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.

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Stephen J. MacDonald, PE Senior Environmental Engineer Date: January 23, 2019

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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.

Mananan manan

Stephen J. MacDonald, PE Senior Environmental Engineer Date: January 23, 2019

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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.
 - 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
 - $\circ~$ 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

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

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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.



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.

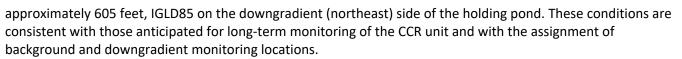
3.2 Groundwater Monitoring Events for 2018

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



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

International Great Lakes Datum of 1985 (IGLD85).

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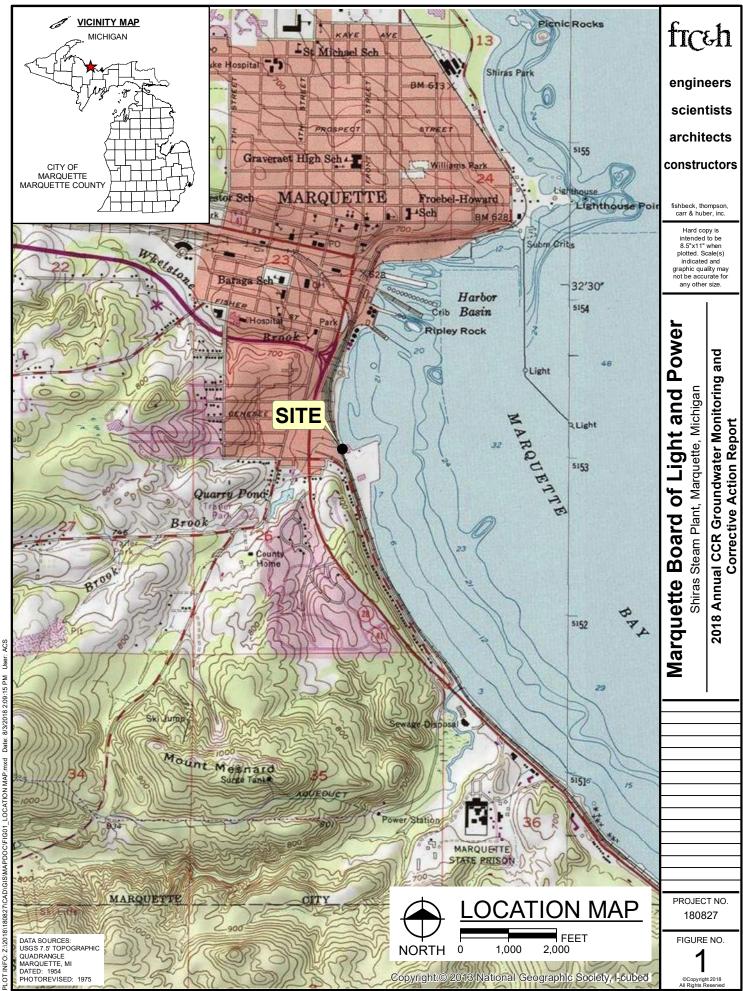
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- ASTM D6312-17, 2017. Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs at Waste Disposal Facilities, 15 p.



