus Brooks

Authorized for release by:

6/19/2018 4:46:03 PM

Kris Brooks, Project Manager II (330)966-9790

kris.brooks@testamericainc.com

.....LINKS

Review your project results through Total Access

Have a Question?



Visit us at: www.testamericainc.com This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

Table of Contents

Cover Page	1
Table of Contents	2
Definitions/Glossary	
Case Narrative	
Method Summary	
Sample Summary	7
Detection Summary	
Client Sample Results	9
QC Sample Results	11
QC Association Summary	13
Lab Chronicle	14
Certification Summary	15
Chain of Custody	

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Definitions/Glossary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Qualifiers

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

MDA

MDC

MDL

ML

NC

ND PQL

QC

Ciossary	
Abbreviation	These commonly used abbreviations may or may not be present in this report.
a	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)

RER Relative Error Ratio (Radiochemistry)

RL Reporting Limit or Requested Limit (Radiochemistry)

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin)

TEQ Toxicity Equivalent Quotient (Dioxin)

Minimum Detectable Activity (Radiochemistry)

Method Detection Limit

Minimum Level (Dioxin)

Practical Quantitation Limit

Not Calculated

Quality Control

Minimum Detectable Concentration (Radiochemistry)

Not Detected at the reporting limit (or MDL or EDL if shown)

Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Job ID: 240-96524-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Fishbeck Thompson Carr & Huber Inc

Project: CCR-MBLP Shiras Steam Plant

Report Number: 240-96524-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 6/5/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5° C.

TOTAL RECOVERABLE METALS (ICPMS)

Samples MBLPS-18-05-MW-2 (I) (240-96524-1) and MBLPS-18-05-MW-2 (D) (240-96524-2) were analyzed for total recoverable metals (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were prepared on 06/05/2018 and analyzed on 06/06/2018.

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

TOTAL MERCURY

Samples MBLPS-18-05-MW-2 (I) (240-96524-1) and MBLPS-18-05-MW-2 (D) (240-96524-2) were analyzed for total mercury in accordance with EPA SW-846 Methods 7470A. The samples were prepared on 06/05/2018 and analyzed on 06/06/2018.

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

<u>ANIONS</u>

Samples MBLPS-18-05-MW-2 (I) (240-96524-1) and MBLPS-18-05-MW-2 (D) (240-96524-2) were analyzed for anions in accordance with

TestAmerica Canton 6/19/2018

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Job ID: 240-96524-1 (Continued)

Laboratory: TestAmerica Canton (Continued)

EPA SW-846 Method 9056A. The samples were analyzed on 06/16/2018.

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

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Method Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Method	Method Description	Protocol	Laboratory
6020A	Metals (ICP/MS)	SW846	TAL CAN
7470A	Mercury (CVAA)	SW846	TAL CAN
9056A	Anions, Ion Chromatography	SW846	TAL CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CAN
7470A	Preparation, Mercury	SW846	TAL CAN

Protocol References:

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

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

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Sample Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-96524-1	MBLPS-18-05-MW-2 (I)	Water	05/31/18 15:07	06/05/18 09:30
240-96524-2	MBLPS-18-05-MW-2 (D)	Water	05/31/18 15:07	06/05/18 09:30

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Detection Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Client Sample ID: MBLPS-18-05-MW-2 (I)

Lab Sample	ID: 240-96524-1
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Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.84	J	5.0	0.75	ug/L		_	6020A	Total
									Recoverable
Barium	73		5.0	2.2	ug/L	1		6020A	Total
									Recoverable
Cobalt	0.38	J	1.0	0.19	ug/L	1		6020A	Total
									Recoverable
Chromium	2.2		2.0	0.98	ug/L	1		6020A	Total
									Recoverable
Molybdenum	1.1	J	5.0	1.1	ug/L	1		6020A	Total
									Recoverable
Lithium	5.9	J	8.0	1.7	ug/L	1		6020A	Total
									Recoverable
Fluoride	0.055		0.050	0.024	mg/L	1		9056A	Total/NA

Client Sample ID: MBLPS-18-05-MW-2 (D)

Lab Sample ID: 240-96524-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D N	Method	Prep Type
Arsenic	1.0	J	5.0	0.75	ug/L		_ 6	6020A	Total
									Recoverable
Barium	72		5.0	2.2	ug/L	1	6	6020A	Total
									Recoverable
Cobalt	0.38	J	1.0	0.19	ug/L	1	6	6020A	Total
									Recoverable
Chromium	1.7	J	2.0	0.98	ug/L	1	6	6020A	Total
									Recoverable
Lithium	6.0	J	8.0	1.7	ug/L	1	6	6020A	Total
									Recoverable
Fluoride	0.055		0.050	0.024	mg/L	1	9	9056A	Total/NA

This Detection Summary does not include radiochemical test results.

6/19/2018

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Client Sample Results

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Client Sample ID: MBLPS-18-05-MW-2 (I)

Lab Sample ID: 240-96524-1

Date Collected: 05/31/18 15:07 Matrix: Water

Date Received: 06/05/18 09:30

Method: 6020A - Metals (ICP/MS Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.84		5.0	0.75	ug/L		06/05/18 15:00	06/06/18 16:24	1
Barium	73		5.0	2.2	ug/L		06/05/18 15:00	06/06/18 16:24	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 16:24	1
Cadmium	0.21	U	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 16:24	1
Cobalt	0.38	J	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 16:24	1
Chromium	2.2		2.0	0.98	ug/L		06/05/18 15:00	06/06/18 16:24	1
Molybdenum	1.1		5.0	1.1	ug/L		06/05/18 15:00	06/06/18 16:24	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 16:24	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 16:24	1
Selenium	0.89	Ü	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 16:24	1
Lithium	5.9	J	8.0	1.7	ug/L		06/05/18 15:00	06/06/18 16:24	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 16:24	1
Method: 7470A - Mercury (CVA)	A)								
Analyte	•	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U	0.20	0.13	ug/L		06/05/18 15:00	06/06/18 15:19	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.055		0.050	0.024	mg/L			06/16/18 02:44	1

6/19/2018

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Client Sample Results

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Lab Sample ID: 240-96524-2

Client Sample ID: MBLPS-18-05-MW-2 (D)

Date Collected: 05/31/18 15:07 **Matrix: Water**

Date Received: 06/05/18 09:30

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.0	J	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 16:29	1
Barium	72		5.0	2.2	ug/L		06/05/18 15:00	06/06/18 16:29	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 16:29	1
Cadmium	0.21	U	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 16:29	1
Cobalt	0.38	J	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 16:29	1
Chromium	1.7	J	2.0	0.98	ug/L		06/05/18 15:00	06/06/18 16:29	1
Molybdenum	1.1	U	5.0	1.1	ug/L		06/05/18 15:00	06/06/18 16:29	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 16:29	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 16:29	1
Selenium	0.89	U	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 16:29	1
Lithium	6.0	J	8.0	1.7	ug/L		06/05/18 15:00	06/06/18 16:29	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 16:29	1
Method: 7470A - Mercury (0	CVAA)								
Analyte	•	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U	0.20	0.13	ug/L		06/05/18 15:00	06/06/18 15:21	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.055		0.050	0.024	ma/L			06/16/18 03:05	1

TestAmerica Job ID: 240-96524-1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 240-330141/1-A **Client Sample ID: Method Blank Matrix: Water Prep Type: Total Recoverable** Analysis Batch: 330498 **Prep Batch: 330141**

	MB	MR							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.75	U	5.0	0.75	ug/L		06/05/18 15:00	06/06/18 15:31	1
Barium	2.2	U	5.0	2.2	ug/L		06/05/18 15:00	06/06/18 15:31	1
Beryllium	0.31	U	1.0	0.31	ug/L		06/05/18 15:00	06/06/18 15:31	1
Cadmium	0.21	U	1.0	0.21	ug/L		06/05/18 15:00	06/06/18 15:31	1
Cobalt	0.19	U	1.0	0.19	ug/L		06/05/18 15:00	06/06/18 15:31	1
Chromium	0.98	U	2.0	0.98	ug/L		06/05/18 15:00	06/06/18 15:31	1
Molybdenum	1.1	U	5.0	1.1	ug/L		06/05/18 15:00	06/06/18 15:31	1
Lead	0.45	U	1.0	0.45	ug/L		06/05/18 15:00	06/06/18 15:31	1
Antimony	0.57	U	2.0	0.57	ug/L		06/05/18 15:00	06/06/18 15:31	1
Selenium	0.89	U	5.0	0.89	ug/L		06/05/18 15:00	06/06/18 15:31	1
Lithium	1.7	U	8.0	1.7	ug/L		06/05/18 15:00	06/06/18 15:31	1
Thallium	0.20	U	1.0	0.20	ug/L		06/05/18 15:00	06/06/18 15:31	1

Lab Sample ID: LCS 240-330141/3-A **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total Recoverable**

Thallium

Analysis Batch: 330498 **Prep Batch: 330141** Spike LCS LCS %Rec. **Analyte** Added Result Qualifier Unit D %Rec Limits Arsenic 1000 947 ug/L 95 80 - 120 Barium 1000 969 97 ug/L 80 - 120 Beryllium 1000 961 ug/L 96 80 - 120 Cadmium 1000 1060 106 ug/L 80 - 120Cobalt 1000 979 ug/L 98 80 - 120 Chromium 1000 964 ug/L 96 80 - 120 Molybdenum 100 94.4 ug/L 94 80 - 120 Lead 1000 1060 ug/L 106 80 - 120 Antimony 100 93.0 ug/L 93 80 - 120 Selenium 947 80 - 120 1000 ug/L 95

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 240-330150/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 330440 Prep Batch: 330150** MB MB

263

ug/L

105

80 - 120

250

Analyte	Result Qualifier	RL	MDL Unit	D Prepared	Analyzed D	il Fac
Mercury	0.13 U	0.20	0.13 ug/L	06/05/18 15:00	06/06/18 15:23	1

Lab Sample ID: LCS 240-330150/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 330440 Prep Batch: 330150 LCS LCS Spike %Rec.

Analyte Added Result Qualifier Unit %Rec Limits Mercury 5.00 4.35 ug/L 80 - 120

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6/19/2018

QC Sample Results

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

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Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-331714/3

Matrix: Water

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

Analysis Batch: 331714

 Analyte
 Result Fluoride
 Qualifier 0.024
 RL U
 MDL 0.050
 Unit 0.024
 D mg/L
 Prepared 0.0/15/18 21:13
 Analyzed 0.0/15/18 21:13
 D mg/L

Lab Sample ID: LCS 240-331714/4

Client Sample ID: Lab Control Sample
Matrix: Water

Prep Type: Total/NA

Analysis Batch: 331714

 Spike
 LCS
 LCS
 %Rec.

 Analyte
 Added
 Result Pluoride
 Qualifier Qualifier Pluoride
 Unit Qualifier Pluoride
 D Mark Pluoride
 Limits Pluoride

TestAmerica Canton

6/19/2018

QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Metals

Prep Batch: 330141

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method Pre	p Batch
240-96524-1	MBLPS-18-05-MW-2 (I)	Total Recoverable	Water	3005A	
240-96524-2	MBLPS-18-05-MW-2 (D)	Total Recoverable	Water	3005A	
MB 240-330141/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-330141/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

Prep Batch: 330150

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96524-1	MBLPS-18-05-MW-2 (I)	Total/NA	Water	7470A	
240-96524-2	MBLPS-18-05-MW-2 (D)	Total/NA	Water	7470A	
MB 240-330150/1-A	Method Blank	Total/NA	Water	7470A	
LCS 240-330150/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 330440

Lab Sample ID 240-96524-1	Client Sample ID MBLPS-18-05-MW-2 (I)	Prep Type Total/NA	Matrix Water	Method 7470A	Prep Batch 330150
240-96524-2	MBLPS-18-05-MW-2 (D)	Total/NA	Water	7470A	330150
MB 240-330150/1-A	Method Blank	Total/NA	Water	7470A	330150
LCS 240-330150/2-A	Lab Control Sample	Total/NA	Water	7470A	330150

Analysis Batch: 330498

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96524-1	MBLPS-18-05-MW-2 (I)	Total Recoverable	Water	6020A	330141
240-96524-2	MBLPS-18-05-MW-2 (D)	Total Recoverable	Water	6020A	330141
MB 240-330141/1-A	Method Blank	Total Recoverable	Water	6020A	330141
LCS 240-330141/3-A	Lab Control Sample	Total Recoverable	Water	6020A	330141

General Chemistry

Analysis Batch: 331714

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-96524-1	MBLPS-18-05-MW-2 (I)	Total/NA	Water	9056A	
240-96524-2	MBLPS-18-05-MW-2 (D)	Total/NA	Water	9056A	
MB 240-331714/3	Method Blank	Total/NA	Water	9056A	
LCS 240-331714/4	Lab Control Sample	Total/NA	Water	9056A	

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Lab Chronicle

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-05-MW-2 (I)

TestAmerica Job ID: 240-96524-1

Lab Sample ID: 240-96524-1

Matrix: Water

Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6020A		1	330498	06/06/18 16:24	DSH	TAL CAN
Total/NA	Prep	7470A			330150	06/05/18 15:00	MBB	TAL CAN
Total/NA	Analysis	7470A		1	330440	06/06/18 15:19	AJC	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/16/18 02:44	JWW	TAL CAN

Client Sample ID: MBLPS-18-05-MW-2 (D) Lab Sample ID: 240-96524-2

Date Collected: 05/31/18 15:07 **Matrix: Water** Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
Total Recoverable	Analysis	6020A		1	330498	06/06/18 16:29	DSH	TAL CAN
Total/NA	Prep	7470A			330150	06/05/18 15:00	MBB	TAL CAN
Total/NA	Analysis	7470A		1	330440	06/06/18 15:21	AJC	TAL CAN
Total/NA	Analysis	9056A		1	331714	06/16/18 03:05	JWW	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-96524-1

Laboratory: TestAmerica Canton

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

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-19
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-18 *
Illinois	NELAP	5	200004	07-31-18 *
Kansas	NELAP	7	E-10336	01-31-19
Kentucky (UST)	State Program	4	58	02-23-19
Kentucky (WW)	State Program	4	98016	12-31-18
Minnesota	NELAP	5	039-999-348	12-31-18
Minnesota (Petrofund)	State Program	1	3506	07-31-18 *
Nevada	State Program	9	OH-000482008A	07-31-18 *
New Jersey	NELAP	2	OH001	06-30-18 *
New York	NELAP	2	10975	03-31-19
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-19
Pennsylvania	NELAP	3	68-00340	08-31-18 *
Texas	NELAP	6	T104704517-17-9	08-31-18 *
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-18 *
Washington	State Program	10	C971	01-12-19
West Virginia DEP	State Program	3	210	12-31-18

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

TestAmerica Canton

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APS, AD 180827 CHAINOL AGOLSOD RUCOAD で、金 ADDITIONAL INFORMATION 15.02 PROJECT LOCATION PROJECT MANAGER PROJECT NAME 前條匠 SAMPLE でいる DATE

RENARKS

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1940 1115-719R METHOD OF SHIPMENTIBILL OF LADING 1170 RELINOUISHED BY YELLOW Copy --- field FdE / Project Documentation 8 DATE REGLINOURSHAED BY MOX

TestAmerica Canton Sam Canton Facility	ple Receipt Form/Narrative	Login#: 1622
Client FTC & H	Site Name 4	
Cooler Received on 5/5	18 Opened on 6	2/10
FedEx: 1" Grd Exp U		1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
Receipt After-hours: Drop-	off Date/Time	Storage Location
Packing material used: COOLANT: W 1. Cooler temperature upon IR GUN# IR-8 (CF +0 IR GUN# 627 (CF -1.) 2. Were tamper/custody service the seals on the -Were tamper/custody -Were tamper/custody -Were tamper/custody -Were tamper/custody -Were the custody papers according to the custody	Bubble Wrap Foam Plastic Fee Ice Blue Ice Dry Ice Wareceipt 1.1 °C) Observed Cooler Temp. 3°C) Observed Cooler Temp. 3°C) Observed Cooler Temp. als on the outside of the cooler(s)? If outside of the cooler(s) signed & date seals on the bottle(s) or bottle kits (L seals intact and uncompromised? tached to the cooler(s)? Impany the sample(s)? relinquished & signed in the appropriate who collected the samples clearly ide good condition (Unbroken)? The reconciled with the COC? seed for the test(s) indicated? wed to perform indicated analyses? The been checked at the originating ble(s) at the correct pH upon receipt? The cooler(s)? Trip Blank I.	er Box Other Bag None Other alter None See Multiple Cooler Form C Corrected Cooler Temp. C Cooler Temp.
Contacted PM	Date by	via Verbal Voice Mail Other
Concerning		
17. CHAIN OF CUSTODY	& SAMPLE DISCREPANCIES	Samples processed by:
18. SAMPLE CONDITION	V	
		after the recommended holding time had expired.
Sample(s)	Were re	ceived with bubble >6 mm in diameter. (Notify PM)
19. SAMPLE PRESERVA	TION	
•		
Sample(s)	Preservative(s) added/Lot number	were further preserved in the laboratory.

Temperature readings:				**************************************
Client Sample ID	Lab ID	Container Type	Container Preservative pH Added (mls)	Lot#
MBLPS-18-05-MW-2 (I)	240-96524-B-1	Plastic 500ml - with Nitric Acid	2	· · · <u>_ · , · · · · · · · · · · · · · · · · · ·</u>
MBLPS-18-05-MW-2 (1)	240-96524-C-1	Plastic 1 liter - Nitric Acid	<u></u>	
MBLPS-18-05-MW-2 (1)	240-96524-D-1	Plastic 1 liter - Nitric Acid		
MBLPS-18-05-MW-2 (I)	240-96524-E-1	Plastic 1 liter - Nitric Acid	<u></u>	
MBLPS-18-05-MW-2 (D)	240-96524-B-2	Plastic 500ml - with Nitric Acid	4	
MBLPS-18-05-MW-2 (D)	240-96524-C-2	Plastic 1 liter - Nitric Acid	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
MBLPS-18-05-MW-2 (D)	240-96524-D-2	Plastic I liter - Nitric Acid	52	- Salaran Artano Araban da Salaran (Salaran Salaran Salaran Salaran Salaran Salaran Salaran Salaran Salaran Sa
MBLPS-18-05-MW-2 (D)	240-96524-E-2	Plastic I liter - Nitric Acid	and the second second	Sometime and indicates which may be thought placement.
MBLPS-18-05-MW-1 (1)	240-96524-A-3	Plastic I liter - Nitric Acid	2	
MBLPS-18-05-MW-1 (I)	240-96524-B-3	Plastic I liter - Nitric Acid	· 1.32	
MBLPS-18-05-MW-1 (I)	240-96524-C-3	Plastic I liter - Nitric Acid	<u> </u>	· · · · · · · · · · · · · · · · · · ·
MBLPS-18-05-MW-1 (1)	240-96524-D-3	Plastic 1 liter - Nitric Acid	2	
MBLPS-18-05-MW-1 (I)	240-96524-E-3	Plastic 1 liter - Nitric Acid	S2	
MBLPS-18-05-MW-1 (I)	240-96524-F-3	Plastic I liter - Nitric Acid	42	
MBLPS-18-05-MW-1 (I)	240-96524-G-3	Plastic Litter - Nitric Acid	4	
MBLPS-18-05-MW-1 (I)	240-96524-11-3	Plastic I liter - Nitric Acid	<u></u>	.;,,,,,
MBLPS-18-05-MW-1 (I)	240-96524-1-3	Plastic I liter - Nitric Acid	<2	



Analytical Data Validation Report September 2018

Shiras Steam Plant Marquette, Michigan

Prepared For:
Marquette Board of Light and Power
2200 Wright Street Marquette, Michigan 49855

October 2018 Project No. 180827

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Appendix 1 Laboratory Data Summary Reports



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List of Abbreviations/Acronyms

%R percent recovery °C degrees Celsius

FTCH Fishbeck, Thompson, Carr & Huber, Inc.

ICP-AES inductively coupled plasma-atomic emission spectroscopy

ICP-MS inductively coupled plasma-mass spectrometry

LCS laboratory control sample MDL method detection limit

MS matrix spike

MSD matrix spike duplicate mg/L milligram per liter QC quality control RL reporting limit

RPD relative percent difference

USEPA U.S. Environmental Protection Agency

μg/L micrograms per liter



1.0 Project Information

Site name: Shiras Steam Plant

Project name: Marquette Board of Light and Power/Shiras

Sample collection dates: 09/20/18
Sample matrix: Groundwater

Analytical parameters/methods: Metals 6010C

General Chemistry 9040B, 9056A, SM2540C

Laboratory: TestAmerica
Sample Delivery Group(s): 240-101698-1

Sample Index:

Field ID	Lab ID
MBLPS-18-09-MW-1(I)	240-101698-3
MBLPS-18-09-MW-2(I)	240-101698-2
MBLPS-18-09-MW-3(I)	240-101698-1

Field ID	Lab ID
MBLPS-18-09-MW-4(I)	240-101698-5
MBLPS-18-09-MW-4(D)	240-101698-6
MBLPS-18-09-MW-5(I)	240-101698-4

The laboratory data package was evaluated for compliance with reference to *National Functional Guidelines for Inorganic Superfund Methods Data Review (January, 2017) and Evaluation of Radiochemical Data Usability (April, 1997)*. These guidelines were modified to accommodate the non-CLP methodologies. The following USEPA Region V data qualifier codes may be utilized in this report:

- U The analyte was analyzed for, but not detected above the MDL.
- J Analyte present. Reported value may not be accurate or precise.
- R Result is rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria.



2.0 **Metals Fraction**

The laboratory data summary report is provided in Appendix 1. The metals data are summarized in Table 1.

ICP-AES/ICP-MS Metals 2.1

2.1.1 **Technical Holding Time and Sample Preservation**

ICP-AES or ICP-MS samples were preserved with nitric acid to pH \leq 2.	Yes ⊠	No \square	NA \square
ICP-AES or ICP-MS metals were analyzed within the 180-day holding time.	Yes ⊠	No 🗆	NA 🗆
Exceptions: None.			
2.1.2 Blanks			
A method blank was prepared and analyzed as part of each QC batch.		Yes ⊠	No □

The target analytes were detected in the method blanks at concentrations above the RL. Yes \square No \boxtimes The target analytes were detected in the method blanks at concentrations above the MDL but Yes \square No \boxtimes

below the RL.

Exceptions:

None

Laboratory Control Samples 2.1.3

LCS were prepared and analyzed as part of each analytical batch.	Yes ⊠	No □
The LCS were spiked with the target analytes at the same concentration as the matrix spike samples.	Yes ⊠	No □
LCS recoveries were within the specified QC limits.	Yes ⊠	No 🗆

Exceptions:

None.



2.1.4 Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD samples were analyzed at the required frequency.	Yes ⊠	No □
Samples identified as field blanks or equipment blanks were used for spiked sample analysis.	Yes □	No ⊠
MS/MSD recoveries are within the established QC limits.	Yes ⊠	No □
The RPD of the concentrations measured for the MS/MSD pairs is within the established QC limits.	Yes ⊠	No □

Exceptions:

None.

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3.0 General Chemistry Fraction

The laboratory data summary report is provided in Appendix 1. The general chemistry data are summarized in Table 1.

3.1	Technical Holding	Time and S	Sample Pr	eservation
-----	-------------------	------------	-----------	------------

Samples were received by the laboratory in proper condition with shipping container temperatures at \leq 6°C (but not frozen) upon receipt.	Yes ⊠	No 🗆	NA □
Samples were properly preserved for the requested analyses.	Yes ⊠	No 🗆	NA 🗆
Samples were analyzed within the analyte-specific holding times.	Yes ⊠	No 🗆	NA 🗆

Exceptions:

pH is a field parameter with a holding time of 15 minutes. Laboratory analysis performed outside of the 15-minute holding time to allow for shipping of samples.

Data Qualification:

None.

3.2 Blanks

A method blank was prepared and analyzed as part of each QC batch.	Yes ⊠ No □
The target analytes were detected in the method blanks at concentrations above the RL.	Yes □ No ⊠
The target analytes were detected in the method blanks at concentrations above the MDL but below the RL.	Yes □ No ⊠

Exceptions:

None.