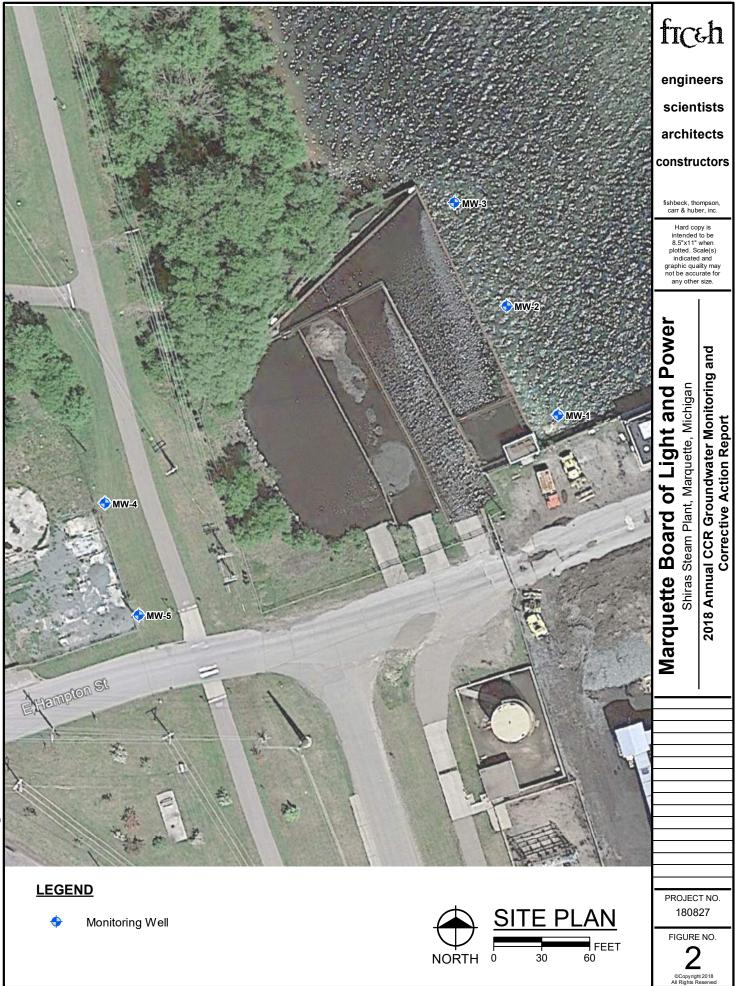
9.0 Certification

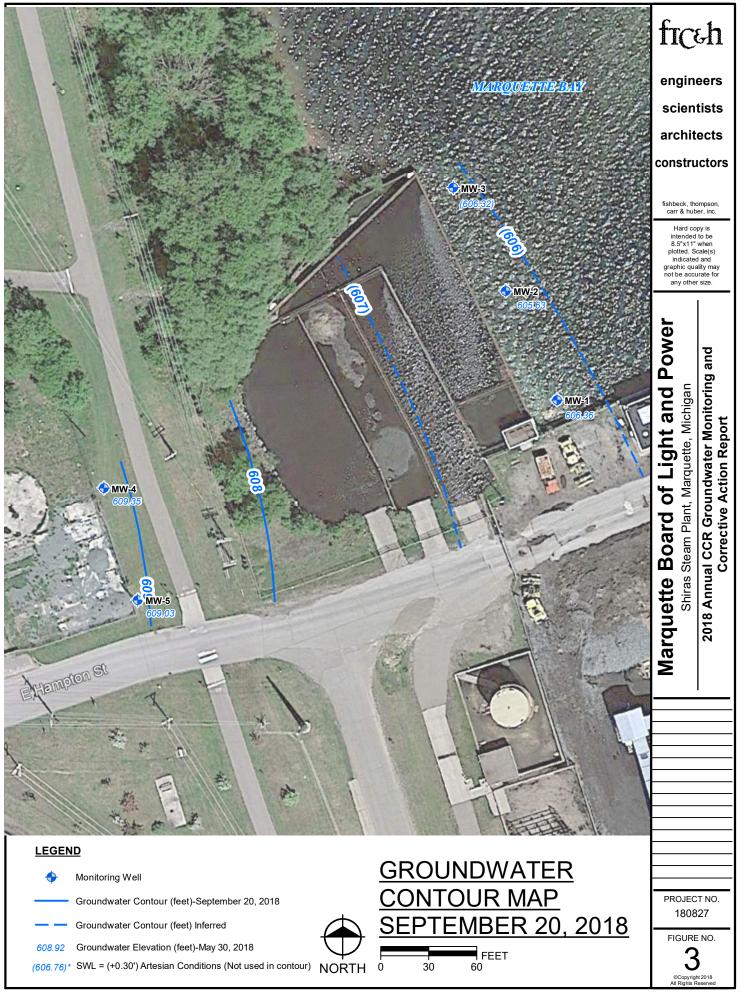
See attached Groundwater Monitoring System and Statistical Methods Certifications at the beginning of this report.

Figures



SP. Date: 8/3/2018 2:09:15 PM pxu LOCATION MAP. NCAD/GIS/MAPDOC/FIG01 ROR 2 21 7.120 . CHNI PLOT





Tables

Table 1 - Cumulative Analytical Data Summary

Marquette Board of Light and Power

Shiras Steam Plant

September 2018

September Lab Suite:	2018						CCR Appendix I	111			CCR Appendix IV																
Lub Suite.									Total													T				í	
Parameter	:			Boron	Calcium	Chloride	Fluoride	Sulfate	Dissolved Solids	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 228	Radium 226	Radium 228	Selenium	Thallium
									(TDS)														Combined			ĺ	
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 N	CL:			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	Duplicate																							1	
	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 09/06/17		300 U 300 U	130,000	270 270	0.10 U 0.10 U	20 21	960 930	6.56 7.56	2.0 U 2.0 U	5.0 U 5.0 U	0.13	1.0 U 1.0 U	1.0 U 1.0 U	18 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 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		09/14/17		300 U	110,000	290	0.10 U	21	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 10/05/17	х	300 U 300 U	130,000 120,000	280 270	0.10 U	21 21	820 880	7.55 7.55	2.0 U 2.0 U	5.0 U 5.0 U	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 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
		05/31/18	^	66 J	120,000	310	0.10 U 0.046 J	21	770	7.55	2.0 U	5.0 U	0.14	1.0 U	1.0 U	2.1	0.77 J	0.042 J	1.0 U	10 0	0.20 U	1.6 J	0.516	0.409	1.00 U 0.107 U	5.0 U	2.0 U
		09/20/18		67 J	120,000	300	0.044 J	24	740	7.9							-										
	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 08/23/17		300 U 300 U	63,000 51,000	59 62	0.38 U 0.10 U	21 26	350 190	8.09 8.13	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 240	10 U 10 U	0.20 U 0.20 U	50 U 50 U	1.56 1.00 U	1.00 U 1.00 U	1.56 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		08/23/17		300 U	52,000	61	0.10 U	20	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
ıt		09/14/17		300 U	52,000	64	0.10 U	23	300 350	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 5.0 U	2.0 U
		09/28/17 10/05/17		300 U 300 U	58,000 61,000	65 65	0.10 U 0.10 U	21 21	350	8.07 7.99	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 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 2.0 U
		05/31/18		74 J	68,000	86	0.056	31	330	8.0	2.0 U	0.84 J	0.073	1.0 U	1.0 U	2.2	0.38 J	0.055	1.0 U	5.9 J	0.20 U	1.1 J	0.519	0.204 U	0.315 U	5.0 U	1.0 U
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
ngra	N 414/ 2	09/20/18		55 J	64,000	85	0.058	29	310	8.0																	
Dow	MW-3	07/19/17 07/24/17		300 U 300 U	68,000 69,000	98 89	0.38 U 0.38 U	49 36	360 440	8.00 7.86	2.0 U 2.0 U	5.0 U 5.0 U	0.10 U 0.23	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 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		08/23/17		300 U	75,000	95	0.10 U	44	300	7.81	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	62,000	86	0.10 U	28	390	6.32	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	62,000	85	0.10 U	26	380	7.77	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.05	1.00 U	1.05	5.0 U	2.0 U
		09/14/17 09/14/17	х	300 U 300 U	57,000 56,000	83 84	0.10 U 0.10 U	25 24	380 380	7.85 7.85	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 10 U	0.20 U 0.20 U	50 U 50 U	1.17 1.00 U	1.00 U 1.00 U	1.17 1.00 U	5.0 U 5.0 U	2.0 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
	MW-4	09/20/18 07/19/17		41 J 300 U	70,000 93,000	92 260	0.055 0.38 U	22 19	340 700	8.1 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 08/29/17		300 U 300 U	100,000	300 340	0.10 U	24 47	830 1,000	7.93	2.0 U	5.0 U 5.0 U	0.10 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
		08/29/17 09/06/17		300 U 300 U	120,000 110,000	340	0.10 U 0.20	53	1,000	7.32	2.0 U 2.0 U	5.0 U	0.10 U 0.10 U	1.0 U	1.0 U 1.0 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	1.00 U	5.0 U	2.0 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 05/31/18		300 U 120	120,000 130,000	380 450	0.10	43 42	1,100 1,000	7.70	2.0 U 1.0 J	5.0 U 1.4 J	0.10 U 0.11	1.0 U 1.0 U	1.0 U 0.24 J	10 U 1.2 J	20 U 0.48 J	0.23	3.0 U 0.50 J	11 9.8	0.20 U 0.20 U	50 U 16	1.00 U 0.639	1.00 U 0.400	1.00 U 0.240 U	5.0 U 5.0 U	2.0 U 1.0 U
		09/20/18		120	130,000	450	0.23	42	970	7.8	1.0 J	1.4 J 			0.24 J 	1.2 J 	0.48 J 	0.25	0.50 J	9.0	0.20 0		0.039		0.240 0		
		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	530 730	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 2.0 U
		07/24/17 08/23/17		300 U 300 U	100,000 110,000	190 210	0.38 U 0.10 U	21 19	590	7.17	2.0 U 2.0 U	5.0 U 5.0 U	0.16	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 1.44	1.00 U 1.00 U	1.00 U 1.44	5.0 U 5.0 U	2.0 U
		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
gradient		08/29/17		300 U	110,000	190	0.10 U	18	750	6.76	2.0 U	5.0 U	0.12	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17	v	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
ŋ		09/06/17 09/14/17	Х	300 U 300 U	100,000 96,000	190 200	0.10 U 0.10 U	18 19	730 720	7.43	2.0 U 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 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
		09/28/17		300 U	120,000	190	0.10 U	15	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
L		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

Lab Suite: CCR Appendix III									CCR Appendix IV																		
Parameter	:			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 N	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	Duplicate																								
	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

616.575.3824 www.ftch.com Fishbeck, Thompson, Carr & Huber, Inc. engineers I scientists I architects I constructors

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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 (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.