3.3 Laboratory Control Samples

LCS were prepared and analyzed as part of each analytical batch.	Yes ⊠ No □
The LCS were spiked with the target analytes at the same concentration as the matrix spike samples.	Yes □ No ⊠
LCS recoveries were within the specified QC limits.	Yes ⊠ No □

Exceptions:

LCS sample for Chloride was spiked at 50.0 mg/L and matrix spike samples were spiked at 250 mg/L.

Data Qualification:

None.



3.4 Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD samples were analyzed at the required frequency.	Yes ⊠	No □
Samples identified as field blanks or equipment blanks were used for spiked sample analysis.	Yes □	No ⊠
MS/MSD recoveries are within the established QC limits.	Yes ⊠	No □
The RPD of the concentrations measured for the MS/MSD pairs is within the established QC limits.	Yes ⊠	No 🗆

Exceptions:

None.



4.0 Reconciliation with Data Quality Objectives

4.1 Overall Precision and Sample Representativeness

RPD for field duplicates is within the project control limits (\pm 30%) for at least 75% of the analyses. Yes \boxtimes No \square

			Field	Field		RPD Control
Sample	Analyte	Units	Sample	Duplicate	RPD	Limits
MW-4	Boron	μg/L	110	110	0.0	30
	Calcium	μg/L	130,000	130,000	0.0	30
	Chloride	mg/L	450	450	0.0	30
	Fluoride	mg/L	0.23	0.23	0.0	30
	Sulfate	mg/L	42	42	0.0	30
	TDS	mg/L	970	1,000	3.0	30
	pH (lab)	SU	7.7	7.7	0.0	30

4.2 Overall Accuracy/Bias

LCS recoveries were met for all samples.	Yes □	No ⊠
MS/MSD recoveries were met for 75% of the samples.	Yes ⊠	No 🗆
100% of the LCS recoveries, and 100% of the MS/MSD recoveries acceptable.		
4.3 Overall Completeness		
Total data points generated		42
Data points available for use		42
At least 90% of the data are determined to be valid.	Yes ⊠	No □

The completeness objective for the task was met and sufficient data are available to support decision-making.

4.4 Data Limitations and Actions

U-qualified results may not be usable when greater than a screening level.

Tables

Table 1 - Cumulative Analytical Data Summary

Marquette Board of Light and Power

Shiras Steam Plant

September 2018

Lab Suite:	2010				CCR Appendix III						CCR Appendix IV																
Lub Suite.						1	T Appendix i	l I	T-4-1		1					I	I	1	CCN Append	X IV	1	1		I			
									Total Dissolved														Radium 226				
Parameter	:			Boron	Calcium	Chloride	Fluoride	Sulfate	Solids	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	& 228	Radium 226	Radium 228	Selenium	Thallium
									(TDS)														Combined				
Units:				μg/L	μg/L	mg/L	mg/L	mg/L	mg/L	SU	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 NE	NE	6.0	10	2.0	4.0	5.0	100	NE	4.0	15	NE	2.0	NE	5.0	NE	NE	50	2.0
		Collection																									
Location	Well ID	Date	Duplicate																								
	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	Х	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 05/31/18	Х	300 U 66 J	120,000 110,000	270 310	0.10 U 0.046 J	21 25	880 770	7.55 7.8	2.0 U 2.0 U	5.0 U 5.0 U	0.14 0.15	1.0 U 1.0 U	1.0 U 1.0 U	10 U 2.1	20 U 0.77 J	0.042 J	3.0 U 1.0 U	10 U 12	0.20 U 0.20 UJ	50 U 1.6 J	1.00 U 0.516	1.00 U 0.409	1.00 U 0.107 U	5.0 U 5.0 U	2.0 U 1.0 U
		09/20/18		67 J	120,000	300	0.046 J	24	740	7.8	2.0 0	3.0 0	0.15	1.0 0			0.77 J	0.042 J			0.20 03	1.0 J	0.510	0.409	0.107 0	3.0 0	
	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
	10100 2	07/13/17		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	Х	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
int		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
adie		05/31/18	Х	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
ngu		09/20/18		55 J	64,000	85	0.058	29	310	8.0																	
, o	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 08/23/17		300 U 300 U	69,000	89 95	0.38 U 0.10 U	36 44	440 300	7.86 7.81	2.0 U 2.0 U	5.0 U 5.0 U	0.23 0.10 U	1.0 U 1.0 U	1.0 U 1.0 U	10 U 10 U	20 U 20 U		3.0 U 3.0 U	10 U 10 U	0.20 U 0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U 1.00 U	1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		08/29/17		300 U	75,000 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	Х	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			-		-												
	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	Х	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 09/14/17		300 U 300 U	110,000	340 360	0.20 0.18	53 49	1,000 1,000	7.75 7.77	2.0 U 2.0 U	5.0 U 5.0 U	0.10 U	1.0 U	1.0 U 1.0 U	10 U	20 U 20 U		3.0 U 3.0 U	10 U	0.20 U	50 U 50 U	1.00 U 1.00 U	1.00 U	1.00 U 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		09/14/17		300 U	100,000 160,000	370	0.18	46	1,000	7.74	2.0 U	5.0 U	0.10 U 0.10 U	1.0 U 1.0 U	1.0 U	10 U 10 U	20 U		3.0 U	13	0.20 U 0.20 U	50 U	1.00 U	1.00 U 1.00 U	1.00 U	5.0 U	2.0 U
		10/05/17		300 U	120,000	380	0.12	43	1,100	7.74	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.1 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	Х	110	130,000	450	0.23	42	1,000	7.7																	
	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	Х	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
پ		08/23/17	Х	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
Jien		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
Upgrad		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	Х	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 05/31/18		300 U 42 J	120,000 100,000	190 210	0.10 U 0.043 J	18 19	700 640	7.45 7.6	2.0 U 2.0 U	5.0 U 5.0 U	0.12 0.095	1.0 U 1.0 U	1.0 U 1.0 U	10 U	20 U 0.25 J	0.046 1	3.0 U 1.0 U	13 7.6 J	0.20 U 0.20 U	50 U 7.1	1.00 U 0.470	1.00 U 0.272	1.00 U 0.198 U	5.0 U 5.0 U	2.0 U 1.0 U
						220			630		+	5.0 0			1.0 0	1.5 J	0.25 J	0.046 J		7.6 J	0.20 0	7.1		0.272	0.198 0	5.0 0	
	l .	09/20/18	l .	39 J	120,000	220	0.031 J	22	030	7.6					-						ı	I					

Table 1 - Cumulative Analytical Data Summary

Marquette Board of Light and Power

Shiras Steam Plant September 2018

Septembe						CD Annandiu	111											CCD Annand	iv IV							
Lab Suite:						CCR Appendix	III .						•					CCR Append	IX IV							
Paramete	r:		Boron	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids (TDS)	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 228 Combined	Radium 226	Radium 228	Selenium	Thallium
Units:			μg/L	μg/L	mg/L	mg/L	mg/L	mg/L	SU	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 I	MCL:		NE	NE	NE	4.0	NE	NE	NE	6.0	10	2.0	4.0	5.0	100	NE	4.0	15	NE	2.0	NE	5.0	NE	NE	50	2.0
Location	Well ID	Collection Date Duplicat	e																							
	Equipment	07/20/17	300 U	1,000 U	10 U	0.38 U	2.5 U	10 U	8.05	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	1.24	1.00 U	1.24	5.0 U	2.0 U
	Blank	07/24/17	300 U	1,000 U	10 U	0.38 U	2.5 U	10 U	7.94	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	1.03	1.00 U	1.03	5.0 U	2.0 U
		08/29/17	300 U	1,000 U	10 U	0.10 U	1 U	10 U	NA	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
gc		09/06/17	300 U	1,000 U	10 U	0.10 U	1 U	10	NA	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	1,000 U	10 U	0.10 U	1 U	10 U	NA	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	1,000 U	10 U	0.10 U	1 U	10	NA	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	1,000 U	10 U	0.10 U	1 U	18	NA	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

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

Appendix 1



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton 4101 Shuffel Street NW North Canton, OH 44720 Tel: (330)497-9396

TestAmerica Job ID: 240-101698-1

Client Project/Site: CCR-MBLP Shiras Steam Plant

For:

Fishbeck Thompson Carr & Huber Inc 1515 Arboretum Drive SE Grand Rapids, Michigan 49546

Attn: Penni Mahler

Hus Brooks
Authorized for release by:

10/5/2018 8:13:25 PM Kris Brooks, Project Manager II

(330)966-9790

kris.brooks@testamericainc.com

.....LINKS

Review your project results through Total Access

Have a Question?



Visit us at: www.testamericainc.com This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Definitions/Glossary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Qualifiers

Metals

Qualitier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

MDA

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)

MDC Minimum Detectable Concentration (Radiochemistry)
MDL Method Detection Limit
ML Minimum Level (Dioxin)
NC Not Calculated

ND Not Detected at the reporting limit (or MDL or EDL if shown)

PQL Practical Quantitation Limit

QC Quality Control

RER Relative Error Ratio (Radiochemistry)

RL Reporting Limit or Requested Limit (Radiochemistry)

Minimum Detectable Activity (Radiochemistry)

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin)
TEQ Toxicity Equivalent Quotient (Dioxin)

TestAmerica Canton

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Job ID: 240-101698-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Fishbeck Thompson Carr & Huber Inc

Project: CCR-MBLP Shiras Steam Plant

Report Number: 240-101698-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 9/22/2018 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.9° C.

TOTAL RECOVERABLE METALS (ICP)

Samples MBLPS-18-09-MW-3 (I) (240-101698-1), MBLPS-18-09-MW-2 (I) (240-101698-2), MBLPS-18-09-MW-1 (I) (240-101698-3), MBLPS-18-09-MW-5 (240-101698-4), MBLPS-18-09-MW-4 (I) (240-101698-5) and MBLPS-18-09-MW-4 (D) (240-101698-6) were analyzed for total recoverable metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 09/24/2018 and analyzed on 09/25/2018.

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

TOTAL DISSOLVED SOLIDS

Samples MBLPS-18-09-MW-3 (I) (240-101698-1), MBLPS-18-09-MW-2 (I) (240-101698-2), MBLPS-18-09-MW-1 (I) (240-101698-3), MBLPS-18-09-MW-5 (240-101698-4), MBLPS-18-09-MW-4 (I) (240-101698-5) and MBLPS-18-09-MW-4 (D) (240-101698-6) were analyzed for total dissolved solids in accordance with SM 2540C. The samples were analyzed on 09/27/2018.

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

TestAmerica Canton 10/5/2018

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Case Narrative

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Job ID: 240-101698-1 (Continued)

Laboratory: TestAmerica Canton (Continued)

<u>PH</u>

Samples MBLPS-18-09-MW-3 (I) (240-101698-1), MBLPS-18-09-MW-2 (I) (240-101698-2), MBLPS-18-09-MW-1 (I) (240-101698-3), MBLPS-18-09-MW-5 (240-101698-4), MBLPS-18-09-MW-4 (I) (240-101698-5) and MBLPS-18-09-MW-4 (D) (240-101698-6) were analyzed for pH in accordance with EPA SW-846 Method 9040B. The samples were analyzed on 09/22/2018.

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

ANIONS

Samples MBLPS-18-09-MW-3 (I) (240-101698-1), MBLPS-18-09-MW-2 (I) (240-101698-2), MBLPS-18-09-MW-1 (I) (240-101698-3), MBLPS-18-09-MW-5 (240-101698-4), MBLPS-18-09-MW-4 (I) (240-101698-5) and MBLPS-18-09-MW-4 (D) (240-101698-6) were analyzed for anions in accordance with EPA SW-846 Method 9056A. The samples were analyzed on 09/26/2018.

Samples MBLPS-18-09-MW-1 (I) (240-101698-3)[5X], MBLPS-18-09-MW-5 (240-101698-4)[5X], MBLPS-18-09-MW-4 (I) (240-101698-5)[10X] and MBLPS-18-09-MW-4 (D) (240-101698-6)[10X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

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

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Method Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CAN
9040B	рН	SW846	TAL CAN
9056A	Anions, Ion Chromatography	SW846	TAL CAN
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CAN

Protocol References:

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

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

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Sample Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-101698-1	MBLPS-18-09-MW-3 (I)	Water	09/20/18 10:01	09/22/18 10:00
240-101698-2	MBLPS-18-09-MW-2 (I)	Water	09/20/18 10:54	09/22/18 10:00
240-101698-3	MBLPS-18-09-MW-1 (I)	Water	09/20/18 11:51	09/22/18 10:00
240-101698-4	MBLPS-18-09-MW-5	Water	09/20/18 13:09	09/22/18 10:00
240-101698-5	MBLPS-18-09-MW-4 (I)	Water	09/20/18 14:13	09/22/18 10:00
240-101698-6	MBLPS-18-09-MW-4 (D)	Water	09/20/18 14:13	09/22/18 10:00

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-09-MW-3 (I)

TestAmerica Job ID: 240-101698-1

Lab Sample ID: 240-101698-2

Lab Sample ID: 240-101698-3

Lab Sample ID: 240-101698-1

•		. ,					-	
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
Boron	41	J	100	23	ug/L	<u> </u>	6010C	Total
								Recoverable
Calcium	70000		5000	310	ug/L	1	6010C	Total
								Recoverable
pН	8.1	HF	0.1	0.1	SU	1	9040B	Total/NA
Chloride	92		1.0	0.28	mg/L	1	9056A	Total/NA
Fluoride	0.055		0.050	0.024	mg/L	1	9056A	Total/NA
Sulfate	22		1.0	0.35	mg/L	1	9056A	Total/NA
Total Dissolved Solids	340		10	7.8	mg/L	1	SM 2540C	Total/NA

Client Sample ID: MBLPS-18-09-MW-2 (I)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D M	ethod	Prep Type
Boron	55	J	100	23	ug/L	1	60	010C	Total
									Recoverable
Calcium	64000		5000	310	ug/L	1	60	010C	Total
									Recoverable
рН	8.0	HF	0.1	0.1	SU	1	90	040B	Total/NA
Chloride	85		1.0	0.28	mg/L	1	90	056A	Total/NA
Fluoride	0.058		0.050	0.024	mg/L	1	90	056A	Total/NA
Sulfate	29		1.0	0.35	mg/L	1	90	056A	Total/NA
Total Dissolved Solids	310		10	7.8	mg/L	1	SI	M 2540C	Total/NA

Client Sample ID: MBLPS-18-09-MW-1 (I)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Me	thod	Prep Type
Boron	67	J	100	23	ug/L	1	601	10C	Total
Calcium	120000		5000	310	ug/L	1	601	10C	Recoverable Total Recoverable
pH	7.9	HF	0.1	0.1	SU	1	904	40B	Total/NA
Chloride	300		5.0	1.4	mg/L	5	905	56A	Total/NA
Fluoride	0.044	J	0.050	0.024	mg/L	1	905	56A	Total/NA
Sulfate	24		1.0	0.35	mg/L	1	905	56A	Total/NA
Total Dissolved Solids	740		10	7.8	mg/L	1	SM	2540C	Total/NA

Client Sample ID: MBLPS-18-09-MW-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
Boron	39	J	100	23	ug/L	1	6010C	Total
								Recoverable
Calcium	120000		5000	310	ug/L	1	6010C	Total
								Recoverable
pH	7.6	HF	0.1	0.1	SU	1	9040B	Total/NA
Chloride	220		5.0	1.4	mg/L	5	9056A	Total/NA
Fluoride	0.031	J	0.050	0.024	mg/L	1	9056A	Total/NA
Sulfate	22		1.0	0.35	mg/L	1	9056A	Total/NA
Total Dissolved Solids	630		10	7.8	mg/L	1	SM 2540C	Total/NA

Client Sample ID: MBLPS-18-09-MW-4 (I)

This Detection Summary does not include radiochemical test results.

TestAmerica Canton

Lab Sample ID: 240-101698-5

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Lab Sample ID: 240-101698-4

Detection Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-09-MW-4 (I) (Continued)

TestAmerica Job ID: 240-101698-1

Lab Sample ID: 240-101698-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
Boron	110		100	23	ug/L		6010C	Total
								Recoverable
Calcium	130000		5000	310	ug/L	1	6010C	Total
								Recoverable
pH	7.7	HF	0.1	0.1	SU	1	9040B	Total/NA
Chloride	450		10	2.8	mg/L	10	9056A	Total/NA
Fluoride	0.23		0.050	0.024	mg/L	1	9056A	Total/NA
Sulfate	42		1.0	0.35	mg/L	1	9056A	Total/NA
Total Dissolved Solids	970		20	16	mg/L	1	SM 2540C	Total/NA

Client Sample ID: MBLPS-18-09-MW-4 (D)

	Lab Sample ID: 240-101698-6										
	Dil Fac	D	Method	Prep Type							
_	1	_	6010C	Total							

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	110		100	23	ug/L	1	_	6010C	Total
									Recoverable
Calcium	130000		5000	310	ug/L	1		6010C	Total
									Recoverable
pH	7.7	HF	0.1	0.1	SU	1		9040B	Total/NA
Chloride	450		10	2.8	mg/L	10		9056A	Total/NA
Fluoride	0.23		0.050	0.024	mg/L	1		9056A	Total/NA
Sulfate	42		1.0	0.35	mg/L	1		9056A	Total/NA
Total Dissolved Solids	1000		20	16	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Canton

10/5/2018

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1:

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Client Sample ID: MBLPS-18-09-MW-3 (I)

Date Collected: 09/20/18 10:01 Date Received: 09/22/18 10:00

Lab Sample ID: 240-101698-1

Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable Analyte Result Qualifier RL MDL Unit Dil Fac Prepared Analyzed 100 09/24/18 14:00 09/25/18 10:07 Boron 41 J 23 ug/L 5000 09/24/18 14:00 09/25/18 10:07 Calcium 70000 310 ug/L

General Chemistry Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	8.1	HF	0.1	0.1	SU			09/22/18 14:32	1
Chloride	92		1.0	0.28	mg/L			09/26/18 09:32	1
Fluoride	0.055		0.050	0.024	mg/L			09/26/18 09:32	1
Sulfate	22		1.0	0.35	mg/L			09/26/18 09:32	1
Total Dissolved Solids	340		10	7.8	mg/L			09/27/18 13:55	1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Client Sample ID: MBLPS-18-09-MW-2 (I)

Date Collected: 09/20/18 10:54 Date Received: 09/22/18 10:00

Sulfate

Total Dissolved Solids

Lab Sample ID: 240-101698-2

Matrix: Water

09/26/18 09:53

09/27/18 13:55

Method: 6010C - Metals (Analyte	,	overable Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	55	J -	100	23	ug/L		09/24/18 14:00	09/25/18 10:12	1
Calcium	64000		5000	310	ug/L		09/24/18 14:00	09/25/18 10:12	1
General Chemistry Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	8.0	HF	0.1	0.1	SU			09/22/18 14:38	1
Chloride	85		1.0	0.28	mg/L			09/26/18 09:53	1
Fluoride	0.058		0.050	0.024	ma/l			09/26/18 09:53	1

1.0

10

29

310

0.35 mg/L

7.8 mg/L

TestAmerica Canton

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Client Sample ID: MBLPS-18-09-MW-1 (I)

Date Collected: 09/20/18 11:51 Date Received: 09/22/18 10:00 Lab Sample ID: 240-101698-3

. Matrix: Water

Method: 6010C - Metals (IC Analyte	•	overable Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	67	J	100	23	ug/L		09/24/18 14:00	09/25/18 10:17	1
Calcium	120000		5000	310	ug/L		09/24/18 14:00	09/25/18 10:17	1
General Chemistry						_			5
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.9	HF	0.1	0.1	SU			09/22/18 14:43	1
Chloride	300		5.0	1.4	mg/L			09/26/18 11:16	5
Fluoride	0.044	J	0.050	0.024	mg/L			09/26/18 10:55	1
Tuonac									
Sulfate	24		1.0	0.35	mg/L			09/26/18 10:55	1

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Client Sample ID: MBLPS-18-09-MW-5

Date Collected: 09/20/18 13:09 Date Received: 09/22/18 10:00 Lab Sample ID: 240-101698-4

Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable Analyte Result Qualifier RL **MDL** Unit Dil Fac Prepared Analyzed 100 Boron 39 J 23 ug/L 09/24/18 14:00 09/25/18 09:45 5000 09/24/18 14:00 09/25/18 09:45 **Calcium** 120000 310 ug/L

General Chemistry Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.6	HF	0.1	0.1	SU			09/22/18 14:54	1
Chloride	220		5.0	1.4	mg/L			09/26/18 12:39	5
Fluoride	0.031	J	0.050	0.024	mg/L			09/26/18 11:37	1
Sulfate	22		1.0	0.35	mg/L			09/26/18 11:37	1
Total Dissolved Solids	630		10	7.8	mg/L			09/27/18 13:55	1

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10/5/2018

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Client Sample ID: MBLPS-18-09-MW-4 (I)

Method: 6010C - Metals (ICP) - Total Recoverable

970

Date Collected: 09/20/18 14:13 Date Received: 09/22/18 10:00

Sulfate

Total Dissolved Solids

Lab Sample ID: 240-101698-5

. Matrix: Water

09/26/18 13:41

09/27/18 13:55

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	110		100	23	ug/L		09/24/18 14:00	09/25/18 10:21	1
Calcium	130000		5000	310	ug/L		09/24/18 14:00	09/25/18 10:21	1
General Chemistry Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.7	HF	0.1	0.1	SU			09/22/18 14:59	1
Chloride	450		10	2.8	mg/L			09/26/18 14:01	10
Fluoride	0.23		0.050	0.024	mg/L			09/26/18 13:41	1

1.0

20

0.35 mg/L

16 mg/L

8

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Client Sample ID: MBLPS-18-09-MW-4 (D)

1000

Date Collected: 09/20/18 14:13 Date Received: 09/22/18 10:00

Total Dissolved Solids

Lab Sample ID: 240-101698-6

. Matrix: Water

09/27/18 13:55

Method: 6010C - Metals (IC	CP) - Total Reco	overable							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	110		100	23	ug/L		09/24/18 14:00	09/25/18 10:26	1
Calcium	130000		5000	310	ug/L		09/24/18 14:00	09/25/18 10:26	1
General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.7	HF	0.1	0.1	SU			09/22/18 15:10	1
Chloride	450		10	2.8	mg/L			09/26/18 18:52	10
Fluoride	0.23		0.050	0.024	mg/L			09/26/18 18:31	1
Sulfate	42		1.0	0.35	mg/L			09/26/18 18:31	1

20

16 mg/L

7

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 240-346908/1-A

Matrix: Water

Analysis Batch: 347083

Client Sample ID: Method Blank **Prep Type: Total Recoverable**

Prep Batch: 346908

-	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	23	U	100	23	ug/L		09/24/18 14:00	09/25/18 09:09	1
Calcium	310	U	5000	310	ug/L		09/24/18 14:00	09/25/18 09:09	1

Lab Sample ID: LCS 240-346908/2-A Client Sample ID: Lab Control Sample **Matrix: Water Prep Type: Total Recoverable Analysis Batch: 347083 Prep Batch: 346908** LCS LCS Spike %Rec. Analyte Added Result Qualifier Unit %Rec Limits Boron 1000 1110 ug/L 111 80 - 120 Calcium 50000 51300 ug/L 103 80 - 120

Client Sample ID: MBLPS-18-09-MW-5 Lab Sample ID: 240-101698-4 MS **Matrix: Water Prep Type: Total Recoverable Analysis Batch: 347083 Prep Batch: 346908** Sample Sample Spike MS MS %Rec.