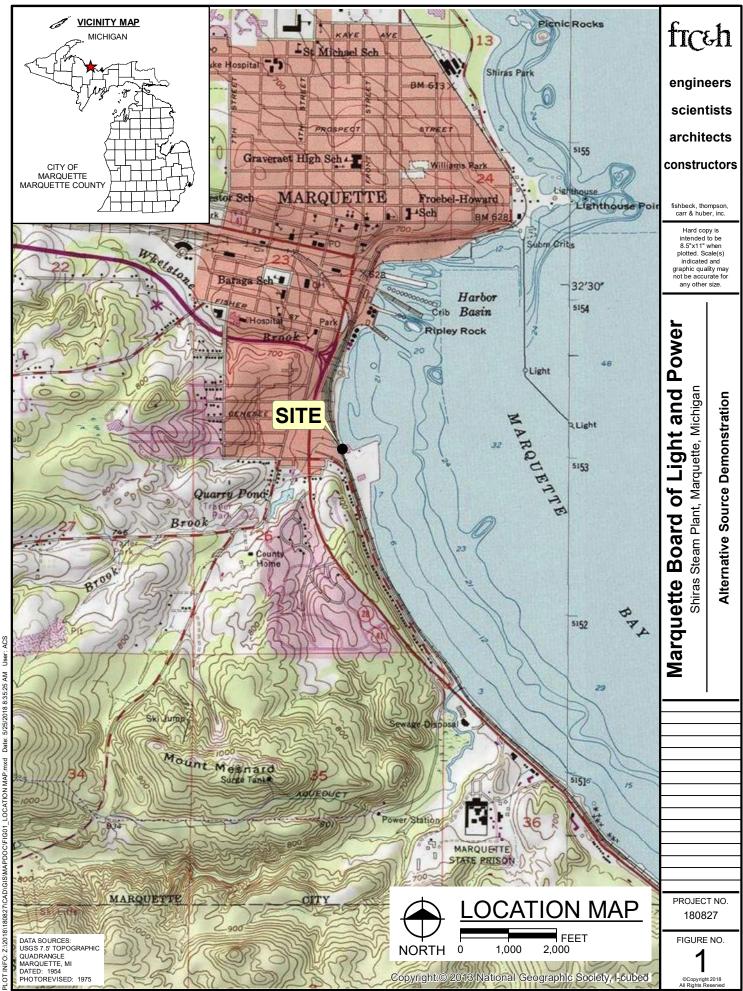
8.0 Certification

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.

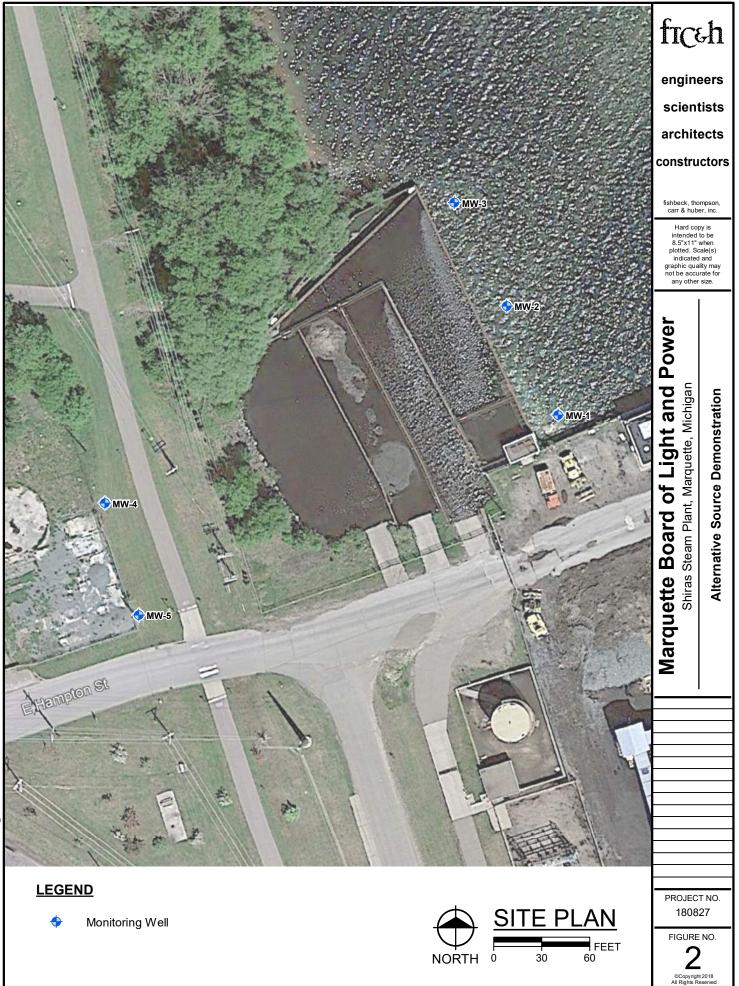


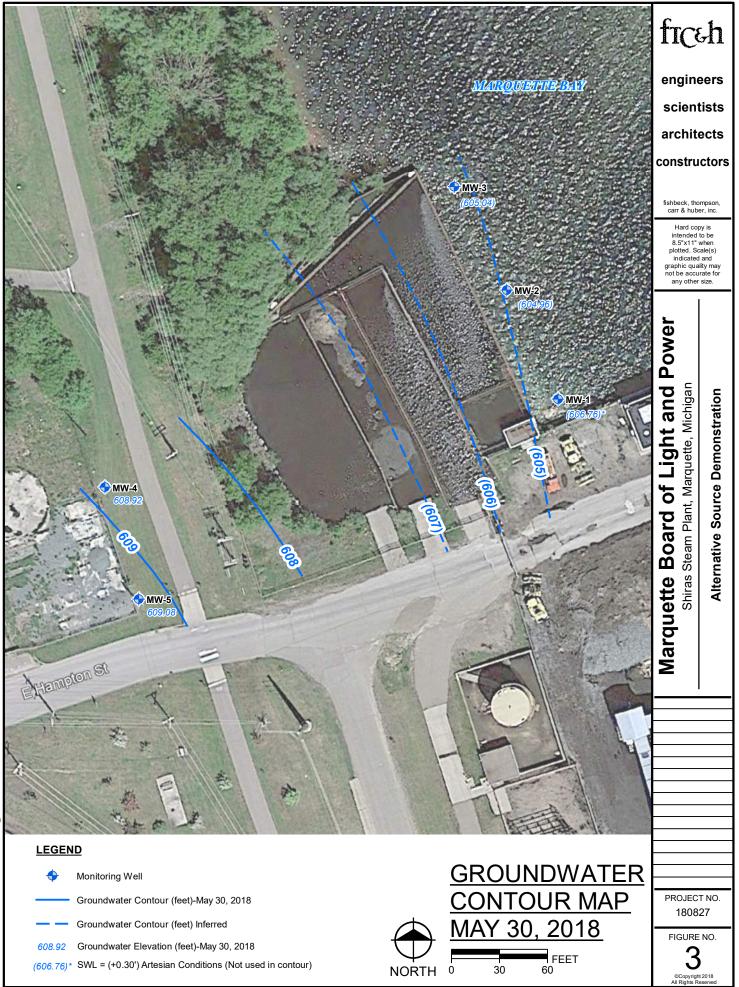
Stephen J. MacDonald, PE License Number 40569 Senior Environmental Engineer Date: September 5, 2018