Analyte Result Qualifier Added Result Qualifier Limits Unit %Rec Boron 39 1000 1120 108 75 - 125 ug/L Calcium 50000 169000 75 - 125 120000 ug/L 105

Lab Sample ID: 240-101698-4 MSD Client Sample ID: MBLPS-18-09-MW-5 **Prep Type: Total Recoverable**

Matrix: Water

Analysis Batch: 347083 Prep Batch: 346908 Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit Boron 39 J 1000 1080 ug/L 104 75 - 125 20 4 Calcium 120000 50000 158000 82 ug/L 75 - 125 20

Method: 9040B - pH

Lab Sample ID: LCS 240-346711/2 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 346711

LCS LCS Spike %Rec. Analyte Added Result Qualifier Unit %Rec Limits рН 6.29 6.2 SU 99 97 - 103

Lab Sample ID: LCS 240-346711/29 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 346711

Spike LCS LCS %Rec. Analyte Added Result Qualifier %Rec Unit Limits 6.29 SU рН 6.3 100 97 - 103

Lab Sample ID: 240-101698-4 DU Client Sample ID: MBLPS-18-09-MW-5 Prep Type: Total/NA

Matrix: Water

Analysis Batch: 346711

Analysis Daten. 040711	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
рН	7.6	HF	 7.6	HF	SU		 	0.1	20

TestAmerica Canton

TestAmerica Job ID: 240-101698-1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-347183/3

Matrix: Water

Analyte

Chloride

Fluoride

Sulfate

Analysis Batch: 347183

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

MB MB Result Qualifier RL **MDL** Unit D Prepared Analyzed Dil Fac 0.28 U 1 0 0.28 mg/L 09/25/18 22:30 0.024 U 0.050 09/25/18 22:30 0.024 mg/L 0.35 U 1.0 0.35 mg/L 09/25/18 22:30

Lab Sample ID: LCS 240-347183/4

Matrix: Water

Analysis Batch: 347183

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

Client Sample ID: MBLPS-18-09-MW-5

Client Sample ID: MBLPS-18-09-MW-5

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit %Rec l imits Chloride 50.0 52.0 mg/L 104 90 - 110 Fluoride 2.50 2.64 mg/L 105 90 - 110 Sulfate 50.0 52.4 mg/L 105 90 - 110

Lab Sample ID: 240-101698-4 MS

Matrix: Water

Analysis Batch: 347183

Sample Sample MS MS Spike %Rec. Result Qualifier Added Limits **Analyte** Result Qualifier Unit %Rec Fluoride 0.031 J 2.50 2.75 mg/L 109 80 - 120 Sulfate 22 50.0 74.3 mg/L 105 80 - 120

Lab Sample ID: 240-101698-4 MS

Matrix: Water

Analysis Batch: 347183

MS MS %Rec. Sample Sample Spike Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Chloride 220 250 452 80 - 120 mg/L 94

Lab Sample ID: 240-101698-4 MSD

Matrix: Water

Analysis Batch: 347183

Sample Sample Spike MSD MSD **Analyte** Result Qualifier Added Result Qualifier Unit D %Rec Limits **RPD** I imit Fluoride 0.031 J 2.50 2.75 mg/L 109 80 - 120 0 15 Sulfate 22 50.0 74.4 mg/L 105 80 - 120 15

Lab Sample ID: 240-101698-4 MSD

Matrix: Water

Analysis Batch: 347183

MSD MSD Spike %Rec. Sample Sample Added Result Qualifier Limits RPD Analyte Result Qualifier Unit %Rec Limit Chloride 220 250 450 94 80 - 120 mg/L

Lab Sample ID: MB 240-347361/3

Matrix: Water

Analysis Batch: 347361

MB MB Analyte Result Qualifier RL **MDL** Unit Prepared Analyzed Dil Fac 1.0 09/26/18 15:45 Chloride 0.28 U 0.28 mg/L

TestAmerica Canton

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Client Sample ID: MBLPS-18-09-MW-5

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

TestAmerica Job ID: 240-101698-1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

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

MR ME

Lab Sample ID: MB 240-347361/3 **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA

Analysis Batch: 347361

	IAID	IAID							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.024	U	0.050	0.024	mg/L			09/26/18 15:45	1
Sulfate	0.35	U	1.0	0.35	mg/L			09/26/18 15:45	1

Lab Sample ID: LCS 240-347361/4 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 347361

LCS LCS Spike %Rec. **Analyte** Added Result Qualifier Unit D %Rec Limits Chloride 50.0 52.0 104 90 - 110 mg/L Fluoride 2.50 2.65 mg/L 106 90 - 110 Sulfate 50.0 90 - 110 52.4 mg/L 105

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

Lab Sample ID: MB 240-347570/1 **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA

Analysis Batch: 347570

MR MR Result Qualifier RL **MDL** Unit Prepared Analyzed Dil Fac 10 **Total Dissolved Solids** 7.8 U 7.8 mg/L 09/27/18 13:55

Lab Sample ID: LCS 240-347570/2 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 347570

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit %Rec Limits Total Dissolved Solids 494 484 mg/L 98 80 - 120

Lab Sample ID: 240-101698-4 DU Client Sample ID: MBLPS-18-09-MW-5 Prep Type: Total/NA

Matrix: Water

Analysis Batch: 347570

Sample Sample DU DU **RPD** Analyte **Result Qualifier** Result Qualifier Unit D RPD Limit Total Dissolved Solids 630 628 mg/L 0.2 20

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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Metals

Prep Batch: 346908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101698-1	MBLPS-18-09-MW-3 (I)	Total Recoverable	Water	3005A	
240-101698-2	MBLPS-18-09-MW-2 (I)	Total Recoverable	Water	3005A	
240-101698-3	MBLPS-18-09-MW-1 (I)	Total Recoverable	Water	3005A	
240-101698-4	MBLPS-18-09-MW-5	Total Recoverable	Water	3005A	
240-101698-5	MBLPS-18-09-MW-4 (I)	Total Recoverable	Water	3005A	
240-101698-6	MBLPS-18-09-MW-4 (D)	Total Recoverable	Water	3005A	
MB 240-346908/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-346908/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
240-101698-4 MS	MBLPS-18-09-MW-5	Total Recoverable	Water	3005A	
240-101698-4 MSD	MBLPS-18-09-MW-5	Total Recoverable	Water	3005A	

Analysis Batch: 347083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101698-1	MBLPS-18-09-MW-3 (I)	Total Recoverable	Water	6010C	346908
240-101698-2	MBLPS-18-09-MW-2 (I)	Total Recoverable	Water	6010C	346908
240-101698-3	MBLPS-18-09-MW-1 (I)	Total Recoverable	Water	6010C	346908
240-101698-4	MBLPS-18-09-MW-5	Total Recoverable	Water	6010C	346908
240-101698-5	MBLPS-18-09-MW-4 (I)	Total Recoverable	Water	6010C	346908
240-101698-6	MBLPS-18-09-MW-4 (D)	Total Recoverable	Water	6010C	346908
MB 240-346908/1-A	Method Blank	Total Recoverable	Water	6010C	346908
LCS 240-346908/2-A	Lab Control Sample	Total Recoverable	Water	6010C	346908
240-101698-4 MS	MBLPS-18-09-MW-5	Total Recoverable	Water	6010C	346908
240-101698-4 MSD	MBLPS-18-09-MW-5	Total Recoverable	Water	6010C	346908

General Chemistry

Analysis Batch: 346711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101698-1	MBLPS-18-09-MW-3 (I)	Total/NA	Water	9040B	<u> </u>
240-101698-2	MBLPS-18-09-MW-2 (I)	Total/NA	Water	9040B	
240-101698-3	MBLPS-18-09-MW-1 (I)	Total/NA	Water	9040B	
240-101698-4	MBLPS-18-09-MW-5	Total/NA	Water	9040B	
240-101698-5	MBLPS-18-09-MW-4 (I)	Total/NA	Water	9040B	
240-101698-6	MBLPS-18-09-MW-4 (D)	Total/NA	Water	9040B	
LCS 240-346711/2	Lab Control Sample	Total/NA	Water	9040B	
LCS 240-346711/29	Lab Control Sample	Total/NA	Water	9040B	
240-101698-4 DU	MBLPS-18-09-MW-5	Total/NA	Water	9040B	

Analysis Batch: 347183

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101698-1	MBLPS-18-09-MW-3 (I)	Total/NA	Water	9056A	
240-101698-2	MBLPS-18-09-MW-2 (I)	Total/NA	Water	9056A	
240-101698-3	MBLPS-18-09-MW-1 (I)	Total/NA	Water	9056A	
240-101698-3	MBLPS-18-09-MW-1 (I)	Total/NA	Water	9056A	
240-101698-4	MBLPS-18-09-MW-5	Total/NA	Water	9056A	
240-101698-4	MBLPS-18-09-MW-5	Total/NA	Water	9056A	
240-101698-5	MBLPS-18-09-MW-4 (I)	Total/NA	Water	9056A	
240-101698-5	MBLPS-18-09-MW-4 (I)	Total/NA	Water	9056A	
MB 240-347183/3	Method Blank	Total/NA	Water	9056A	
LCS 240-347183/4	Lab Control Sample	Total/NA	Water	9056A	

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QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant TestAmerica Job ID: 240-101698-1

General Chemistry (Continued)

Analysis Batch: 347183 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method Prep B	atch
240-101698-4 MS	MBLPS-18-09-MW-5	Total/NA	Water	9056A	
240-101698-4 MS	MBLPS-18-09-MW-5	Total/NA	Water	9056A	
240-101698-4 MSD	MBLPS-18-09-MW-5	Total/NA	Water	9056A	
240-101698-4 MSD	MBLPS-18-09-MW-5	Total/NA	Water	9056A	

Analysis Batch: 347361

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101698-6	MBLPS-18-09-MW-4 (D)	Total/NA	Water	9056A	
240-101698-6	MBLPS-18-09-MW-4 (D)	Total/NA	Water	9056A	
MB 240-347361/3	Method Blank	Total/NA	Water	9056A	
LCS 240-347361/4	Lab Control Sample	Total/NA	Water	9056A	

Analysis Batch: 347570

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101698-1	MBLPS-18-09-MW-3 (I)	Total/NA	Water	SM 2540C	_
240-101698-2	MBLPS-18-09-MW-2 (I)	Total/NA	Water	SM 2540C	
240-101698-3	MBLPS-18-09-MW-1 (I)	Total/NA	Water	SM 2540C	
240-101698-4	MBLPS-18-09-MW-5	Total/NA	Water	SM 2540C	
240-101698-5	MBLPS-18-09-MW-4 (I)	Total/NA	Water	SM 2540C	
240-101698-6	MBLPS-18-09-MW-4 (D)	Total/NA	Water	SM 2540C	
MB 240-347570/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 240-347570/2	Lab Control Sample	Total/NA	Water	SM 2540C	
240-101698-4 DU	MBLPS-18-09-MW-5	Total/NA	Water	SM 2540C	

TestAmerica Canton

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TestAmerica Job ID: 240-101698-1

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Client Sample ID: MBLPS-18-09-MW-3 (I)

Date Collected: 09/20/18 10:01 Date Received: 09/22/18 10:00

Lab Sample ID: 240-101698-1

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			346908	09/24/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	347083	09/25/18 10:07	WKD	TAL CAN
Total/NA	Analysis	9040B		1	346711	09/22/18 14:32	MMM	TAL CAN
Total/NA	Analysis	9056A		1	347183	09/26/18 09:32	JWW	TAL CAN
Total/NA	Analysis	SM 2540C		1	347570	09/27/18 13:55	ACR	TAL CAN

Client Sample ID: MBLPS-18-09-MW-2 (I) Lab Sample ID: 240-101698-2

Date Collected: 09/20/18 10:54 Date Received: 09/22/18 10:00

Matrix: Water

Batch **Batch** Dilution Batch **Prepared Prep Type** Туре Method Run Number or Analyzed Analyst **Factor** Lab 3005A TAL CAN Total Recoverable Prep 346908 09/24/18 14:00 MBB Total Recoverable 6010C TAL CAN Analysis 1 347083 09/25/18 10:12 WKD Total/NA Analysis 9040B 346711 09/22/18 14:38 MMM TAL CAN 1 Total/NA Analysis 9056A TAL CAN 347183 09/26/18 09:53 JWW 1 Analysis TAL CAN Total/NA SM 2540C 347570 09/27/18 13:55 ACR

Client Sample ID: MBLPS-18-09-MW-1 (I) Lab Sample ID: 240-101698-3

Date Collected: 09/20/18 11:51 Date Received: 09/22/18 10:00 **Matrix: Water**

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			346908	09/24/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	347083	09/25/18 10:17	WKD	TAL CAN
Total/NA	Analysis	9040B		1	346711	09/22/18 14:43	MMM	TAL CAN
Total/NA	Analysis	9056A		1	347183	09/26/18 10:55	JWW	TAL CAN
Total/NA	Analysis	9056A		5	347183	09/26/18 11:16	JWW	TAL CAN
Total/NA	Analysis	SM 2540C		1	347570	09/27/18 13:55	ACR	TAL CAN

Client Sample ID: MBLPS-18-09-MW-5 Lab Sample ID: 240-101698-4 Date Collected: 09/20/18 13:09 **Matrix: Water**

Date Received: 09/22/18 10:00

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			346908	09/24/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	347083	09/25/18 09:45	WKD	TAL CAN
Total/NA	Analysis	9040B		1	346711	09/22/18 14:54	MMM	TAL CAN
Total/NA	Analysis	9056A		1	347183	09/26/18 11:37	JWW	TAL CAN
Total/NA	Analysis	9056A		5	347183	09/26/18 12:39	JWW	TAL CAN
Total/NA	Analysis	SM 2540C		1	347570	09/27/18 13:55	ACR	TAL CAN

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Lab Chronicle

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Lab Sample ID: 240-101698-5

Client Sample ID: MBLPS-18-09-MW-4 (I)

Date Collected: 09/20/18 14:13 **Matrix: Water** Date Received: 09/22/18 10:00

	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab	
Total Recoverable	Prep	3005A	-		346908	09/24/18 14:00	MBB	TAL CAN	
Total Recoverable	Analysis	6010C		1	347083	09/25/18 10:21	WKD	TAL CAN	
Total/NA	Analysis	9040B		1	346711	09/22/18 14:59	MMM	TAL CAN	
Total/NA	Analysis	9056A		1	347183	09/26/18 13:41	JWW	TAL CAN	
Total/NA	Analysis	9056A		10	347183	09/26/18 14:01	JWW	TAL CAN	
Total/NA	Analysis	SM 2540C		1	347570	09/27/18 13:55	ACR	TAL CAN	

Client Sample ID: MBLPS-18-09-MW-4 (D) Lab Sample ID: 240-101698-6

Date Collected: 09/20/18 14:13 **Matrix: Water**

Date Received: 09/22/18 10:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			346908	09/24/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010C		1	347083	09/25/18 10:26	WKD	TAL CAN
Total/NA	Analysis	9040B		1	346711	09/22/18 15:10	MMM	TAL CAN
Total/NA	Analysis	9056A		1	347361	09/26/18 18:31	JMB	TAL CAN
Total/NA	Analysis	9056A		10	347361	09/26/18 18:52	JMB	TAL CAN
Total/NA	Analysis	SM 2540C		1	347570	09/27/18 13:55	ACR	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

TestAmerica Job ID: 240-101698-1

Laboratory: TestAmerica Canton

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

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-19
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-19
Illinois	NELAP	5	200004	07-31-19
Kansas	NELAP	7	E-10336	01-31-19
Kentucky (UST)	State Program	4	58	02-23-19
Kentucky (WW)	State Program	4	98016	12-31-18 *
Minnesota	NELAP	5	039-999-348	12-31-18 *
Minnesota (Petrofund)	State Program	1	3506	07-31-19
Nevada	State Program	9	OH00048	07-31-19
New Jersey	NELAP	2	OH001	06-30-19
New York	NELAP	2	10975	03-31-19
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-19
Pennsylvania	NELAP	3	68-00340	08-31-19 *
Texas	NELAP	6	T104704517-17-9	08-31-19
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-19
Washington	State Program	10	C971	01-12-19
West Virginia DEP	State Program	3	210	12-31-18 *

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

TestAmerica Canton

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TestAmerica Canton Sample Receip Canton Facility	ot Form/Narrative		Login	# ; IVI6	48
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Receipt After-hours: Drop-off Date/Ti			Location		
		william transport and the same		***************************************	*/ ***********************************
Packing material used: Bubble W COOLANT: Wer Ice E 1. Cooler temperature upon receipt IR GUN# IR-8 (CF +0.9 °C) OF IR GUN# IR-8 (CF +0.6 °C) Obs. 2. Were tamper/custody seals on the outside of -Were the seals on the outside of -Were tamper/custody seals intact 3. Shippers' packing slip attached to the 4. Did custody papers accompany the 5. Were the custody papers relinquish 6. Was/were the person(s) who collect 7. Did all bottles arrive in good condit 8. Could all bottle labels be reconciled 9. Were correct bottle(s) used for the tell 10. Sufficient quantity received to perfect 11. Are these work share samples? 11 Are these work share sample(s) at the 12 Were all preserved sample(s) at the 13 Were VOAs on the COC? 14 Were air bubbles >6 mm in any VC 15 Was a VOA trip blank present in the 16 Was a LL Hg or Me Hg trip blank present in the	blue lee Dry lee Wasserved Cooler Temp. Derved Cooler Temp. Detved Coo	ag None ler None See Multi O °C Corrected 'C Corrected Yes Quantity d? LHg/MeHg)? interplace? ntified on the Co	pic Cooler Form d Cooler Tem Cooler Tem Yes	np. Z9 °C No N	Tests that are not checked for pH by Receiving: VOAs Oil and Grease TOC
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18. SAMPLE CONDITION Sample(s) Sample(s) Sample(s)		fter the recomm	ere received i	n a broken co	unamer.
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Login Container Summary Report

240-101698

Temperature readings:

Client Sample ID	<u>Lab ID</u>	Container Type	Container pH	Preservative Added (mls)	<u>Lot #</u>
MBLPS-18-09-MW-3 (I)	240-101698-A-I	Plastic 250ml - with Nitric Acid	<2		
MBLPS-18-09-MW-2 (I)	240-101698-A-2	Plastic 250ml - with Nitric Acid	<2	A STATE OF THE STA	
MBLPS-18-09-MW-1 (I)	240-101698-A-3	Plastic 250ml - with Nitric Acid	s2.	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
MBLPS-18-09-MW-5	240-101698-A-4	Plastic 250ml - with Nitric Acid		- Chimananananananahakanan	
MBLPS-18-09-MW-5	240-101698-B-4	Plastic 250ml - with Nitric Acid	<2		
MBLPS-18-09-MW-5	240-101698-C-4	Plastic 250ml - with Nitric Acid	<2		
MBLPS-18-09-MW-5 (1)	240-101698-A-5	Plastic 250ml - with Nitric Acid	<2		· ·
MBLPS-18-09-MW-5 (P)	240-101698-A-6	Plastic 250ml - with Nitric Acid	$ \checkmark 2 $	**************************************	energia de la compania del la compania de la compania del la compania de la compania del la compania de la compania del la com

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Appendix D



MEMO

TO: Marquette Board of Light and Power

FROM: Stephen J. MacDonald, PE

DATE: January 21, 2019 **PROJECT NO.:** 180827

RE: Groundwater Statistics 2018 – Shiras Steam Plant

As part of meeting the requirements of the USEPA Coal Combustion Residuals (CCR) Rule, statistical analyses were completed on background and downgradient groundwater data related to the CCR surface impoundment at the Marquette Board of Light and Power (MBLP) Shiras Steam Plant. The statistical analysis process included the following:

- 1. Review of site specific information
- 2. Selection/confirmation of the upgradient (or background) wells and downgradient wells
- 3. Updating of the statistical database for the background data
- 4. Computation of detection frequencies in upgradient and downgradient wells to date
- 5. Test for potential outliers on background data
- 6. Computation of tests of normality and lognormality
- 7. Based on detection frequency and tests of statistical distribution (normal or lognormal) perform the computation prediction limits utilizing up-to-date database:
 - a. Detection frequency ≥ 50%, and data Normal in distribution: compute a Normal prediction limit
 - b. Detection frequency ≥ 50%, and data Lognormal in distribution: compute a Lognormal prediction limit
 - c. Detection frequency ≥ 50%, and data neither Normal or Lognormal in distribution: compute a nonparametric prediction limit
 - d. Detection frequency >0% and < 50%: compute a nonparametric prediction limit
 - e. Detection frequency equal to zero (=0%): compute lab specific prediction limit equal to quantitation limit
- 8. Compute false positive and false negative rates for entire monitoring program based on observed conditions
 - a. If the false positive rate is greater than 5% (> 5%), increase the number of background samples or change verification resampling plan (i.e., Pass 1 of 3 resamples versus Pass 1 of 2)
- 9. Comparison of upgradient versus downgradient wells using the background data
 - a. Note any wells which exceed the prediction limits
 - Note an initial statistically significant increase (SSI) if downgradient is greater than background
 - b. For downgradient wells which exceed prediction limit, resample well
 - If the resample does not exceed the prediction limit, resume detection monitoring
 - If the resample exceeds the prediction limit, conduct an alternate source demonstration (ASD)

Memo - Shiras Steam Plant Page 2 January 18, 2019



The statistical methodology used in this study is consistent with USEPA regulation 40 CFR 264.97(h), 40 CFR 257.93 (§257.93(d), §257.93(e), §257.93(f) and §257.93(g)), USEPA (2009) and ASTM D6312-17 guidance. Statistical analyses were completed using the latest version of ProUCL 5.1 software developed by the USEPA (USEPA, 2016).

Site data was reviewed to confirm upgradient and downgradient monitoring wells. Wells MW-4 and MW-5 have been previously identified as upgradient background wells based on static groundwater data collected from these wells, and as of September 2018, this continues to be the case. Wells MW-1, MW-2, and MW-3 have been identified as downgradient wells. For the semi-annual sampling events, groundwater data was collected on May 31, 2018 (following re-development of the wells) and September 20, 2018 and added to the existing database of data containing results from the eight sampling events that occurred in 2017. In 2018, the monitoring wells were sampled for Appendix III and Appendix IV parameters in May and Appendix III parameters only in September. Since statistical analyses of Appendix III data did not demonstrate any exceedance in the downgradient boundary wells, the Appendix IV data from the May 2018 sampling event were not statistically analyzed.

Detection frequencies for each well and each parameter were tabulated. Table 1 presents a summary of detection frequencies for Appendix III parameters for all monitoring wells sample results.

Monitoring results were loaded into ProUCL and the following tests/calculations were performed:

- Check the data for outliers using Dixon's test
- Test the data for normality (normal and lognormal distribution) using Shapiro-Wilk test
- Based on results of normality test, compute either a normal, lognormal or nonparametric prediction limit

All ProUCL outputs are presented in Attachment A.

Dixon's Test

The USEPA Unified Guidance (USEPA, 2009) recommends that outliers tests should be performed on background data, but they generally not to be removed unless some basis for a likely error or discrepancy can be identified. Possible identifiable errors or discrepancies could include data recording errors, unusual sampling and laboratory procedures or conditions, inconsistent sample turbidity, and values significantly outside the historical ranges of background data. Regarding the new and historical data for the background, the Total Dissolved Solids value of 2300 mg/L for background data (MW-5 sample from September 28, 2017) was identified as potential outlier with 0.99 confidence level. Still, this value was kept in the data set because its potential to be an outlier was not confirmed. That is, the basis to classify the identified potential outlier as an error or discrepancy (as suggested by the USEPA unified guidance) does not exist at this time.

Shapiro-Wilk Normal and Lognormal Test

Table 2 presents the results of Shapiro-Wilk test of normality for the background data for the Appendix III parameters. Based on the analysis, the normal prediction limit was computed for field pH; the lognormal prediction limit was calculated for total calcium; and nonparametric prediction limits were computed for total boron, chloride, fluoride, sulfate, and total dissolved solids.

Memo - Shiras Steam Plant Page 3 January 18, 2019



Upper Prediction Limit

Table 3 presents summary statistics and prediction limits based on background data from background wells (MW-4 and MW-5). All downgradient data for parameter-well combinations were compared to the prediction limits.

Upgradient vs. Downgradient Comparison

Table 4 presents the historical downgradient data for parameter-well combinations, which failed the current statistical comparisons for Appendix III parameters. For historical monitoring data, a prediction limit exceedance for boron in well MW-1 (sampled on September 28, 2017). This was the only detection of boron in all 10 sample events. All sampling events after this, including both 2018 events, were non-detect and invalidates the initial exceedance. Regarding historical data of fluoride, wells MW-1, MW-2, and MW-3 presented values above prediction limit in samples from July 2017, but all these potential exceedances were qualified as non-detects, thus invalidating the exceedance. For 2018, no exceedances in fluoride were observed. Wells MW-2 historical monitoring results indicate a prediction limit exceedance for field pH from a sample collected on July 19, 2017. All sampling events after this, including both 2018 events did not exceed the prediction limit and invalidates the initial exceedance. The ASD study performed after redevelopment of the wells explained previously reported SSI and stated that sample results may also indicate a natural variation in groundwater.