Figures



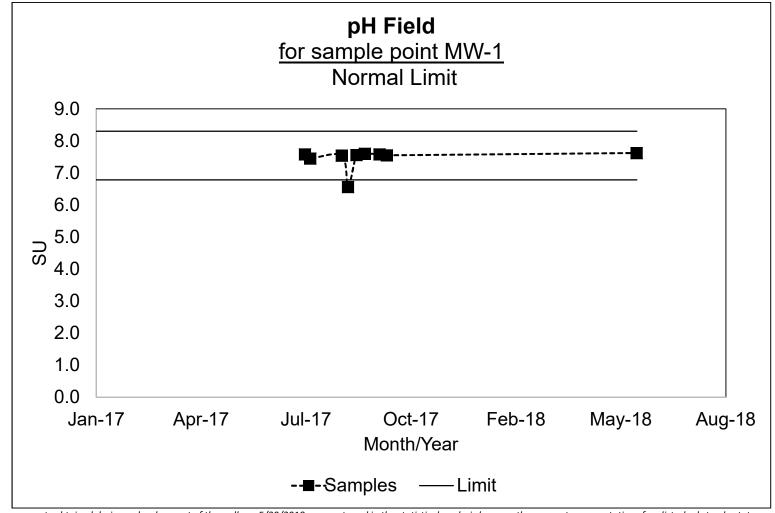
User: ΜA Date: 5/25/2018 8:35:25 hyd LOCATION MAP. NCAD/GIS/MAPDOC/FIG01 ROR 2 21 7.120 . CHNI PLOT





ACS

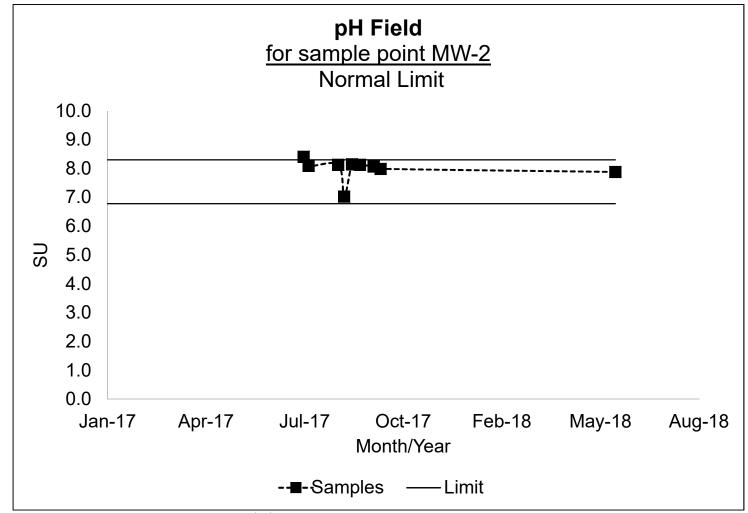
Up vs. Down Prediction Limits



*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

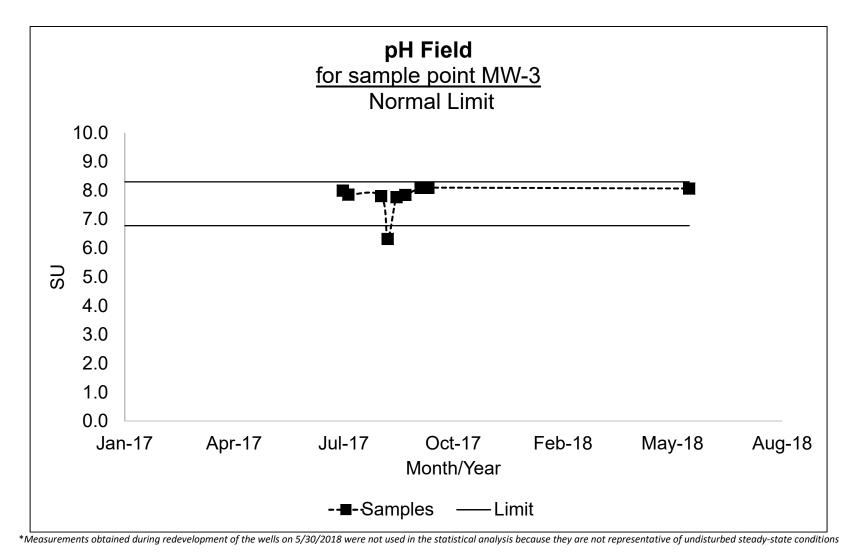
Up vs. Down Prediction Limits



*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



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	
рН*	SU	MW-1	5/30/2018	7.56	6.861-8.211	
рН*	SU	MW-1	5/30/2018	8.11	6.861-8.211	
рН*	SU	MW-1	5/30/2018	7.77	6.861-8.211	
рН*	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	
pH*	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	
pH*	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	
pH*	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:	5130/18
	PIOFZ
Weather Conditions	62°, overcest
Weather conditions.	1 out of the state
Purpose: MW d	evelopment
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9:20: MW.	5 developed ~17 sellors presed
9:45 MW	· 4 puyed dry at ~ S gal, tub toot to two it and plt
Lampa	rable to MW-5 will retarn forwarrow to sample
10:30 : 1 aun	In boat at Cinder Pond Marina
11:20: 12	in developing MW-3 - purged dry of ~5 gallons
w: l	I let well recover and return after other 2 wells
64	the nate - boat taking on water, used bilse pump
1145: brigg	development of MW-2, pursed day at ~ 5 gallons
bont	talety on nate sceningly quicker, plug is in scaled well
cont	we to interritently use bilse purpo
mill	return after allowing time for NW-) to revove
1219: MW	1 swal dry at ~ 6 sol
1275: midda	att cal checker = 7. 22 S.U.
1258 - MW	
1305 - MW-	1 awal dry right 8.4'
the.	after 4 sollars pured (9 collars prod tate)) move to
MŴ	
Completed by:	(signature)

FIELD NOTES

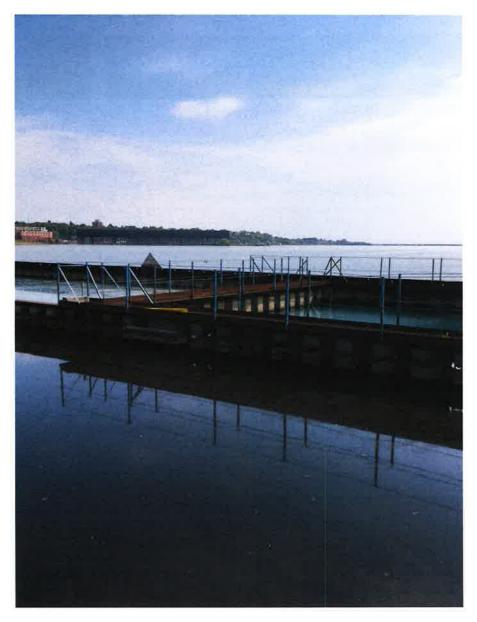
	MBLP/Shiras ASD & GW Monitoring
Project Number:	180827
Site Location:	Marquette, MI
Date:	5/20/18
	22 JE 2
Weather Conditions	
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	- his away recovered to 5.55 below toc, ristarty
pwye	
	2 proved day after 3 gallons - & sallons purged total
the second se	
	more to MW-1. boat filling with substantial amounts
o L	not regularly - use pilge pump
02 1337 Mw-1	motor regularly - use pilge pump resourced to 2.3' below TOC, will purpe again
0£ 1337 Mw-1	not regularly - use pilge pump
02 1337 MW-1 NOTE: MW-1,N	motor regularly - use pilge pump resourced to 2.3' below TOC, will purpe again
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0£ 1337 MW-1 NOTE: MW-1,1 ml	not regularly - use pilge pump resourced to 2.3' below TOC, will purpe again w-2, MW-3 did not resure fully due to societ issues (really early thundestorms
0£ 1337 MW-1 NOTE: MW-1,1 ml	not regularly - use pilge pump resourced to 2.3' below TOC, will purpe again w-2, MW-3 did not resure fully due to societ issues (really early thundestorms i purph dry after 4 sellors on success attempt, 10 sal purph total for marine
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Fishbeck, Thompson, Carr & Huber, Inc.

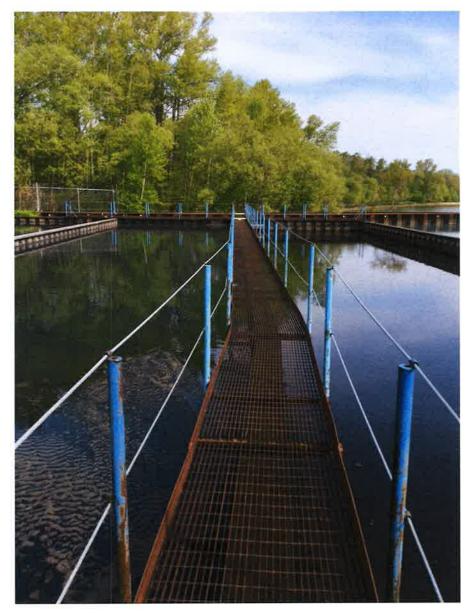
MBLP/Shiras ASD & GW Monitoring.

Marquette, MI





Retention ponds, facing NNW.



Retention ponds, facing W.