When the background upper limits were compared the most recent concentrations (2018) of the compliance wells (MW-1, MW-2, and MW-3), no SSI above background occurred.

Time series plots of the Appendix III parameters were created for all monitoring wells (Attachment B) together with a Mann-Kendall trend test that was performed on ProUCL. Overall, significant variability (either increase or decrease) was observed both upgradient (MW-4 and MW-5) and downgradient (MW-1, MW-2, and MW-3) for several parameters from Appendix III. A significant increase in calcium was observed in MW-4 and MW-2; a significant increase in chloride was observed in MW-4, MW-2, and MW-1; and a decrease in pH-field was observed for MW-4, while an increase was observed for MW-1. For sulfate, a significant decrease was observed for MW-3 while an increase was observed for MW-1. For total dissolved solids, a significant increase was observed for MW-4. This variability in both upgradient and downgradient wells signposts a natural variation in groundwater.

The upgradient vs. downgradient prediction limit comparison was plotted and show that currently there are no statistically significant increase for wells MW-1, MW-2 and MW-3 for any of the Appendix III parameters (Attachment C).

Summary

Statistical analyses were completed following USEPA CCR rule and USEPA (2009) and ASTM D6312-17 groundwater statistics guidance. ProUCL, a statistical analysis program developed by the USEPA, was used to analyze background and downgradient groundwater results. Parametric and nonparametric prediction limits were selected in comparing downgradient groundwater concentrations to upgradient background for Appendix III parameters.

Based on the statistical analysis and discussion executed during this study, no SSI above background was observed for any Appendix III parameters. Few statistically significant trends were noted in the background data collected through time series plots. Overall, significant variability (either increase or decrease) was observed

Memo - Shiras Steam Plant Page 4 January 18, 2019



both upgradient (MW-4 and MW-5) and downgradient (MW-1, MW-2, and MW-3) for calcium, chloride, pH-field, sulfate, and total dissolved solids. This variability in both upgradient and downgradient wells signposts a natural variation in groundwater. Up vs. Down prediction limits comparison shows that currently there are no SSI for wells MW-1, MW-2, and MW-3 for any of the Appendix III parameters.

Recommendations

- It is FTCH's understanding that the plant has discontinued power generation activities in preparation of permanent plan closure; therefore, FTCH recommends the following:
 - Prepare and submit a Surface Impoundment Closure Plan for the closure of the CCR surface impoundment. The closure plan is required under Title 40, Code of Federal Regulations (40 CFR) Part 257.101 and detailed in 40 CFR Part 257.102.
 - Implement the closure plan.
- In the event that the CCR material is closed in-place, a post closure plan including groundwater monitoring for a period of 30 years may be needed (40 CFR 257.104).

References

United States Environmental Protection Agency (USEPA), 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance.

https://nepis.epa.gov/Exe/ZyPDF.cgi/P10055GQ.PDF?Dockey=P10055GQ.PDF. Accessed on October 2018.

ASTM D6312-17, 2017. Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs at Waste Disposal Facilities, 15 p.

USEPA, 2016. ProUCL Version 5.1 User Guide - Statistical Software for Environmental Applications for Data Sets with and without Non-detect Observations. https://www.epa.gov/sites/production/files/2016-05/documents/proucl 5.1 user-guide.pdf. Accessed in October 2018.

- **Table 1 Summary of Detection Frequencies for Appendix III Parameters**
- Table 2 Shapiro-Wilk Test of Normality for Background
- **Table 3** Summary Statistics and Upper Prediction Limits
- **Table 4** Historical Downgradient Data for Constituent-Well Combinations Which Failed the Current Statistical Evaluation

ATTACHMENT A - ProUCL Outputs for Marquette Board of Light and Power Shiras Steam Plant

ATTACHMENT B – Time Series Graphs and Mann-Kendall trend tests for Appendix III Parameters

ATTACHMENT C - Up vs. Down Prediction Limits Graphs for Appendix III Parameters

ATTACHMENT D – False Positive and False Negative Rates for Current Upgradient vs Downgradient Monitoring Program

Tables

Table 1 - Summary of Detection Frequencies for Appendix III Parameters Marquette Board of Light and Power Shiras Steam Plant

Parameter	Detection frequency	MW-1	MW-2	MW-3	MW-4	MW-5
Boron, Total	n	10	10	10	10	10
	ND	8	10	10	8	10
	%ND	80%	100%	100%	80%	100%
Calcium, Total	n	10	10	10	10	10
	ND	0	0	0	0	0
	%ND	0%	0%	0%	0%	0%
Chloride	n	10	10	10	10	10
	ND	0	0	0	0	0
	%ND	0%	0%	0%	0%	0%
Fluoride	n	10	10	10	10	10
	ND	10	8	8	5	10
	%ND	100%	80%	80%	50%	100%
pH, Field	n	10	10	10	10	10
	ND	0	0	0	0	0
	%ND	0%	0%	0%	0%	0%
Sulfate	n	10	10	10	10	10
	ND	0	0	0	0	0
	%ND	0%	0%	0%	0%	0%
Total Dissolved Solids (TDS)	n	10	10	10	10	10
	ND	0	0	0	0	0
	%ND	0%	0%	0%	0%	0%

Notes:

n - sample size

ND - count of nondetect values in sample

%ND - percentage of nondetects in sample

Table 2 - Shapiro-Wilk Test of Normality for Background Marquette Board of Light and Power Shiras Steam Plant

Parameter	N (detects)	Detection Frequency	Test Value (W)	Log Test Value (Log _w)	Critical Value (0.05)	Limit Type
Boron, Total	2	0.100	-		-	Nonparametric
Calcium, Total	20	1.000	0.882	0.921	0.905	Lognormal
Chloride	20	1.000	0.825	0.839	0.905	Nonparametric
Fluoride	5	0.250	-	-	-	Nonparametric
pH, Field	20	1.000	0.927	0.914	0.905	Normal
Sulfate	20	1.000	0.770	0.786	0.905	Nonparametric
Total Dissolved Solids (TDS)	20	1.000	0.657	0.832	0.905	Nonparametric

Notes:

If detection frequency is < 0.500, nonparametric limit is used

If W< critical value, normal distribution is rejected

If Log_W< critical value, lognormal distribution is rejected

Table 3 - Summary Statistics and Upper Prediction Limits Marquette Board of Light and Power Shiras Steam Plant

Parameter	Units	Model Type	n	Detect	Х	S	Prediction Limit	¹ Confidence Level
Boron, Total	ug/L	Nonparametric	20	2	-	-	300	0.99
Calcium, Total	ug/L	Lognormal	20	20	11.61	0.141	159381	
Chloride	mg/L	Nonparametric	20	20	273	91.66	450	0.99
Fluoride	mg/L	Nonparametric	20	5	0.192	0.455	0.23	0.99
pH, Field	SU	Normal	20	20	7.543	0.275	6.82-8.26	
Sulfate	mg/L	Nonparametric	20	20	29.1	13.09	53	0.99
Total Dissolved Solids (TDS)	mg/L	Nonparametric	20	20	900	373.3	2300	0.99

Notes:

When the number of detect values was too low for statistical calculations, the lab specific detection limit was used as upper prediction limit for the parameter

Model type refers to type of prediction limit

For lognormal test, mean and standard deviation are in lognormal units and prediction limit in original units

All sample sizes and statistics are based on outlier free data

For nonparametric limits, median reporting limits are substituted for extreme reporting limit values.

¹- Confidence level for passing initial test or one verification resample at all downgradient wells for a single parameter (nonparametric test only)

Table 4 - Historical Downgraduent Data for Constituent-Well Combinations which Failed the Current Statistical Evaluation Marquette Board of Light and Power

Shiras Steam Plant

Parameter	Units	Sample Point	Date	Qualifier	Result	Prediction Limit	SSI
Boron	ug/L	MW-1	9/28/2017		530	300	>PL
Fluoride	mg/L	MW-1	7/19/2017	ND	0.38	0.23	>PL
Fluoride	mg/L	MW-1	7/24/2017	ND	0.38	0.23	>PL
Fluoride	mg/L	MW-2	7/19/2017	ND	0.38	0.23	>PL
Fluoride	mg/L	MW-2	7/24/2017	ND	0.38	0.23	>PL
pH-field	S.U.	MW-2	7/19/2017		8.41	8.259	>PL
Fluoride	mg/L	MW-3	7/19/2017	ND	0.38	0.23	>PL
Fluoride	mg/L	MW-3	7/24/2017	ND	0.38	0.23	>PL

Notes:

>PL - results exceeds prediction limit; significantly increased over background

ND = not detected, result = detection limit

Attachment A

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.110/25/2018 11:37:44 AM

From File WorkSheet.xls

Full Precision OFF

Dixon's Outlier Test for Bckgd-Result (calcium)

Number of Observations = 20

10% critical value: 0.401 5% critical value: 0.45 1% critical value: 0.535

1. Observation Value 160000 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.469

For 10% significance level, 160000 is an outlier. For 5% significance level, 160000 is an outlier. For 1% significance level, 160000 is not an outlier.

2. Observation Value 89000 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.171

For 10% significance level, 89000 is not an outlier. For 5% significance level, 89000 is not an outlier. For 1% significance level, 89000 is not an outlier.

Dixon's Outlier Test for Bckgd-Result (chloride)

Number of Observations = 20

10% critical value: 0.401 5% critical value: 0.45 1% critical value: 0.535

1. Observation Value 450 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.269

For 10% significance level, 450 is not an outlier. For 5% significance level, 450 is not an outlier. For 1% significance level, 450 is not an outlier.

2. Observation Value 190 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.000

For 10% significance level, 190 is not an outlier. For 5% significance level, 190 is not an outlier. For 1% significance level, 190 is not an outlier.

Dixon's Outlier Test for Bckgd-Result (fluoride)

Number of Observations = 5 10% critical value: 0.557 5% critical value: 0.642 1% critical value: 0.78

1. Observation Value 0.23 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.000

For 10% significance level, 0.23 is not an outlier. For 5% significance level, 0.23 is not an outlier. For 1% significance level, 0.23 is not an outlier.

2. Observation Value 0.12 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.545

For 10% significance level, 0.12 is not an outlier. For 5% significance level, 0.12 is not an outlier. For 1% significance level, 0.12 is not an outlier.

Dixon's Outlier Test for Bckgd-Result (ph-field)

Number of Observations = 20 10% critical value: 0.401 5% critical value: 0.45

1% critical value: 0.535

1. Observation Value 7.93 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.131

For 10% significance level, 7.93 is not an outlier. For 5% significance level, 7.93 is not an outlier. For 1% significance level, 7.93 is not an outlier.

2. Observation Value 6.76 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.514

For 10% significance level, 6.76 is an outlier. For 5% significance level, 6.76 is an outlier. For 1% significance level, 6.76 is not an outlier.

Dixon's Outlier Test for Bckgd-Result (sulfate)

Number of Observations = 20 10% critical value: 0.401 5% critical value: 0.45 1% critical value: 0.535

1. Observation Value 53 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.171

For 10% significance level, 53 is not an outlier. For 5% significance level, 53 is not an outlier. For 1% significance level, 53 is not an outlier.

2. Observation Value 18 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.000

For 10% significance level, 18 is not an outlier. For 5% significance level, 18 is not an outlier. For 1% significance level, 18 is not an outlier.

Dixon's Outlier Test for Bckgd-Result (total dissolved solids)

Number of Observations = 20 10% critical value: 0.401 5% critical value: 0.45

1% critical value: 0.535

1. Observation Value 2300 is a Potential Outlier (Upper Tail)?

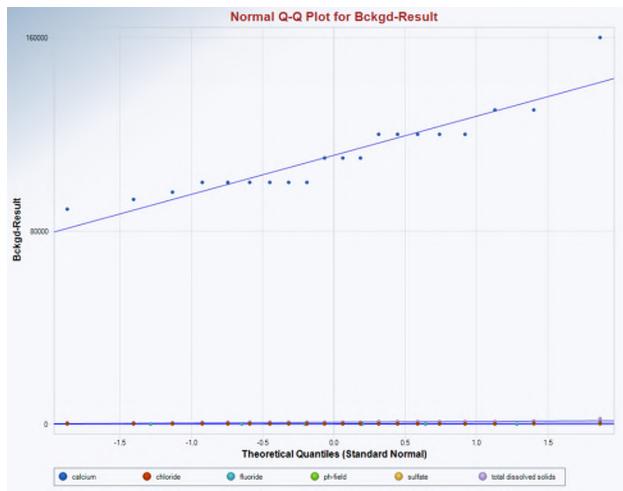
Test Statistic: 0.723

For 10% significance level, 2300 is an outlier. For 5% significance level, 2300 is an outlier. For 1% significance level, 2300 is an outlier.

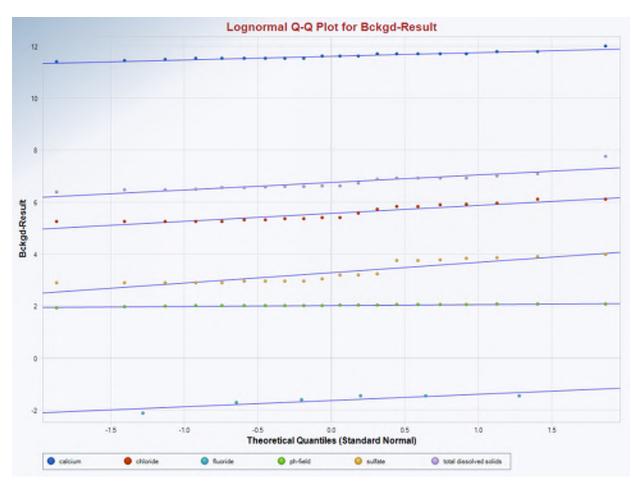
2. Observation Value 590 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.098

For 10% significance level, 590 is not an outlier. For 5% significance level, 590 is not an outlier. For 1% significance level, 590 is not an outlier.



Parameter	n	Mean	SD	Slope	Intercept	Correlation, R	Shapiro-Wilk test exact test statistic	Criticla value (0.05)	p-Value	Data Appear Normal?
Calcium	20	111400	16681	16168	111400	0.934	0.882	0.905	0.0184	NO
Chloride	20	273	91.66	87.32	273	0.918	0.825	0.905	0.00176	NO
Fluoride	5	0.192	0.0455	0.0472	0.192	0.939	0.805	0.762	N/A	YES
pH-field	20	7.543	0.275	0.274	7.543	0.958	0.927	0.905	0.135	YES
Sulfate	20	29.1	13.09	12.07	29.1	0.888	0.770	0.905	1.9303E-4	NO
Total Dissolved Solids	20	900	373.3	308.1	900	0.795	0.657	0.905	2.8432E-6	NO



Parameter	n	Mean	SD	Slope	Intercept	Correlation, R	Shapiro-Wilk test exact test statistic	Criticla value (0.05)	p-Value	Data Appear Lognormal?
Calcium	20	11.61	0.141	0.14	11.61	0.956	0.921	0.905	0.108	YES
Chloride	20	5.56	0.318	0.306	5.56	0.928	0.839	0.905	0.00334	NO
Fluoride	5	-1.677	0.269	0.271	-1.677	0.915	0.838	0.762	N/A	YES
pH-field	20	2.02	0.0372	0.0367	2.02	0.95	0.914	0.905	0.0745	YES
Sulfate	20	3.281	0.424	0.396	3.281	0.899	0.786	0.905	3.7159E-4	NO
Total Dissolved Solids	20	6.748	0.311	0.292	6.748	0.904	0.832	0.905	0.00202	NO

Background Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation ProUCL 5.110/25/2018 10:55:10 AM

From File WorkSheet.xls

Full Precision OFF

Confidence Coefficient 99%

Coverage 99%

New or Future K Observations 1

Number of Bootstrap Operations 2000

Bckgd-Result (calcium)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	8
Minimum	89000	First Quartile	100000
Second Largest	130000	Median	110000
Maximum	160000	Third Quartile	120000
Mean	111400	SD	16681
Coefficient of Variation	0.15	Skewness	1.27
Mean of logged Data	11.61	SD of logged Data	0.141

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL) 3.832 d2max (for USL) 2.884

Normal GOF Test

Shapiro Wilk Test Statistic	0.882	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.203	Lilliefors GOF Test
5% Lilliefors Critical Value	0.192	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

99% UTL with 99% Coverage 175321	90% Percentile (z) 132777
99% UPL (t) 154807	95% Percentile (z) 138838
99% USL 159505	99% Percentile (z) 150206

Gamma GOF Test

A-D Test Statistic	0.698	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.211	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.193	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	50.98	k star (bias corrected MLE)	43.37
Theta hat (MLE)	2185	Theta star (bias corrected MLE)	2569
nu hat (MLE)	2039	nu star (bias corrected)	1735
MLE Mean (bias corrected)	111400	MLE Sd (bias corrected)	16917

Background Statistics Assuming Gamma Distribution

99% Wilson Hilferty (WH) Approx. Gamma UPL 157525	90% Percentile 133555
99% Hawkins Wixley (HW) Approx. Gamma UPL 157953	95% Percentile 140607
99% WH Approx. Gamma UTL with 99% Coverage 183648	99% Percentile 154484
99% HW Approx. Gamma UTL with 99% Coverage 185003	
99% WH USL 163273	99% HW USL 163866

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.206	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.192	Data Not Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

90% Percentile (z) 13222	99% UTL with 99% Coverage 189657	99
95% Percentile (z) 13919	99% UPL (t) 159381	
99% Percentile (z) 15328	99% USL 165857	

Nonparametric Distribution Free Background Statistics Data appear Approximate Gamma Distribution at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	20	99% UTL with 99% Cove	age 160000	
Approx, f used to compute achieved CC	0.202	Approximate Actual Confidence Coefficient achieved by	UTL 0.18	2
		Approximate Sample Size needed to achieve specified	CC 461	
99% Percentile Bootstrap UTL with 99% Coverage	160000	99% BCA Bootstrap UTL with 99% Cove	age 160000	
99% UPL	160000	90% Perce	ntile 130000	
90% Chebyshev UPL	162679	95% Perce	ntile 131500	
95% Chebyshev UPL	185906	99% Perce	ntile 154300	
99% USL	160000			

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.

Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Bckgd-Result (chloride)

General Statistics

11	Number of Distinct Observations	20	Total Number of Observations
197.5	First Quartile	190	Minimum
220	Median	450	Second Largest
345	Third Quartile	450	Maximum
91.66	SD	273	Mean
0.765	Skewness	0.336	Coefficient of Variation
0.318	SD of logged Data	5.56	Mean of logged Data

Critical	Values for	Background	Threshold	Values ((BTVs)	
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Tolerance Factor K (For UTL) 3.832 d2n	x (for USL)) 2.884
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Shapiro Wilk Test Statistic	0.825	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.268	Lilliefors GOF Test
5% Lilliefors Critical Value	0.192	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

99% UTL with 99% Coverage	624.2	90% Percentile (z)	390.5
99% UPL (t)	511.5	95% Percentile (z)	423.8
99% USL	537.3	99% Percentile (z)	486.2

Gamma GOF Test

stic 1.366 Anderson-Darling Gamma G	OF Test
lue 0.742 Data Not Gamma Distributed at 5% \$	Significance Level
stic 0.262 Kolmogorov-Smirnov Gamma	GOF Test
lue 0.194 Data Not Gamma Distributed at 5% S	Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

8.71	k star (bias corrected MLE)	10.21	k hat (MLE)
31.34	Theta star (bias corrected MLE)	26.74	Theta hat (MLE)
348.4	nu star (bias corrected)	408.3	nu hat (MLE)
92.5	MLE Sd (bias corrected)	273	MLE Mean (bias corrected)

Background Statistics Assuming Gamma Distribution

99% Wilson Hilferty (WH) Approx. Gamma UPL	556.2	90% Percentile	396.2
99% Hawkins Wixley (HW) Approx. Gamma UPL	564.2	95% Percentile	440.8
99% WH Approx. Gamma UTL with 99% Coverage	748.3	99% Percentile	532.8
99% HW Approx. Gamma UTL with 99% Coverage	773.7		
99% WH USL	596.9	99% HW USL	607.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.839	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.249	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.192	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

99% UTL with 99% Coverage	877.4	90% Percentile (z)	390.3
99% UPL (t)	593.7	95% Percentile (z)	438
99% USL	649.2	99% Percentile (z)	543.9

Nonparametric Distribution Free Background Statistics Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	20	99% UTL with 99% Coverage	450
Approx, f used to compute achieved CC	0.202	Approximate Actual Confidence Coefficient achieved by UTL	0.182
		Approximate Sample Size needed to achieve specified CC	461
99% Percentile Bootstrap UTL with 99% Coverage	450	99% BCA Bootstrap UTL with 99% Coverage	450
99% UPL	450	90% Percentile	387
90% Chebyshev UPL	554.8	95% Percentile	450
95% Chebyshev UPL	682.4	99% Percentile	450
99% USL	450		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Bckgd-Result (fluoride)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	4
Minimum	0.12	First Quartile	0.18
Second Largest	0.23	Median	0.2
Maximum	0.23	Third Quartile	0.23
Mean	0.192	SD	0.0455
Coefficient of Variation	0.237	Skewness	-1.171
Mean of logged Data	-1.677	SD of logged Data	0.269

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL) 4.203 d2max (for USL) 1.671

Normal GOF Test

Shapiro Wilk GOF Test	0.876	Shapiro Wilk Test Statistic
Data appear Normal at 5% Significance Le	0.762	5% Shapiro Wilk Critical Value
Lilliefors GOF Test	0.202	Lilliefors Test Statistic
Data appear Normal at 5% Significance Lo	0.343	5% Lilliefors Critical Value

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

99% UTL with 99% Coverage	0.383	90% Percentile (z)	0.25
99% UPL (t)	0.298	95% Percentile (z)	0.267
99% USL	0.268	99% Percentile (z)	0.298

Gamma GOF Test

Anderson-Darling Gamma GOF Test	0.452	A-D Test Statistic
Detected data appear Gamma Distributed at 5% Significance Level	0.679	5% A-D Critical Value
Kolmogorov-Smirnov Gamma GOF Test	0.22	K-S Test Statistic
Detected data appear Gamma Distributed at 5% Significance Level	0.357	5% K-S Critical Value

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

7.744	k star (bias corrected MLE)	19.03	k hat (MLE)
0.0248	Theta star (bias corrected MLE)	0.0101	Theta hat (MLE)
77.44	nu star (bias corrected)	190.3	nu hat (MLE)
0.069	MLE Sd (bias corrected)	0.192	MLE Mean (bias corrected)

Background Statistics Assuming Gamma Distribution

99% Wilson Hilferty (WH) Approx. Gamma UPL	0.327	90% Percentile	0.284
99% Hawkins Wixley (HW) Approx. Gamma UPL	0.332	95% Percentile	0.318
99% WH Approx. Gamma UTL with 99% Coverage	0.476	99% Percentile	0.388
99% HW Approx. Gamma UTL with 99% Coverage	0.496		
99% WH USL	0.282	99% HW USL	0.285

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.838	Shapiro Wilk Lognormal GOF Test		
5% Shapiro Wilk Critical Value	0.762	Data Not Lognormal at 5% Significance Leve		
Lilliefors Test Statistic	0.244	Lilliefors Lognormal GOF Test		
5% Lilliefors Critical Value	0.343	Data appear Lognormal at 5% Significance Level		

Data appear Approximate Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

99% UTL with 99% Coverage	0.578	90% Percentile (z)	0.264
99% UPL (t)	0.35	95% Percentile (z)	0.291
99% USL	0.293	99% Percentile (z)	0.349

Nonparametric Distribution Free Background Statistics Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	5	99% UTL with 99% Coverage	0.23
Approx, f used to compute achieved CC	0.263	Approximate Actual Confidence Coefficient achieved by UTL	0.226
		Approximate Sample Size needed to achieve specified CC	59
99% Percentile Bootstrap UTL with 99% Coverage	0.23	99% BCA Bootstrap UTL with 99% Coverage	0.23
99% UPL	0.23	90% Percentile	0.23
90% Chebyshev UPL	0.342	95% Percentile	0.23
95% Chebyshev UPL	0.409	99% Percentile	0.23
99% USL	0.23		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Bckgd-Result (ph-field)

General Statistics

19	Number of Distinct Observations	20	Total Number of Observations
7.44	First Quartile	n 6.	Minimum
7.525	Median	7.	Second Largest
7.743	Third Quartile	n 7.	Maximum
0.275	SD	ı 7.	Mean
-1.066	Skewness	0.0	Coefficient of Variation
0.0372	SD of logged Data	2.	Mean of logged Data

Critical V	alues for	Background	Threshold i	Values ((BTVs)
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Shapiro Wilk Test Statistic	0.927	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.118	Lilliefors GOF Test
5% Lilliefors Critical Value	0.192	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

99% UTL with 99% Coverage	8.597	90% Percentile (z)	7.895
99% UPL (t)	8.259	95% Percentile (z)	7.995
99% USL	8.336	99% Percentile (z)	8.183

Gamma GOF Test

A-D Test Statistic	0.418	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.12	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.193	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

655.8	k star (bias corrected MLE)	771.5	k hat (MLE)
0.0115	Theta star (bias corrected MLE)	0.00978	Theta hat (MLE)
26233	nu star (bias corrected)	30861	nu hat (MLE)
0.295	MLE Sd (bias corrected)	7.543	MLE Mean (bias corrected)

Background Statistics Assuming Gamma Distribution

99% Wilson Hilferty (WH) Approx. Gamma UPL	8.288	90% Percentile	7.923
99% Hawkins Wixley (HW) Approx. Gamma UPL	8.292	95% Percentile	8.034
99% WH Approx. Gamma UTL with 99% Coverage	8.658	99% Percentile	8.245
99% HW Approx. Gamma UTL with 99% Coverage	8.667		
99% WH USL	8.372	99% HW USL	8.377

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.914	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.126	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.192	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

99% UTL with 99% Coverage	8.693	90% Percentile (z)	7.906
99% UPL (t)	8.304	95% Percentile (z)	8.014
99% USL	8.392	99% Percentile (z)	8.219

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	20	99% UTL with 99% Coverage	7.93
Approx, f used to compute achieved CC	0.202	Approximate Actual Confidence Coefficient achieved by UTL	0.182
		Approximate Sample Size needed to achieve specified CC	461
99% Percentile Bootstrap UTL with 99% Coverage	7.93	99% BCA Bootstrap UTL with 99% Coverage	7.93
99% UPL	7.93	90% Percentile	7.857
90% Chebyshev UPL	8.389	95% Percentile	7.921
95% Chebyshev UPL	8.772	99% Percentile	7.928
99% USL	7.93		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.

Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

LPL is not calculated at ProUCL, but utilizing the equivalent formula for 99% UPL (t), the 99% LPL (t) 6.819642

Predicition limit Formula: $\overline{X}_n \pm T_a s_n \sqrt{1 + (1/n)}$

Bckgd-Result (sulfate)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	11
Minimum	18	First Quartile	18.75
Second Largest	49	Median	22.5
Maximum	53	Third Quartile	42.25
Mean	29.1	SD	13.09
Coefficient of Variation	0.45	Skewness	0.71
Mean of logged Data	3.281	SD of logged Data	0.424
Critical Values for	Background Threshold Values (BTV	s)	
Tolerance Factor K (For UTL)	3.832	d2max (for USL)	2.884

Normal GOF Test

Shapiro Wilk Test Statistic	0.77	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.273	Lilliefors GOF Test
5% Lilliefors Critical Value	0.192	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

99% UTL with 99% Coverage	79.28	90% Percentile (z)	45.88
99% UPL (t)	63.17	95% Percentile (z)	50.64
99% USL	66.86	99% Percentile (z)	59.56

Gamma GOF Test

1.985 Anderson-Darling Gamma GOF Test	1.985	A-D Test Statistic
0.745 Data Not Gamma Distributed at 5% Significance Level	0.745	5% A-D Critical Value
0.241 Kolmogorov-Smirnov Gamma GOF Test	0.241	K-S Test Statistic
0.194 Data Not Gamma Distributed at 5% Significance Leve	0.194	5% K-S Critical Value

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

4.924	k star (bias corrected MLE)	5.754	k hat (MLE)
5.91	Theta star (bias corrected MLE)	5.058	Theta hat (MLE)
197	nu star (bias corrected)	230.1	nu hat (MLE)
13.11	MLE Sd (bias corrected)	29.1	MLE Mean (bias corrected)

Background Statistics Assuming Gamma Distribution

99% Wilson Hilferty (WH) Approx. Gamma UPL	71.89	90% Percentile	46.66
99% Hawkins Wixley (HW) Approx. Gamma UPL	73.6	95% Percentile	53.48
99% WH Approx. Gamma UTL with 99% Coverage	103.7	99% Percentile	67.89
99% HW Approx. Gamma UTL with 99% Coverage	109.4		
99% WH USL	78.51	99% HW USL	80.87

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.786	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.237	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.192	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

99% UTL with 99% Coverage	135.1	90% Percentile (z)	45.82
99% UPL (t)	80.22	95% Percentile (z)	53.46
99% USI	90.4	99% Percentile (z)	71.37

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	20	99% UTL with 99% Coverage	53
Approx, f used to compute achieved CC	0.202	Approximate Actual Confidence Coefficient achieved by UTL	0.182
		Approximate Sample Size needed to achieve specified CC	461
99% Percentile Bootstrap UTL with 99% Coverage	53	99% BCA Bootstrap UTL with 99% Coverage	53
99% UPL	53	90% Percentile	47.2
90% Chebyshev UPL	69.35	95% Percentile	49.2
95% Chebyshev UPL	87.59	99% Percentile	52.24
99% USL	53		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Bckgd-Result (total dissolved solids)

General Statistics

14	Number of Distinct Observations	20	Total Number of Observations
700	First Quartile	590	Minimum
745	Median	1200	Second Largest
1000	Third Quartile	2300	Maximum
373.3	SD	900	Mean
2.997	Skewness	0.415	Coefficient of Variation
0.311	SD of logged Data	6.748	Mean of logged Data

Critical V	alues for	Background	Threshold i	Values ((BTVs)
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Tolerance Factor K (For UTL) 3.832 d2n	x (for USL)) 2.884
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Vormal	GOF	Test
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Shapiro Wilk Test Statistic	0.657	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.244	Lilliefors GOF Test
5% Lilliefors Critical Value	0.192	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

99% UTL with 99% Coverage	2330	90% Percentile (z)	1378
99% UPL (t)	1871	95% Percentile (z)	1514
99% USL	1976	99% Percentile (z)	1768

Gamma GOF Test

Anderson-Darling Gamma GOF Test	1.272	A-D Test Statistic
Data Not Gamma Distributed at 5% Significance Leve	0.742	5% A-D Critical Value
Kolmogorov-Smirnov Gamma GOF Test	0.216	K-S Test Statistic
Data Not Gamma Distributed at 5% Significance Leve	0.194	5% K-S Critical Value

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.297	k star (bias corrected MLE)	7.936
Theta hat (MLE)	96.8	Theta star (bias corrected MLE)	113.4
nu hat (MLE)	371.9	nu star (bias corrected)	317.4
MLE Mean (bias corrected)	900	MLE Sd (bias corrected)	319.5

Background Statistics Assuming Gamma Distribution

99% Wilson Hilferty (WH) Approx. Gamma UPL	1879	90% Percentile	1326
99% Hawkins Wixley (HW) Approx. Gamma UPL	1886	95% Percentile	1482
99% WH Approx. Gamma UTL with 99% Coverage	2554	99% Percentile	1804
99% HW Approx. Gamma UTL with 99% Coverage	2604		
99% WH USL	2022	99% HW USL	2035

Lognormal GOF Test

Shapiro Wilk Lognormal GOF Test	0.832	Shapiro Wilk Test Statistic
Data Not Lognormal at 5% Significance Leve	0.905	5% Shapiro Wilk Critical Value
Lilliefors Lognormal GOF Test	0.209	Lilliefors Test Statistic
Data Not Lognormal at 5% Significance Leve	0.192	5% Lilliefors Critical Value

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

99% UTL with 99% Coverage	2810	90% Percentile (z)	1270
99% UPL (t)	1916	95% Percentile (z)	1422
99% USL	2092	99% Percentile (z)	1758

Nonparametric Distribution Free Background Statistics Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

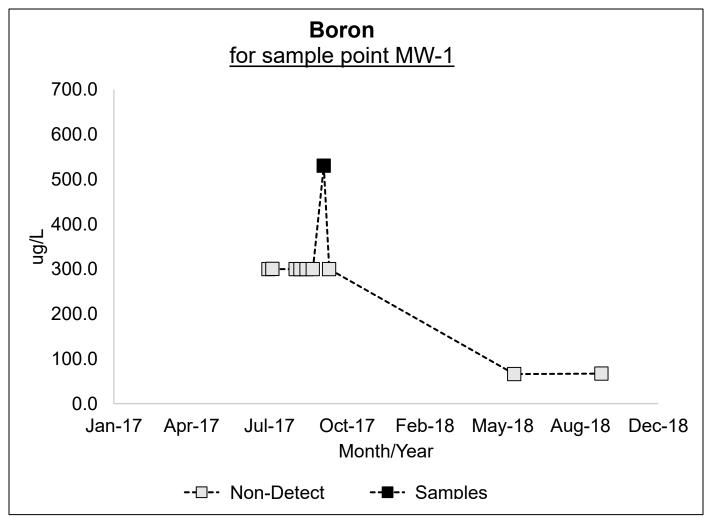
Order of Statistic, r	20	99% UTL with 99% Coverage	2300
Approx, f used to compute achieved CC	0.202	Approximate Actual Confidence Coefficient achieved by UTL	0.182
		Approximate Sample Size needed to achieve specified CC	461
99% Percentile Bootstrap UTL with 99% Coverage	2300	99% BCA Bootstrap UTL with 99% Coverage	2300
99% UPL	2300	90% Percentile	1110
90% Chebyshev UPL	2047	95% Percentile	1255
95% Chebyshev UPL	2567	99% Percentile	2091
99% USL	2300		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.

Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

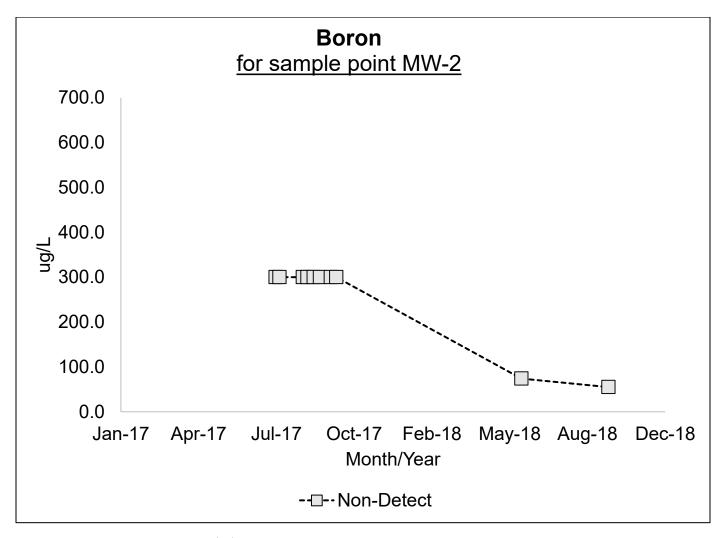
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Attachment B

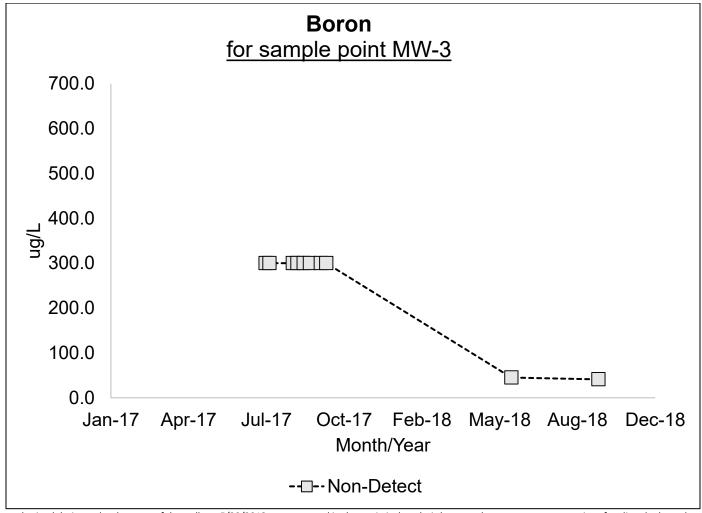


^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

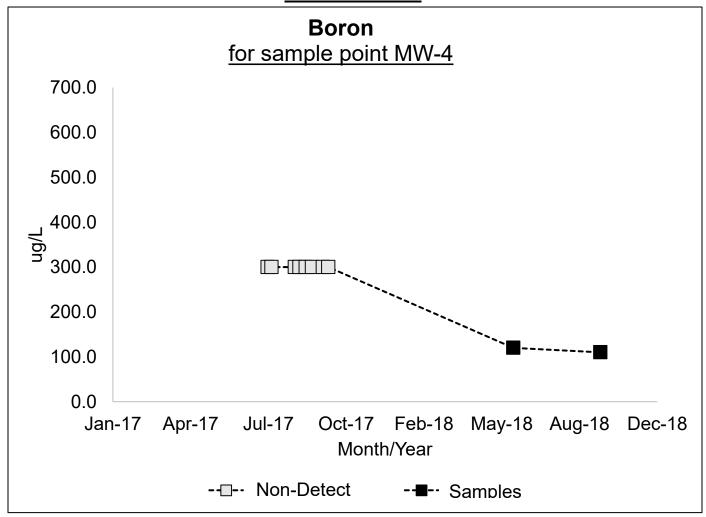
Graph 1



^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

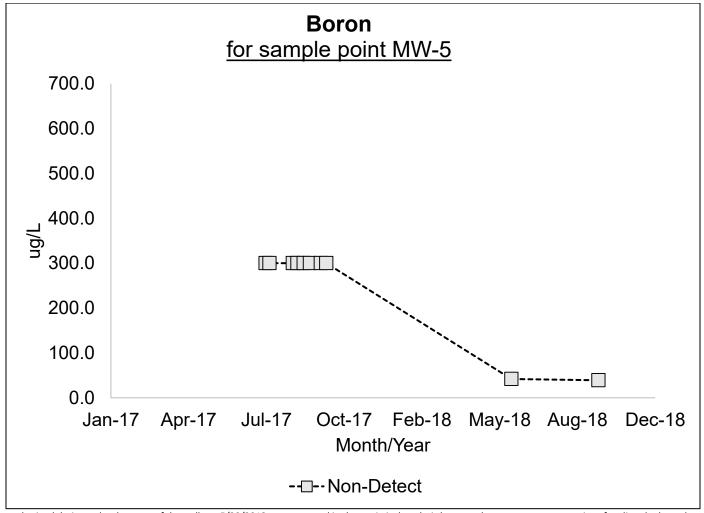


^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

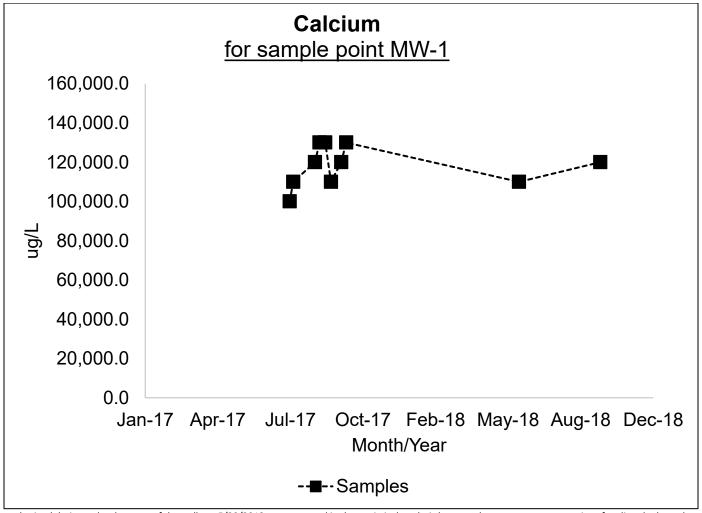


^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

Graph 4

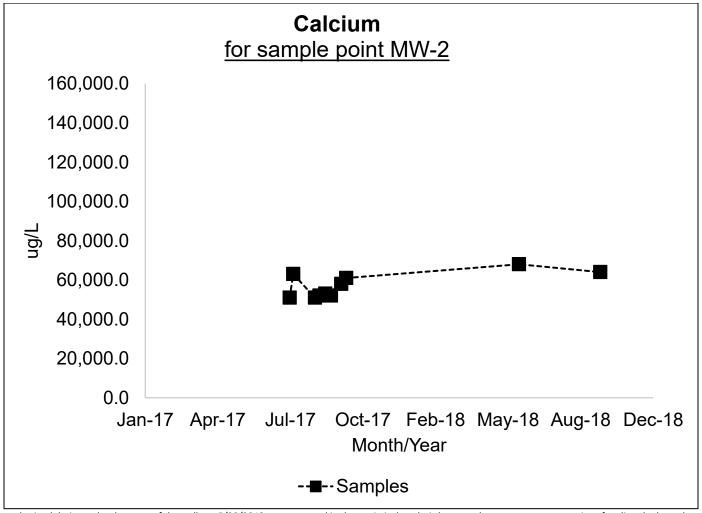


^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

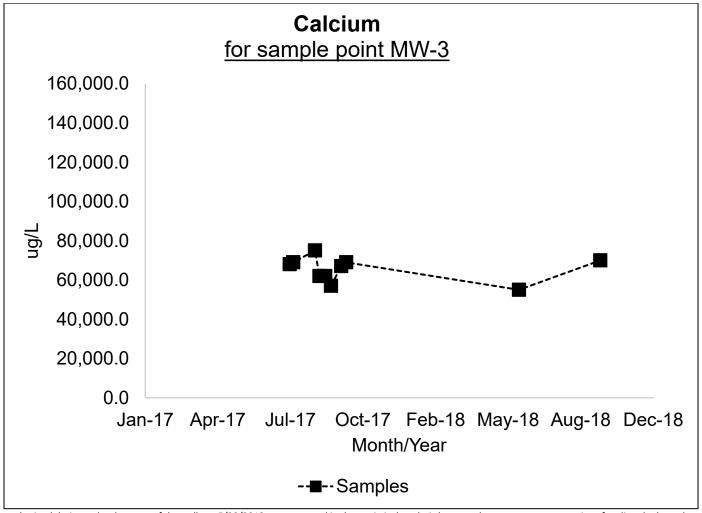


^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

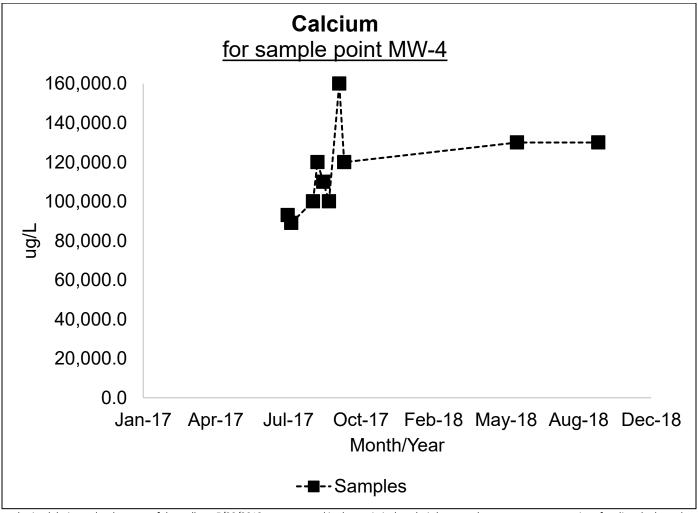
Graph 6



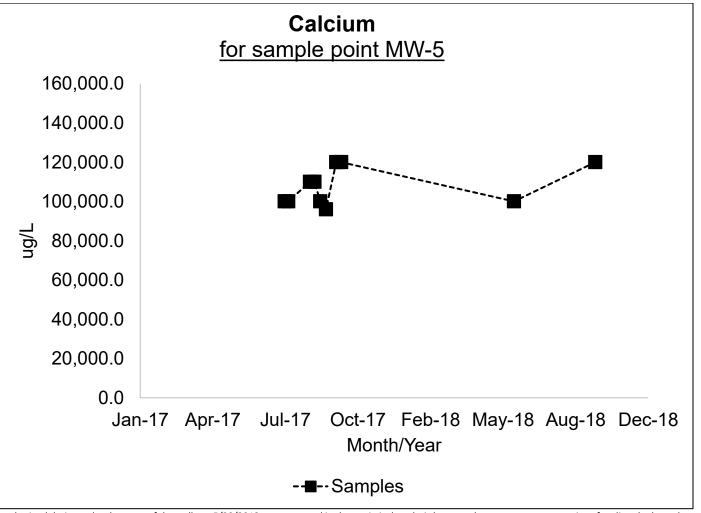
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



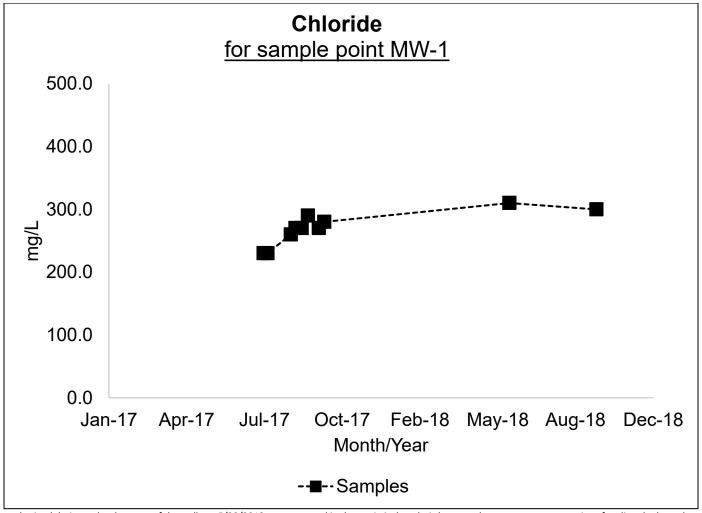
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



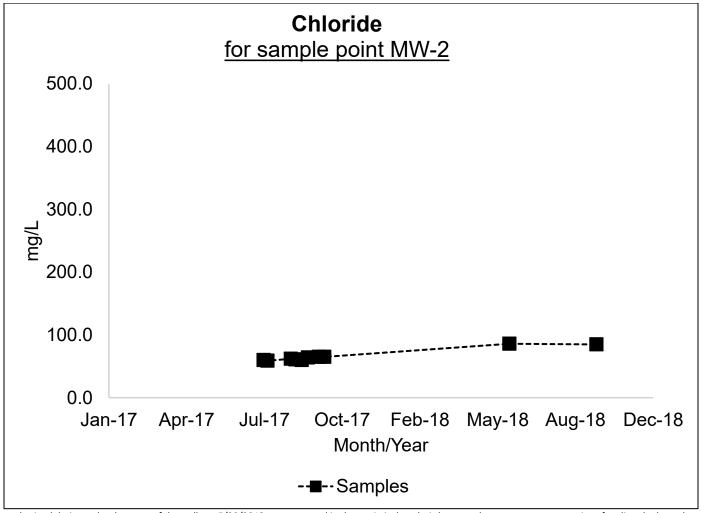
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