180827

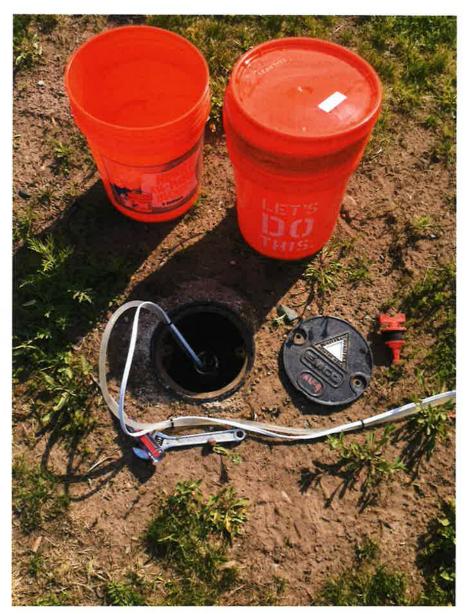
Date: 5/31/2018

18 Project Name:

MBLP/Shiras ASD & GW Monitoring.



Well development (MW-4)



Well development (MW-4)



Project No.: 180827

Date: 5/31/2018

018 Project Name:

MBLP/Shiras ASD & GW Monitoring.



Equipment decon between locations.

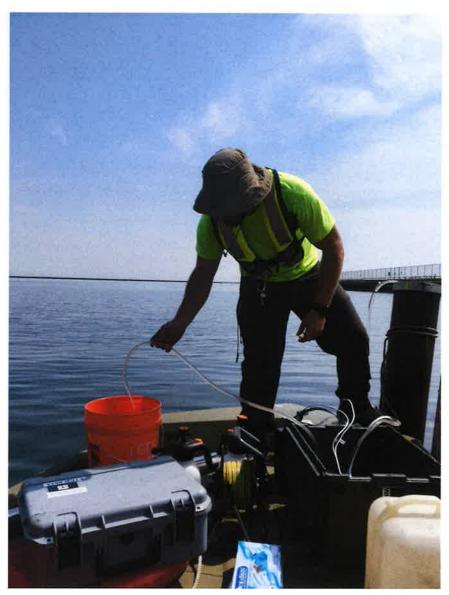


Dumping of development water.





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)



e: 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	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		4709695-11077	S.U.	7.06	21.1	6.9 - 7.1	4513
	10.00	442504-01117	S.U.	9.99		9.9 - 10.1	010
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	4410
Notes:							#41D

EQUIPMENT CALIBRATION VERIFICATION FORM

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827		2				
Date/Time:	5/30/18 123	25	• •				
Initials:	AD		«			NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
pН	7.00	4709645-110817	S.U.	7.02	23.2	6.9 - 7.1	YSI PP
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:							
	~						



EQUIPMENT CALIBRATION VERIFICATION FORM

Project Name:		& GW Monitoring	-				
Project Number:	180827		-				
Date/Time:	5130118 1500						
Initials:	<u>A</u> [3		-			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	13, P.P. # 55551
Specific Conductance	1412		µmhos/cm			1342 - 1484	
Eh	Zobell's solution		mV				
Dissolved Oxygen	NA	NA	mg/L			±10% Theoretical:	
Turbidity	10 NTU	A6272	NTU	9.22	NA	9 - 11	1. 2020 We #450
Notes:							
		×					
			24				
			÷				