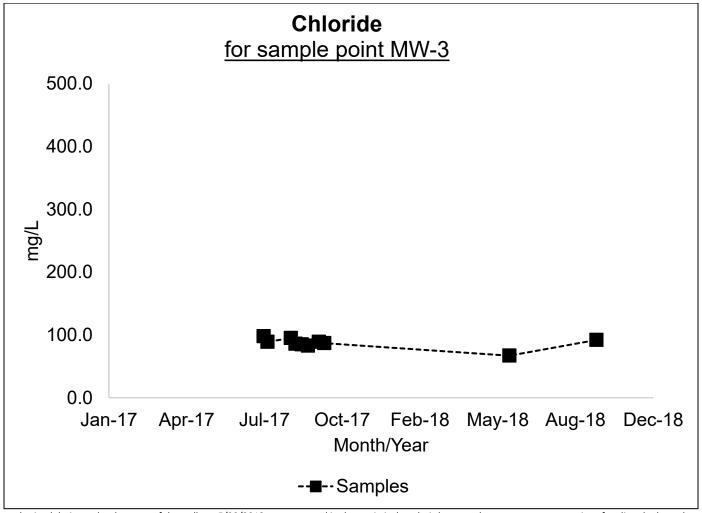
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



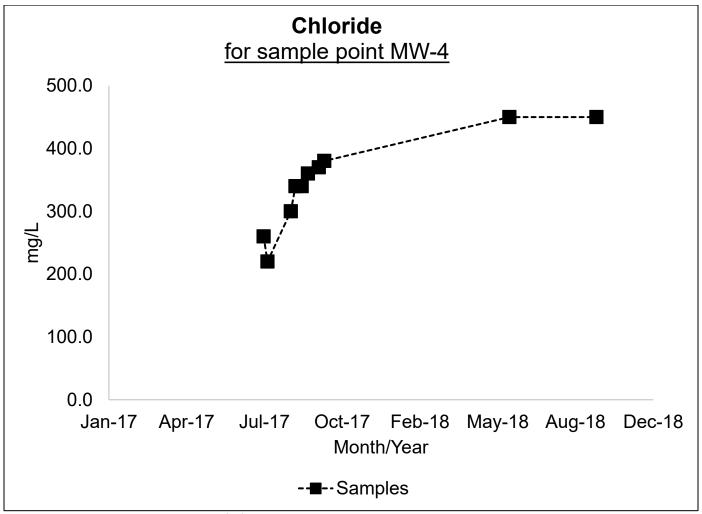
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



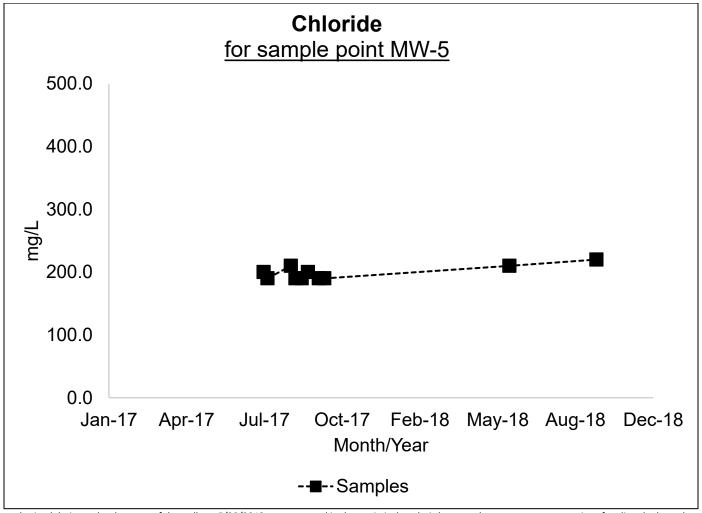
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



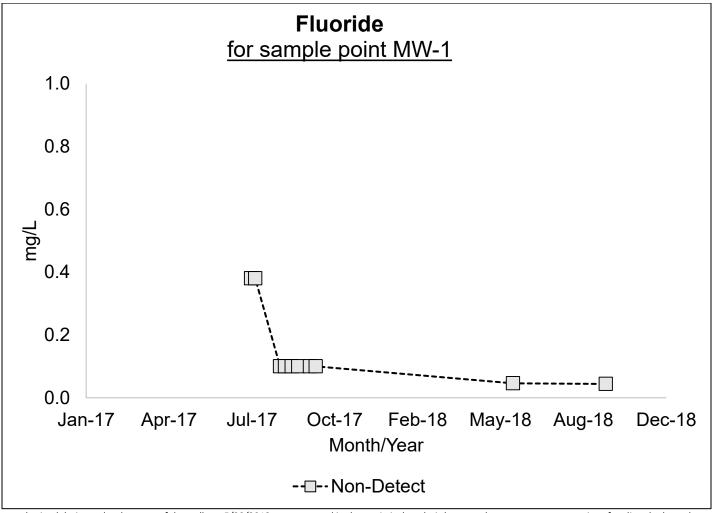
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



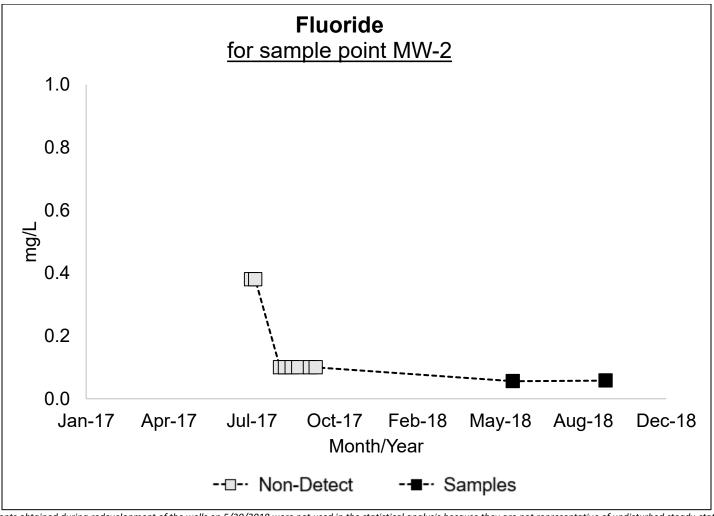
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



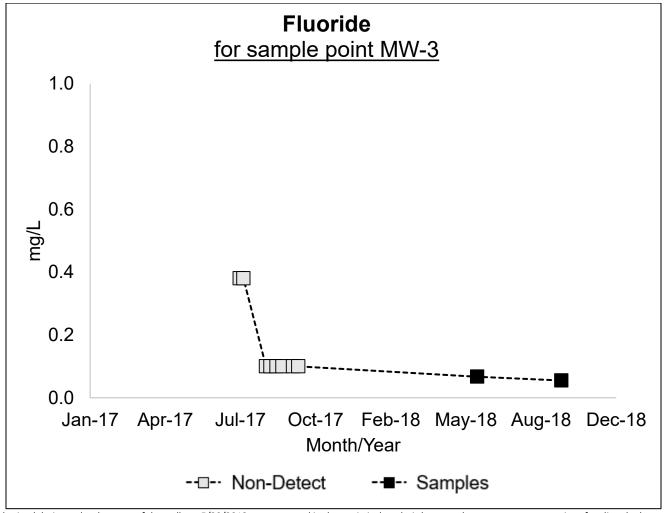
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



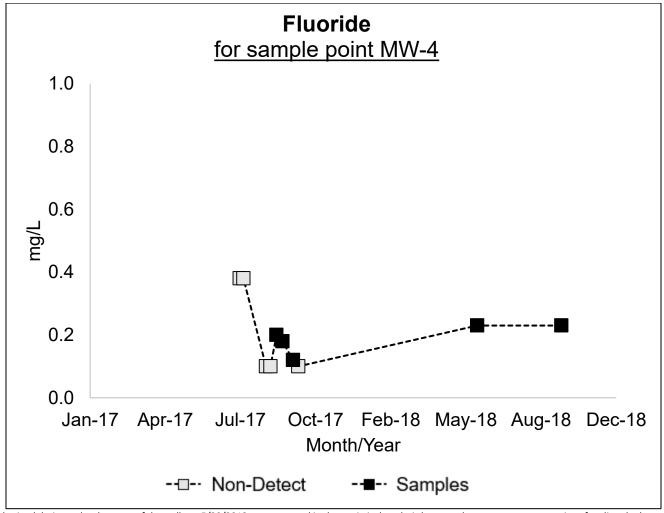
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



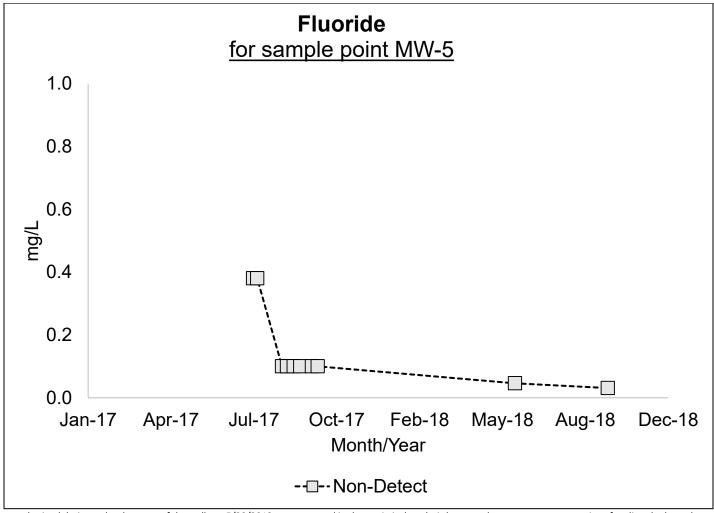
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



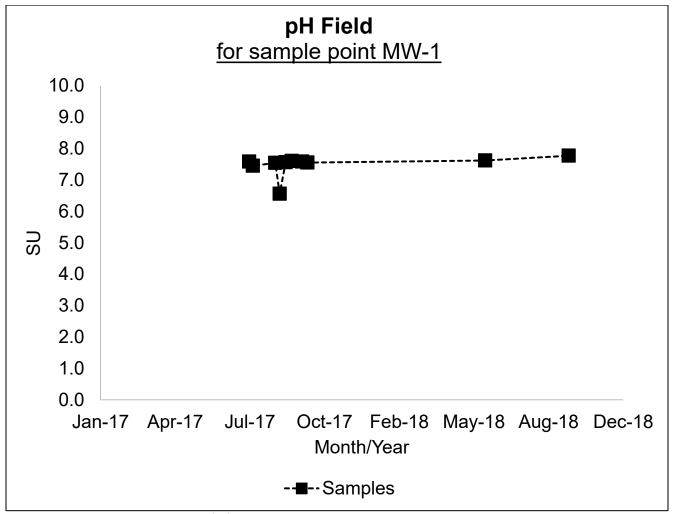
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



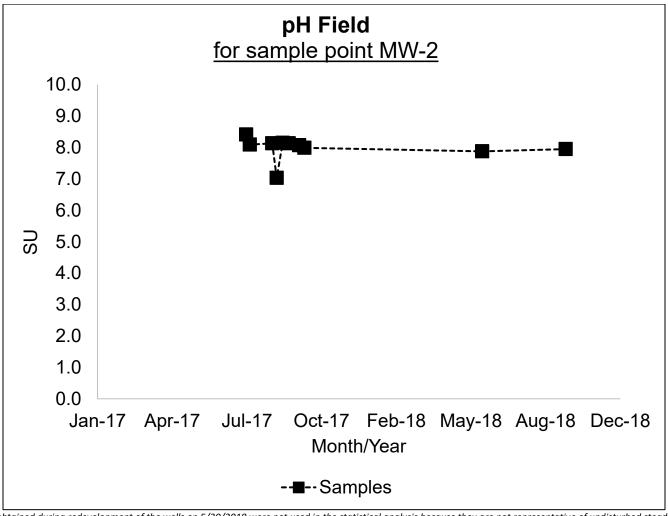
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



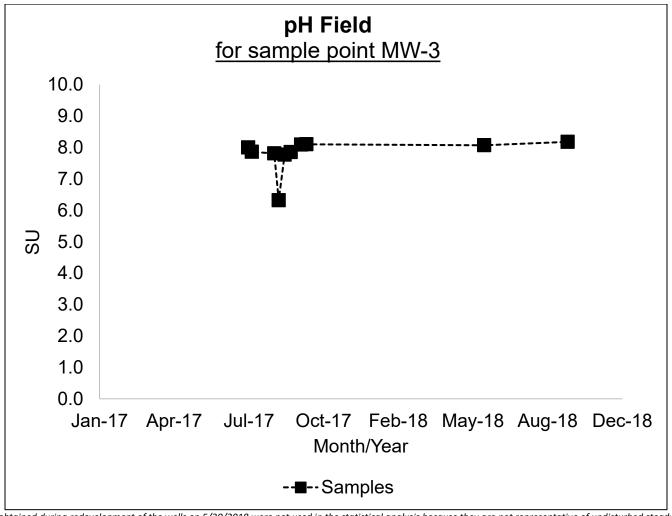
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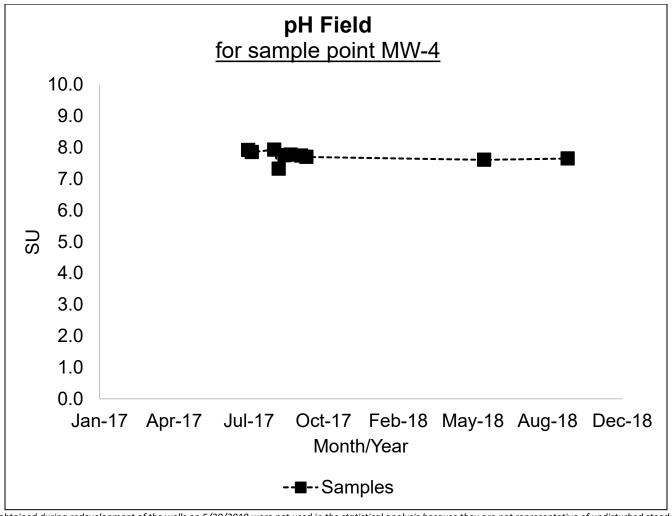
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



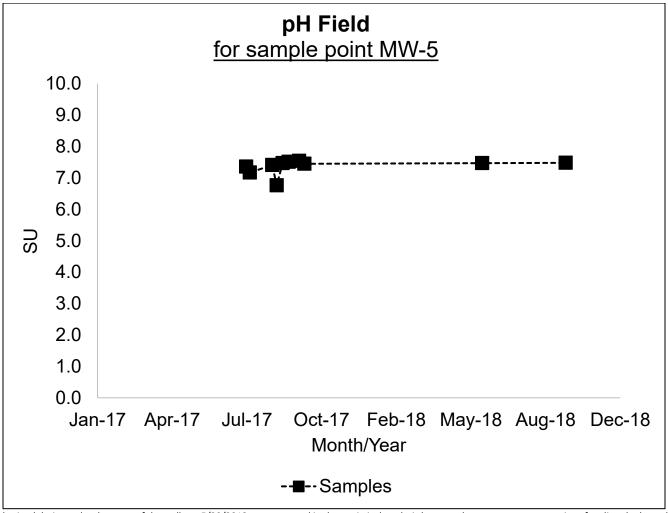
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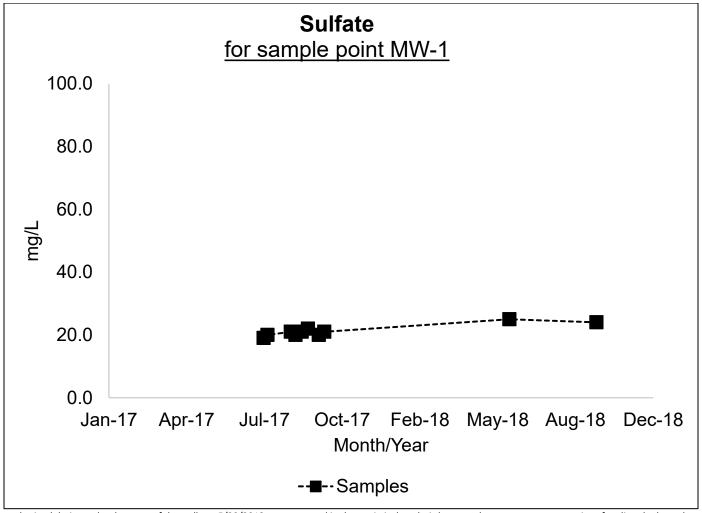
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



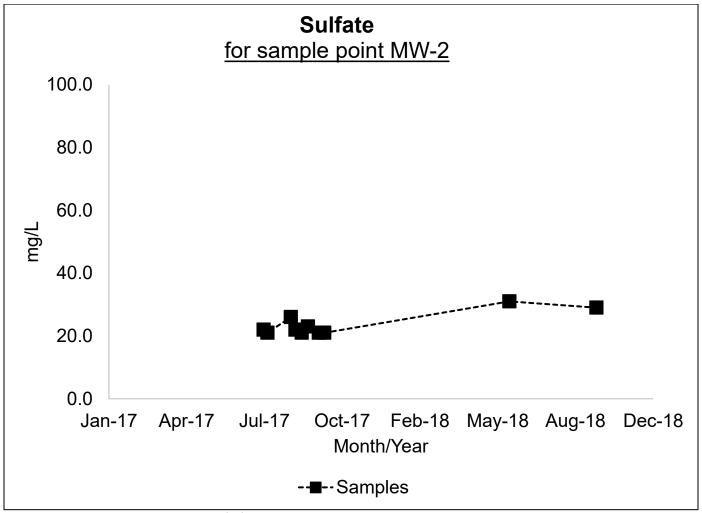
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



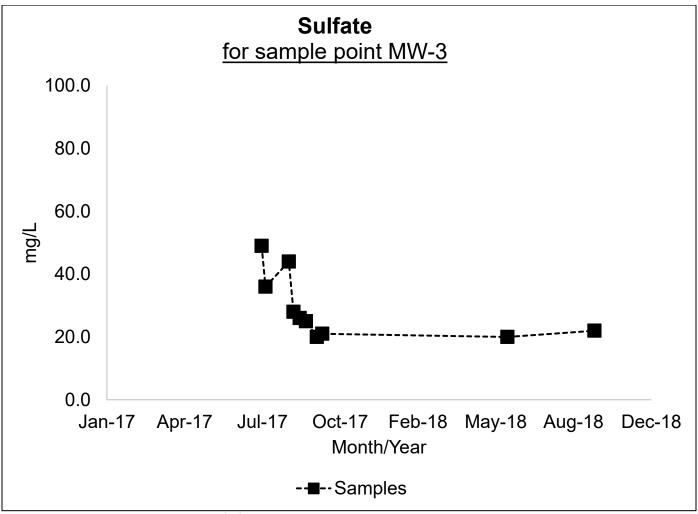
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



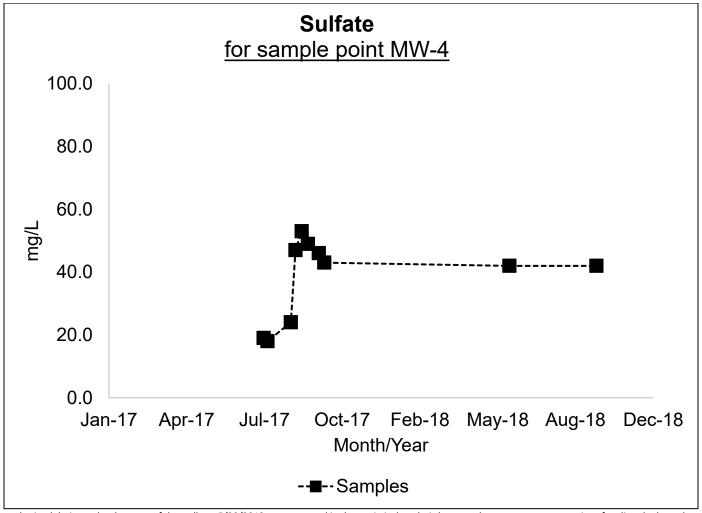
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



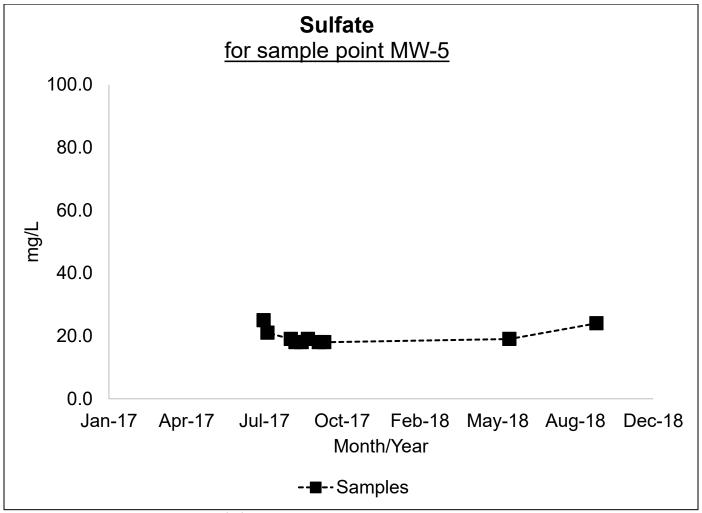
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



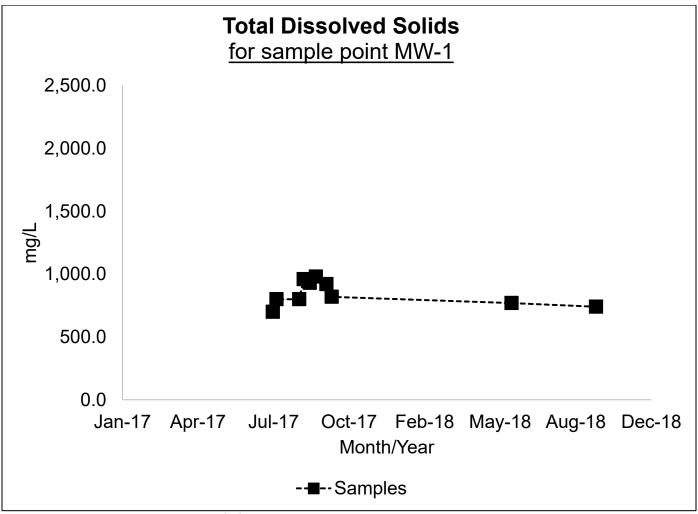
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



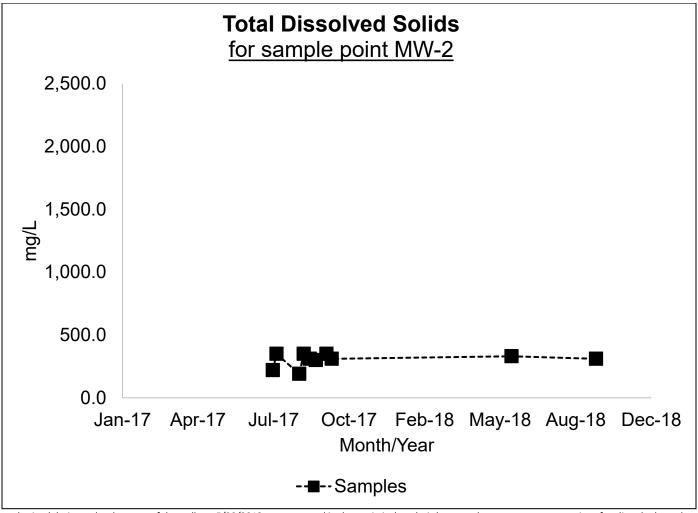
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



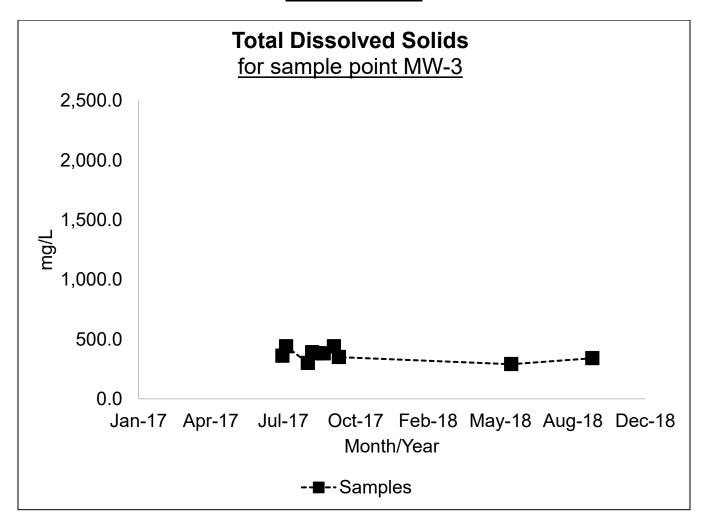
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



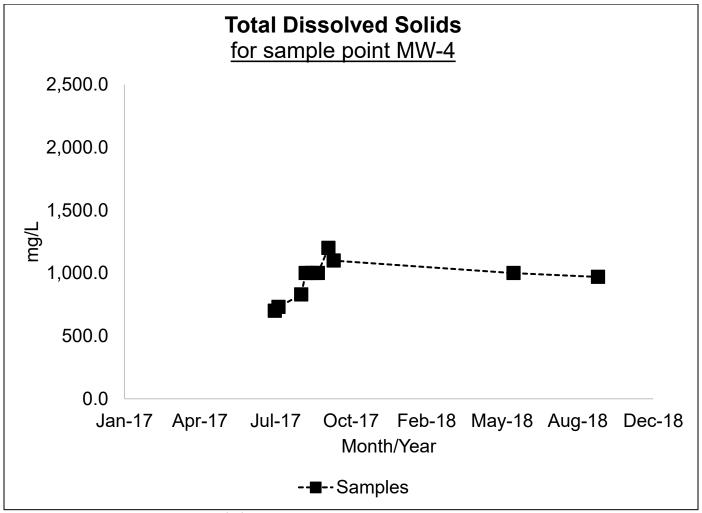
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



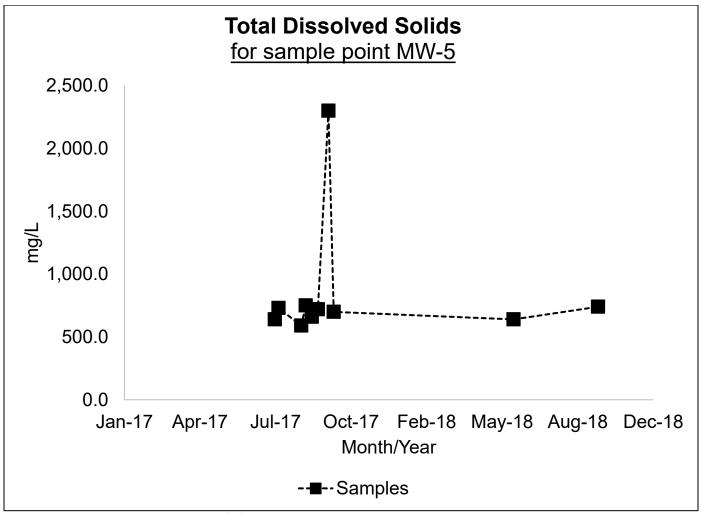
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

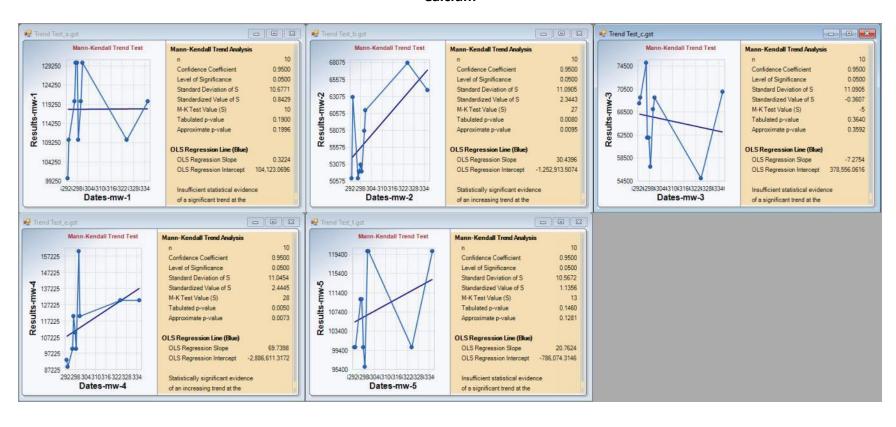


^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

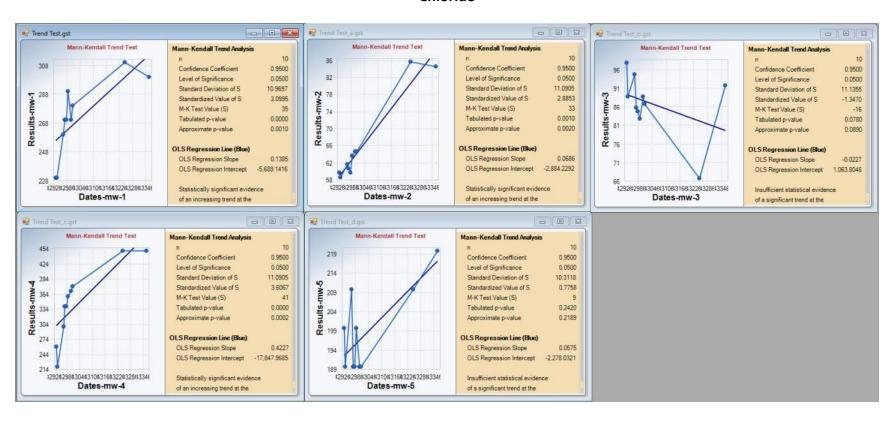


^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions

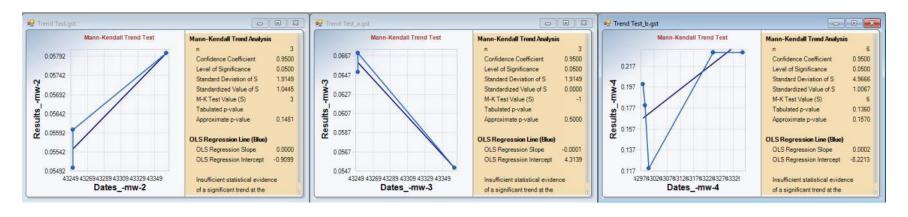
Calcium



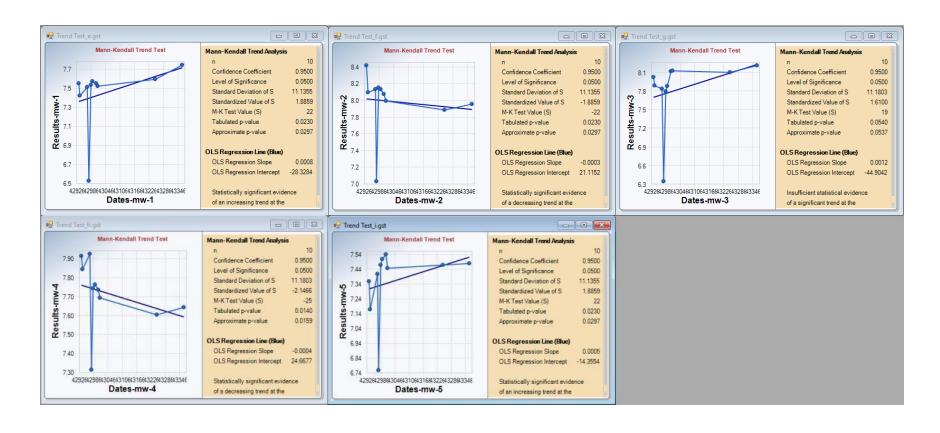
Chloride



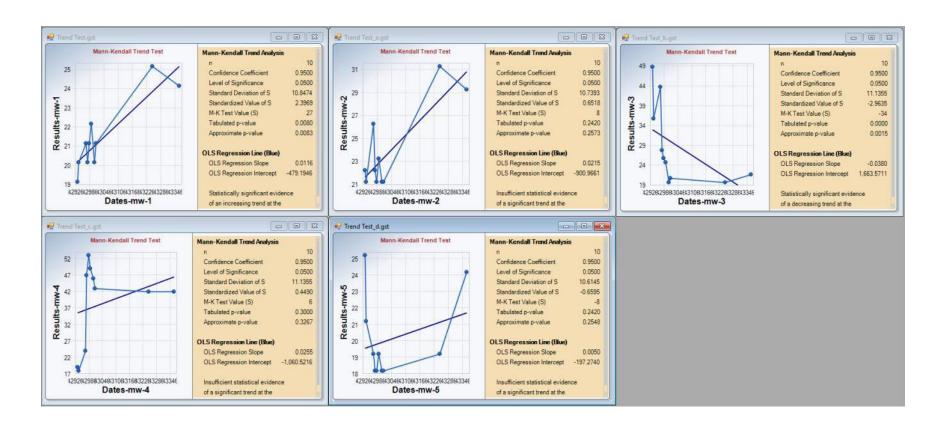
Fluoride



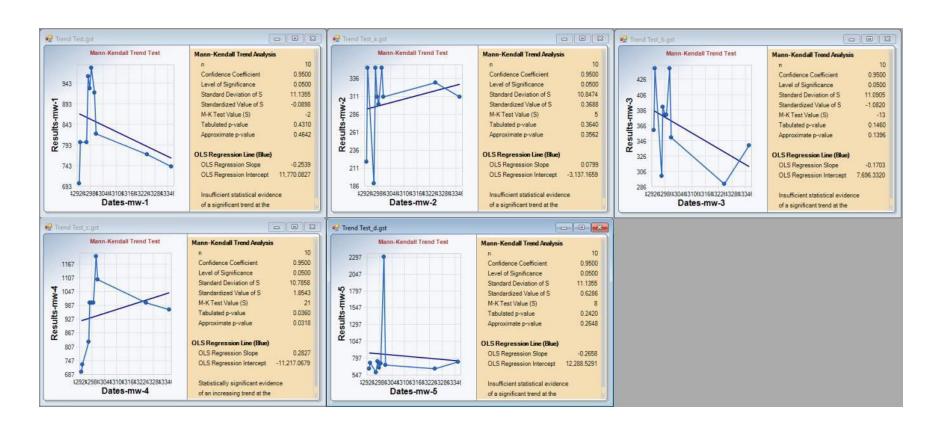
pH-Field



Sulfate



Total Dissolved Solids



Mann-Kendall Trend Test Analysis

User Selected Options

Date/Time of Computation ProUCL 5.110/29/2018 3:21:17 PM

From File WorkSheet.xls

Full Precision OFF
Confidence Coefficient 0.95
Level of Significance 0.05

Results-mw-1

General Statistics

Number of Events Reported (m) 10
Number of Missing Events 0
Number or Reported Events Used 10
Number Values Reported (n) 10

Minimum 100000

Maximum 130000

Mean 118000

Geometric Mean 117586

Median 120000

Standard Deviation 10328

Coefficient of Variation 0.0875

Mann-Kendall Test

M-K Test Value (S) 10
Tabulated p-value 0.19
Standard Deviation of S 10.68
Standardized Value of S 0.843
Approximate p-value 0.2

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-2

General Statistics

Number of Events Reported (m)

Number of Missing Events

0

Number or Reported Events Used

10

Number Values Reported (n)

Minimum

51000

Maximum

68000

Mean 57300

Geometric Mean 56993

Median 55500

Standard Deviation 6325 Coefficient of Variation 0.11

Mann-Kendall Test

M-K Test Value (S) 27
Tabulated p-value 0.008
Standard Deviation of S 11.09
Standardized Value of S 2.344
Approximate p-value 0.00953

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-3

General Statistics

Number of Events Reported (m) 10 Number of Missing Events 0 Number or Reported Events Used 10 Number Values Reported (n) 10 Minimum 55000 Maximum 75000 Mean 65400 Geometric Mean 65125 Median 67500 Standard Deviation 6240 Coefficient of Variation 0.0954

Mann-Kendall Test

M-K Test Value (S) -5
Tabulated p-value 0.364
Standard Deviation of S 11.09
Standardized Value of S -0.361
Approximate p-value 0.359

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-4

General Statistics

Number of Events Reported (m) 10
Number of Missing Events 0
Number or Reported Events Used 10
Number Values Reported (n) 10
Minimum 89000
Maximum 160000
Mean 115200
Geometric Mean 113492
Median 115000
Standard Deviation 21498

Coefficient of Variation

0.187

Mann-Kendall Test

M-K Test Value (S) 28
Tabulated p-value 0.005
Standard Deviation of S 11.05
Standardized Value of S 2.444
Approximate p-value 0.00725

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-5

General Statistics

Number of Events Reported (m) 10
Number of Missing Events 0
Number or Reported Events Used 10
Number Values Reported (n) 10
Minimum 96000
Maximum 120000
Mean 107600
Geometric Mean 107216
Median 105000

Standard Deviation 9652

Coefficient of Variation 0.0897

Mann-Kendall Test

M-K Test Value (S) 13
Tabulated p-value 0.146
Standard Deviation of S 10.57
Standardized Value of S 1.136
Approximate p-value 0.128

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options

Date/Time of Computation ProUCL 5.110/29/2018 3:30:39 PM

From File WorkSheet.xls

Full Precision OFF

Confidence Coefficient 0.95 Level of Significance 0.05

Results-mw-1

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 Minimum 230 Maximum 310 Mean 271 Geometric Mean 269.8 Median 270

Standard Deviation

Coefficient of Variation

26.44

0.0976

Mann-Kendall Test

M-K Test Value (S) 35
Tabulated p-value 0
Standard Deviation of S 10.97
Standardized Value of S 3.099
Approximate p-value 9.6937E-4

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-2

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 Minimum 59 Maximum 86 Mean 66.7 Geometric Mean 66.08 Median 63 Standard Deviation 10.13

Coefficient of Variation

0.152

Mann-Kendall Test

M-K Test Value (S) 33
Tabulated p-value 0.001
Standard Deviation of S 11.09
Standardized Value of S 2.885
Approximate p-value 0.00195

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-3

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 67 Minimum Maximum 98 Mean 87.1 Geometric Mean 86.7 Median 88 Standard Deviation 8.425 Coefficient of Variation 0.0967

Mann-Kendall Test

M-K Test Value (S) -16
Tabulated p-value 0.078
Standard Deviation of S 11.14
Standardized Value of S -1.347
Approximate p-value 0.089

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-4

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 220 Minimum 450 Maximum Mean 347 Geometric Mean 339.5 Median 350 Standard Deviation 73.79 Coefficient of Variation 0.213

Mann-Kendall Test

M-K Test Value (S) 41
Tabulated p-value 0
Standard Deviation of S 11.09
Standardized Value of S 3.607
Approximate p-value 1.5507E-4

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-5

General Statistics

ed (m) 10	Number of Events Reported (m)
vents 0	Number of Missing Events
Used 10	Number or Reported Events Used
ed (n) 10	Number Values Reported (n)
imum 190	Minimum
imum 220	Maximum
Mean 199	Mean
Mean 198.7	Geometric Mean
edian 195	Median
riation 11.01	Standard Deviation
riation 0.0553	Coefficient of Variation

Mann-Kendall Test

M-K Test Value (S)	9
Tabulated p-value	0.242
Standard Deviation of S	10.31
Standardized Value of S	0.776
Approximate p-value	0.219

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options

Date/Time of Computation ProUCL 5.110/29/2018 3:36:00 PM

From File WorkSheet.xls

Full Precision OFF

Confidence Coefficient 0.95 Level of Significance 0.05

Results_-mw-2

General Statistics

Number of Events Reported (m) 3

Number of Missing Events 0

Number or Reported Events Used 3

Number Values Reported (n) 3

Minimum 0.055

Maximum 0.058

Mean 0.0563

Geometric Mean 0.0563

Median 0.056

Standard Deviation 0.00153

Coefficient of Variation 0.0271

Mann-Kendall Test

M-K Test Value (S) 3

Tabulated p-value N/A

Standard Deviation of S 1.915

Standardized Value of S 1.044

Approximate p-value 0.148

Insufficient evidence to identify a significant trend at the specified level of significance.

Results_-mw-3

General Statistics

Number of Events Reported (m) 3

Number of Missing Events 0

Number or Reported Events Used 3

Number Values Reported (n) 3

Minimum 0.055

Maximum 0.067

Mean 0.0623

Geometric Mean 0.0621

Median 0.065

Standard Deviation 0.00643

Coefficient of Variation 0.103

Mann-Kendall Test

M-K Test Value (S) -1
Tabulated p-value N/A
Standard Deviation of S 1.915
Standardized Value of S 0
Approximate p-value 0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Results_-mw-4

General Statistics

Number of Events Reported (m) 6 **Number of Missing Events** 0 Number or Reported Events Used 6 Number Values Reported (n) 6 Minimum 0.12 0.23 Maximum Mean 0.198 0.194 Geometric Mean Median 0.215 Standard Deviation 0.0436 Coefficient of Variation 0.22

Mann-Kendall Test

M-K Test Value (S) 6
Tabulated p-value 0.136
Standard Deviation of S 4.967
Standardized Value of S 1.007
Approximate p-value 0.157

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options

Date/Time of Computation ProUCL 5.110/29/2018 3:42:57 PM

From File WorkSheet.xls

Full Precision OFF

Confidence Coefficient 0.95 Level of Significance 0.05

Results-mw-1

General Statistics

Number or Reported Events Not Used 0

Number of Generated Events 10

Number Values Reported (n) 10

Minimum 6.56

Maximum 7.77

Mean 7.481

Geometric Mean 7.474

Median 7.57

Standard Deviation 0.333

Coefficient of Variation 0.0446

Mann-Kendall Test

M-K Test Value (S) 22

Tabulated p-value 0.023

Standard Deviation of S 11.14

Standardized Value of S 1.886

Approximate p-value 0.0297

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-2

General Statistics

Number or Reported Events Not Used 0

Number of Generated Events 10

Number Values Reported (n) 10

Minimum 7.03

Maximum 8.41

Mean 7.983

Geometric Mean 7.975

Median 8.08

Standard Deviation 0.364

Coefficient of Variation 0.0456

Mann-Kendall Test

M-K Test Value (S) -10
Tabulated p-value 0.19
Standard Deviation of S 11.14
Standardized Value of S -0.808
Approximate p-value 0.209

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-3

General Statistics

Number or Reported Events Not Used 0 **Number of Generated Events** 10 Number Values Reported (n) 10 Minimum 6.32 Maximum 8.18 Mean 7.805 Geometric Mean 7.786 Median 7.93 Standard Deviation 0.54 Coefficient of Variation 0.0692

Mann-Kendall Test

M-K Test Value (S) 11
Tabulated p-value 0.19
Standard Deviation of S 11.18
Standardized Value of S 0.894
Approximate p-value 0.186

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-4

General Statistics

Number or Reported Events Not Used	0
Number of Generated Events	10
Number Values Reported (n)	10
Minimum	7.32
Maximum	7.93
Mean	7.724
Geometric Mean	7.722
Median	7.745
Standard Deviation	0.177
Coefficient of Variation	0.0229

Mann-Kendall Test

M-K Test Value (S) -25
Tabulated p-value 0.014
Standard Deviation of S 11.18
Standardized Value of S -2.147
Approximate p-value 0.0159

Statistically significant evidence of a decreasing trend at the specified level of significance.

Results-mw-5

General Statistics

Number or Reported Events Not Used 0 **Number of Generated Events** 10 Number Values Reported (n) 10 Minimum 6.76 Maximum 7.54 Mean 7.362 Geometric Mean 7.358 Median 7.46 Standard Deviation 0.236 Coefficient of Variation 0.032

Mann-Kendall Test

M-K Test Value (S) 22
Tabulated p-value 0.023
Standard Deviation of S 11.14
Standardized Value of S 1.886
Approximate p-value 0.0297

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options

Date/Time of Computation ProUCL 5.110/29/2018 3:48:37 PM

From File WorkSheet.xls

Full Precision OFF

Confidence Coefficient 0.95 Level of Significance 0.05

Results-mw-1

General Statistics

Number of Events Reported (m) 10
Number of Missing Events 0
Number or Reported Events Used 10
Number Values Reported (n) 10
Minimum 19
Maximum 25
Mean 21.3

Geometric Mean 21.23 Median 21

Standard Deviation 1.889

Coefficient of Variation 0.0887

Mann-Kendall Test

M-K Test Value (S) 27
Tabulated p-value 0.008
Standard Deviation of S 10.85
Standardized Value of S 2.397
Approximate p-value 0.00827

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-2

General Statistics

Number of Events Reported (m) 10
Number of Missing Events 0
Number or Reported Events Used 10
Number Values Reported (n) 10
Minimum 21

Maximum 31

Mean 23.7

Geometric Mean 23.46

Median 22

Standard Deviation 3.683 Coefficient of Variation 0.155

Mann-Kendall Test

M-K Test Value (S) 8
Tabulated p-value 0.242
Standard Deviation of S 10.74
Standardized Value of S 0.652
Approximate p-value 0.257

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-3

General Statistics

Number of Events Reported (m) 10 0 Number of Missing Events Number or Reported Events Used 10 Number Values Reported (n) 10 Minimum 20 Maximum 49 29.1 Mean Geometric Mean 27.65 Median 25.5 Standard Deviation 10.41 Coefficient of Variation 0.358

Mann-Kendall Test

M-K Test Value (S) -34
Tabulated p-value 0
Standard Deviation of S 11.14
Standardized Value of S -2.963
Approximate p-value 0.00152

Statistically significant evidence of a decreasing trend at the specified level of significance.

Results-mw-4

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 18 Minimum 53 Maximum Mean 38.3 Geometric Mean 35.84 Median 42.5 Standard Deviation 12.93 Coefficient of Variation 0.338

Mann-Kendall Test

M-K Test Value (S) 6
Tabulated p-value 0.3
Standard Deviation of S 11.14
Standardized Value of S 0.449
Approximate p-value 0.327

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-5

General Statistics

Number of Events Reported (m) 10 Number of Missing Events 0 Number or Reported Events Used 10 Number Values Reported (n) 10 Minimum 18 Maximum 25 Mean 19.9 Geometric Mean 19.76 Median 19 Standard Deviation 2.601 Coefficient of Variation 0.131

Mann-Kendall Test

M-K Test Value (S) -8
Tabulated p-value 0.242
Standard Deviation of S 10.61
Standardized Value of S -0.659
Approximate p-value 0.255

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options

Date/Time of Computation ProUCL 5.110/29/2018 3:52:23 PM

From File WorkSheet.xls

Full Precision OFF

Confidence Coefficient 0.95 Level of Significance 0.05

Results-mw-1

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 Minimum 700 980 Maximum Mean 842 Geometric Mean 836.9 Median 810 Standard Deviation 98.07

Coefficient of Variation

Mann-Kendall Test

M-K Test Value (S) -2

0.116

Tabulated p-value 0.431
Standard Deviation of S 11.14
Standardized Value of S -0.0898
Approximate p-value 0.464

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-2

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 Minimum 190 Maximum 350 Mean 302 Geometric Mean 296.7 Median 310

Standard Deviation

Coefficient of Variation

54.93

0.182

Mann-Kendall Test

M-K Test Value (S) 5
Tabulated p-value 0.364
Standard Deviation of S 10.85
Standardized Value of S 0.369
Approximate p-value 0.356

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-3

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 290 Minimum Maximum 440 Mean 367 Geometric Mean 363.8 Median 370 Standard Deviation 50.56 Coefficient of Variation 0.138

Mann-Kendall Test

M-K Test Value (S) -13
Tabulated p-value 0.146
Standard Deviation of S 11.09
Standardized Value of S -1.082
Approximate p-value 0.14

Insufficient evidence to identify a significant trend at the specified level of significance.

Results-mw-4

General Statistics

Number of Events Reported (m) 10 **Number of Missing Events** 0 Number or Reported Events Used 10 Number Values Reported (n) 10 700 Minimum 1200 Maximum Mean 953 Geometric Mean 940.8 Median 1000 Standard Deviation 156.6 Coefficient of Variation 0.164

Mann-Kendall Test

M-K Test Value (S) 21
Tabulated p-value 0.036
Standard Deviation of S 10.79
Standardized Value of S 1.854
Approximate p-value 0.0318

Statistically significant evidence of an increasing trend at the specified level of significance.

Results-mw-5

General Statistics

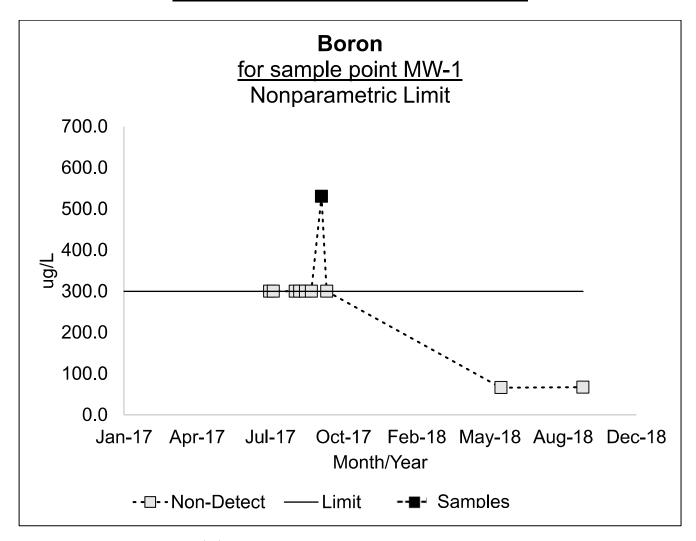
Number of Events Reported (m)	10
Number of Missing Events	0
Number or Reported Events Used	10
Number Values Reported (n)	10
Minimum	590
Maximum	2300
Mean	847
Geometric Mean	771.7
Median	710
Standard Deviation	513.2
Coefficient of Variation	0.606

Mann-Kendall Test

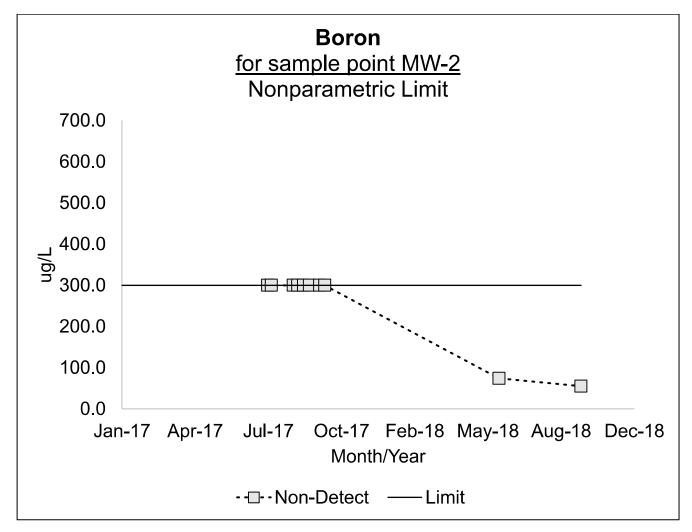
M-K Test Value (S)	8
Tabulated p-value	0.242
Standard Deviation of S	11.14
Standardized Value of S	0.629
Approximate p-value	0.265

Insufficient evidence to identify a significant trend at the specified level of significance.

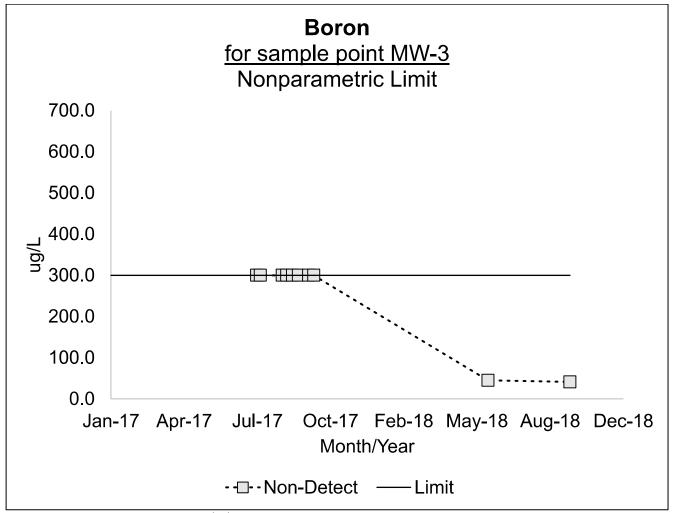
Attachment C



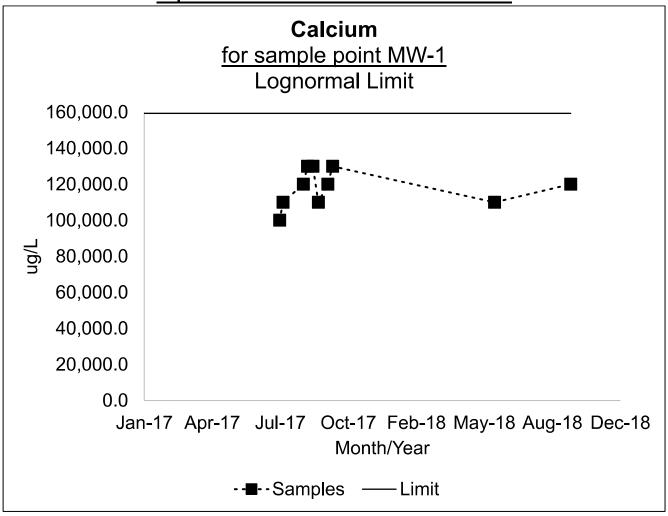
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



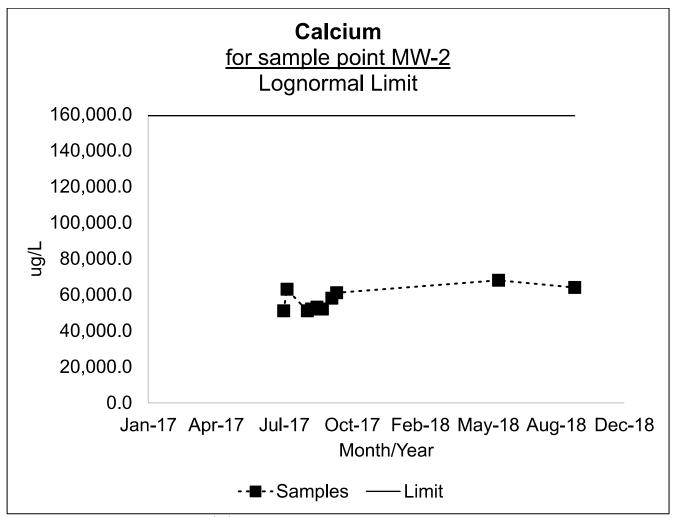
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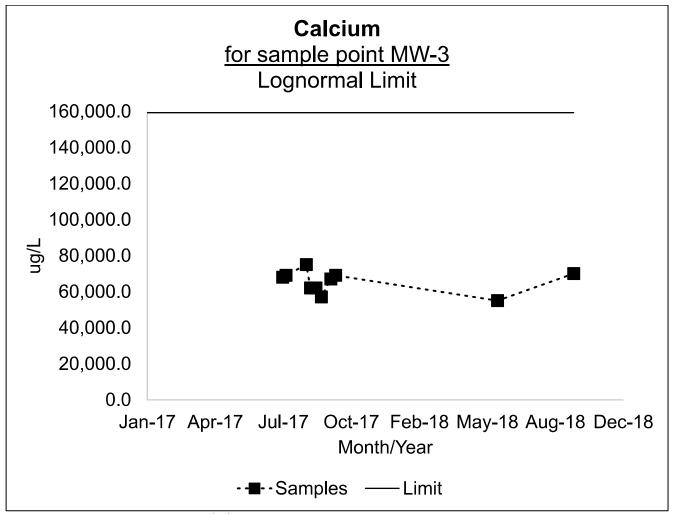
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



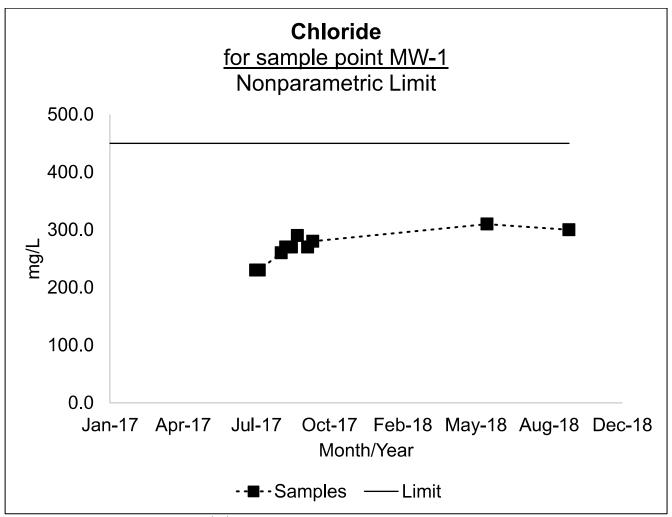
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



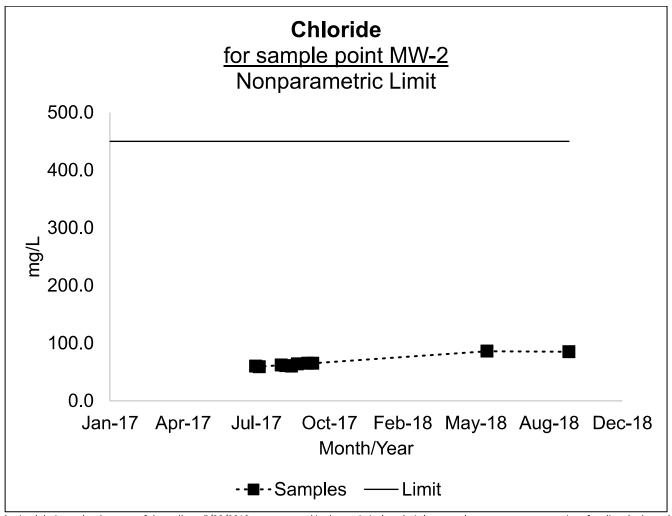
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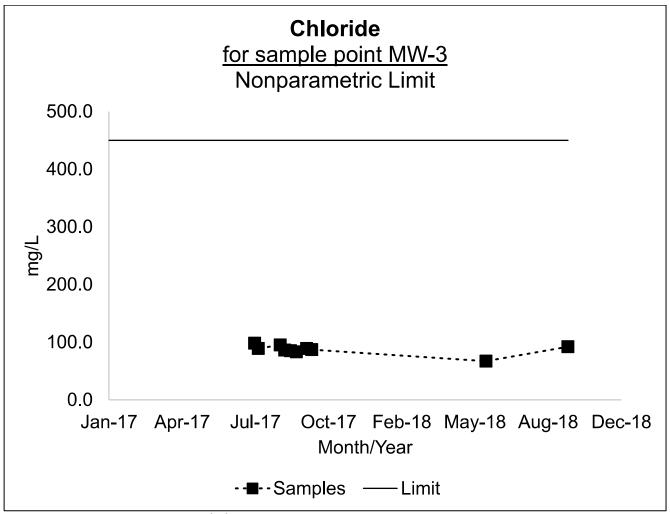
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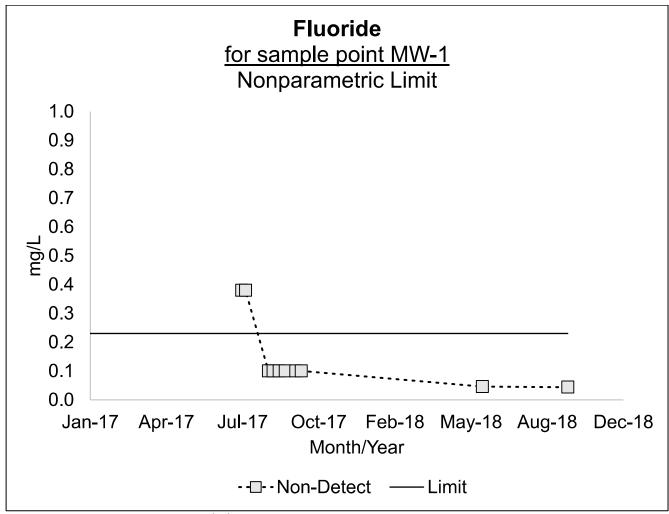
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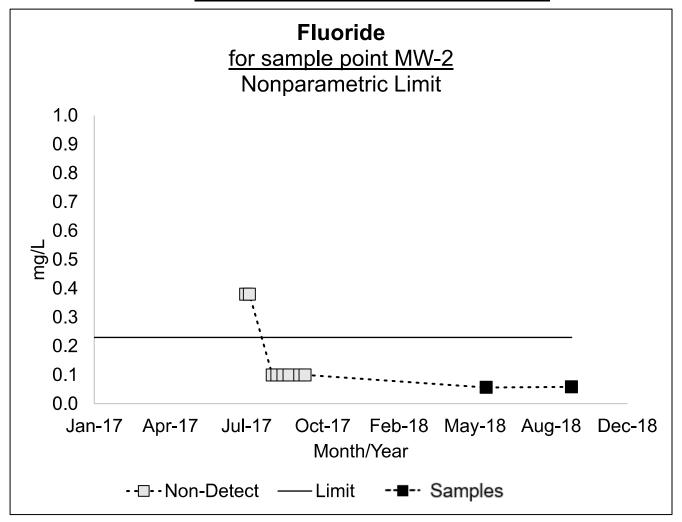
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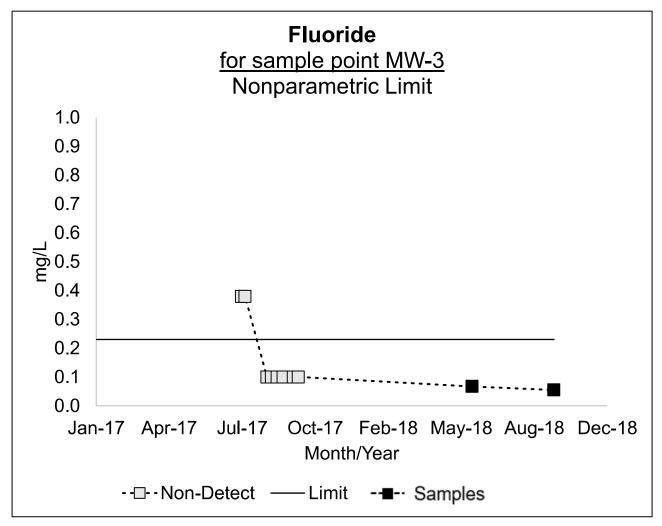
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



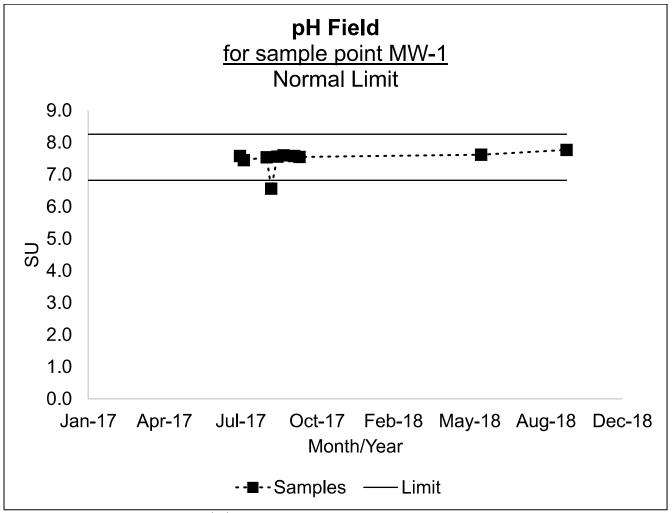
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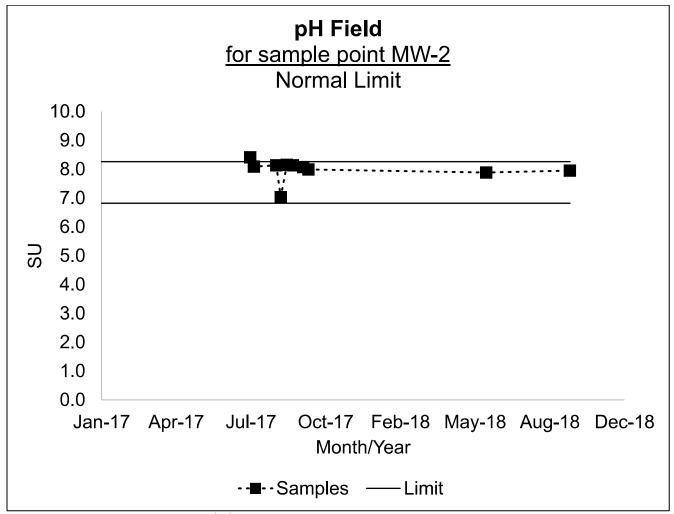
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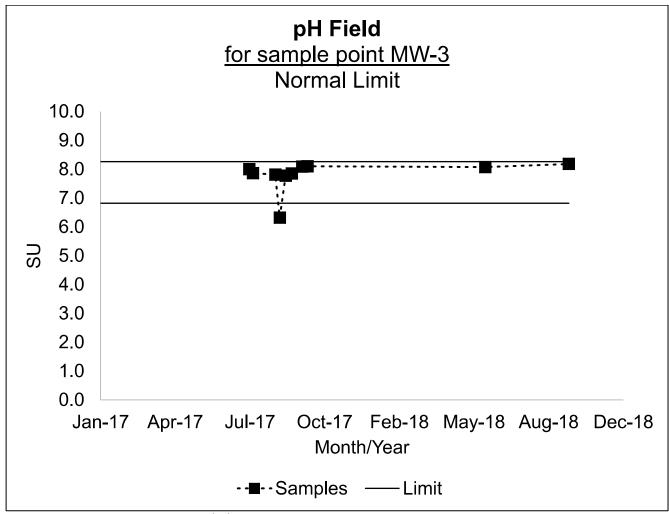
^{*}Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



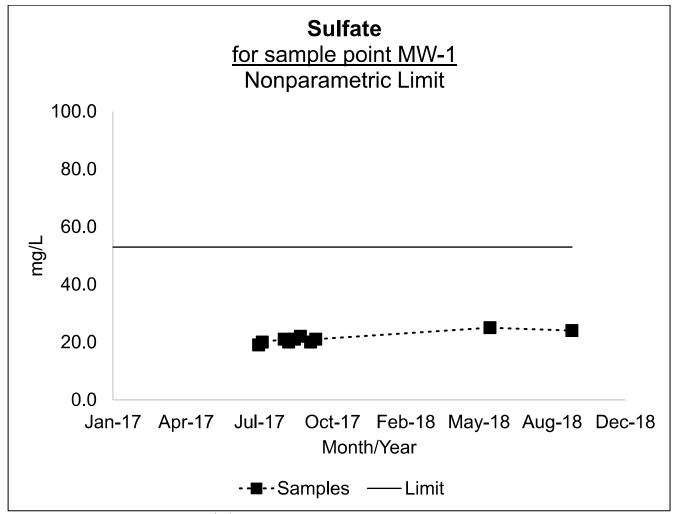
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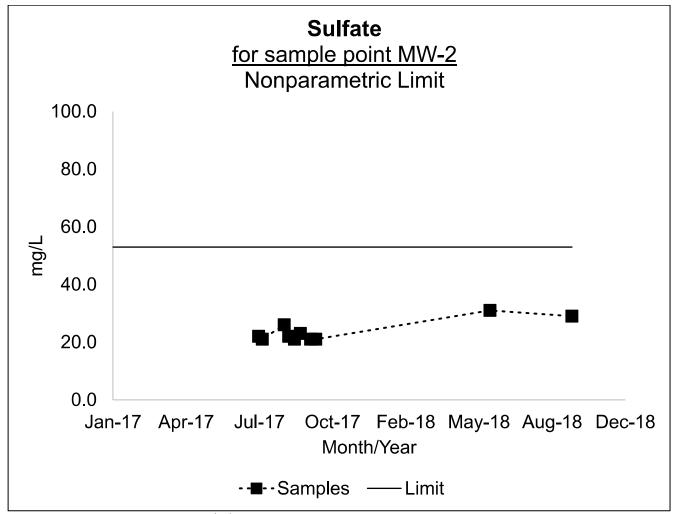
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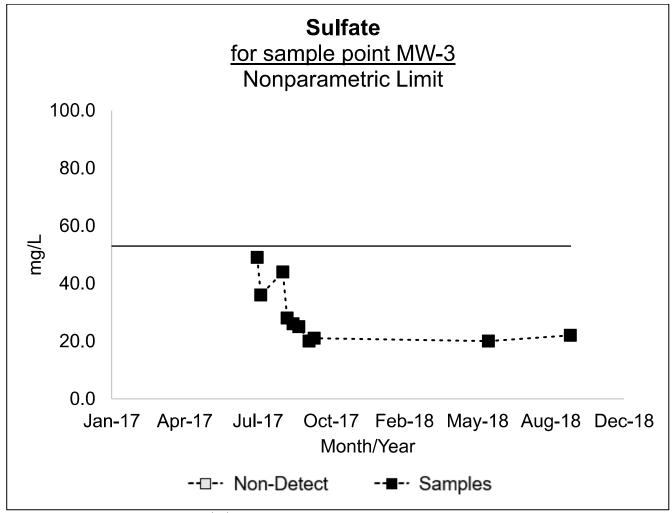
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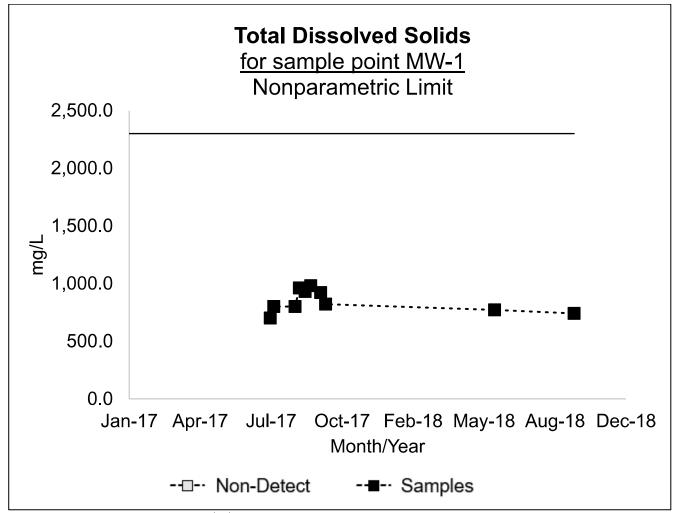
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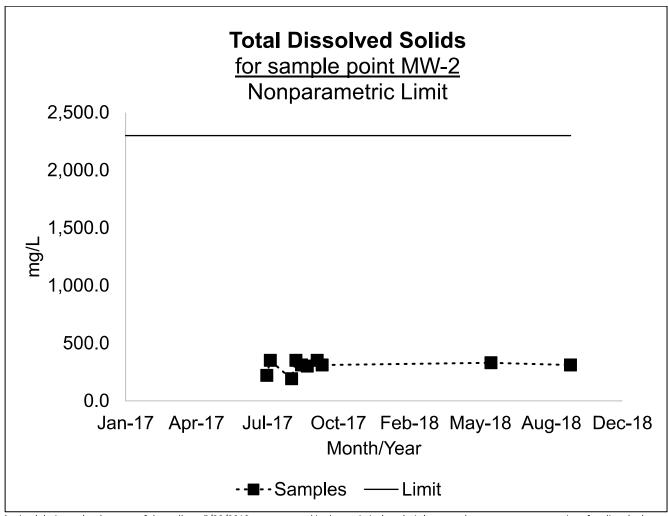
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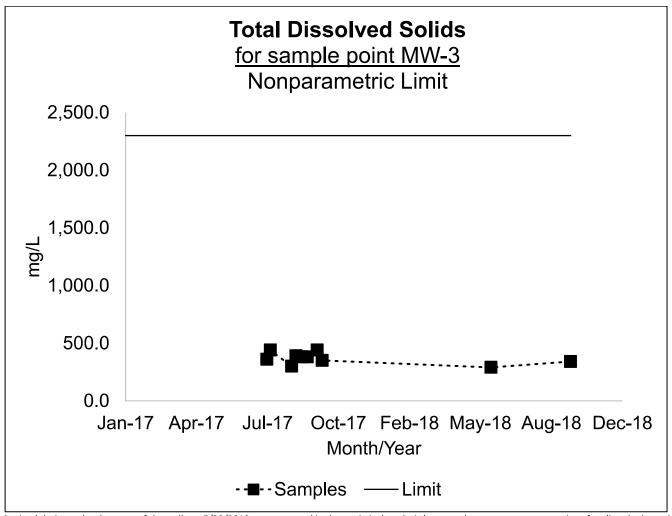
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False positive and false negative rates for current upgradient vs downgradient monitoring program