EQUIPMENT CALIBRATION FORM

ate/Time: $5/31/1/8 \ jooo$ NA = Not ApplicableNA = Not ApplicableNA = Not ApplicableParameterCalibration Verification Acceptance WindowParameterStandardLot NumberUnitsMeasured ValueCalibration Verification Acceptance WindowH7.00 $4/0/6/25 - 1/0/277S.U.3.9 \cdot 4.17.004/0/6/25 - 1/0/277S.U.3.9 \cdot 4.17.004/10/6/25 - 1/0/277S.U.3.9 \cdot 4.17.0941/856.9 \cdot 7.19.9 \cdot 10.19/5 \cdot 7.79.9 \cdot 10.1august colspan="4">august colspan="4">110/010.004/13/25/204 \cdot 0.111710.001/9/202 \cdot 7.61/2720 \cdot 7.4Intervention1/9/2720 \cdot 7.61/9 \cdot 20208 \cdot 7.61/9/202 \cdot 7.61/9 \cdot 20208 \cdot 7.61/9/202 \cdot 7.61/10 \cdot 1/272 \cdot 7.6Intervention1/9/202 \cdot 7.61/10 \cdot 1/202 \cdot 7.61/3/2 \cdot 162/20208 \cdot 7.61/12 \cdot 5/10/03 - 32.61/9/202 \cdot 7.61/9/2 \cdot 7.61/9/202 \cdot 7.6$	Project Name:	MBLP/Shiras ASD	& GW Monitoring	-				
AFSNA = Not ApplicableParameterStandardLot NumberUnitsMeasured ValueCalibration Verification Acceptance WindowInstrument Model NumberH4.0046/28/4/-0.011/7S.U.3.98 7.0018.53.9-4.1 6.9-7.1YS 1 P.P.H7.0046/28/9/-0.011/7S.U.7.04 9.9-10.118.56.9-7.1 9.9-10.1YS 1 P.P.pecific onductance147\$6/80208-1/2 1265µmhos/cm1/4/1 28/02-28-2A18.7132-162 26/2132-162 26/2hZobell's solution208208-7/2 2013-3-22µmhos/cm1/4/0 28/0218.8132-8-4445.81issolved OxygenNANAmg/L9.231/9-8110% Theoretical: 7.094urbidity10 NTUAc272NTU9.75-9.11L-202-4444	Project Number:	180827						
ParameterStandardLot NumberUnitsMeasured ValueMeasurement Temperature (°C)Calibration Verification Acceptance WindowInstrument Model NumberH 4.00 $4(23941 - 6(11/7)$ S.U. 3.98 1.000 $3.9 - 4.1$ $3.9 - 4.1$ $3.9 - 4.1$ 7.00 $4704035 - 110937$ S.U. 7.04 1.85 $6.9 - 7.1$ $9.9 - 10.1$ $9.9 - 10.1$ 10.00 $4612804 - 0111(7)$ S.U. 10.920 $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ pecific onductance 147 $5(180208 - 1c)$ $1/4/10$ 18.7 $132 - 162$ 1412 $5(180208 - 2A)$ μ mhos/cm $1/4/10$ 18.7 $1342 - 1484$ 2765 $5(13010^3 - 3c)$ μ mhos/cm 2802 $2628 - 2905$ hZobell's solution $2082045 - 1$ mV $423 \cdot 5$ 18.8 $925 \cdot 8 - 4445 \cdot 8$ issolved OxygenNANAmg/L 9.20 19.8 110% urbidity 10 NTU $A(a272)$ NTU 9.75 $ 9-11$ $L.202 \cdot 444$	Date/Time:	5131/18 10	00	-				
ParameterStandardLot NumberUnitsMeasured ValueTemperature (°C)Verification Acceptance WindowInstrument Model NumberH 4.00 $4612841-6111/7$ S.U. 3.98 $3.9-4.1$ $9.9-4.1$ $9.9-4.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ <t< th=""><th>Initials:</th><th>APS</th><th></th><th></th><th></th><th></th><th>NA = Not</th><th>Applicable</th></t<>	Initials:	APS					NA = Not	Applicable
H 7.00 $4703035 - 1102917$ S.U. 7.04 185 $6.9 - 7.1$ $YS1 \ P.P.$ 10.00 $4412804 - 011117$ S.U. 10.200 $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $132 - 162$ $132 - 162$ $132 - 162$ $132 - 162$ $132 - 162$ $132 - 162$ $132 - 162$ $132 - 202$ $132 - 2102$ $132 - 2102$ $132 - 2102$ $132 - 2102$ $132 - 2102$ $132 - 2102$ $132 - 2102$ $132 - 2102$ $19.9 - 2102$ $19.9 - 2102$ $19.9 - 2102$ $19.9 - 2102$ $19.9 - 2102$ $19.9 - 2102$ $19.9 - 2102$ $19.9 - 2102$ $19.9 - 2102$	Parameter	Standard	Lot Number	Units	Measured Value	Temperature	Verification	instrument Model/IC Number
$\frac{1000}{1000} = \frac{11000}{1000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{100000}{100000} + \frac{1000000}{10000000} + 1100000000000000000000000000000000000$		4.00	4612941-61117	S.U.	398		3.9 - 4.1	
$ \begin{array}{ c c c c c c c } \hline 10.00 & 4672804 - 011117 & S.U. & 10.20 & 9.9 - 10.1 & 14729 \\ \hline 1412 & 56780208 - 1C & \mu mhos/cm & 1/61 & 18.7 & 132 - 162 \\ \hline 1412 & 56780208 - 2A & \mu mhos/cm & 1/4/0 & 18.7 & 1342 - 1484 \\ \hline 2765 & 5673073 - 3C & \mu mhos/cm & 2802 & 2628 - 2905 & 2628 - 2905 \\ \hline h & Zobell's solution & 2082045 - 1 & mV & 429 - 5 & 18.8 & 425 - 8 - 445 - 3 & 18.7 & 10.00 & 10.00 & 10.00 & mg/L & 9.20 & 19.9 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.0$	эΗ	7.00		S.U.	7.04	185	6.9 - 7.1	
147 $\frac{50180208 - 1C}{100208 - 2A}$ μ mhos/cm $\frac{161}{1410}$ 132 - 162 1412 $\frac{50180208 - 2A}{2765}$ μ mhos/cm $\frac{1410}{1410}$ $\frac{132 - 1484}{2628 - 2905}$ h $2082 \times 045 - 1$ mV $\frac{429 \cdot 5}{18.8}$ $\frac{18.7}{18.8}$ $\frac{125 \cdot 8 - 4445 \cdot 8}{110\%}$ issolved Oxygen NA NA mg/L $\frac{9.20}{1.20}$ $\frac{19.7}{18.8}$ $\frac{110\%}{1342 - 1484}$ urbidity 10 NTU $A_{62}272$ NTU 9.75 $ 9-11$ $L-202 - 4245 \cdot 4$		10.00		S.U.	10.00		9.9 - 10.1	#429
$\frac{1412}{\text{onductance}} = \frac{1412}{2765} \frac{5c/B020B-2A}{5c/B020B-3-3c} \frac{\mu\text{mhos/cm}}{\mu\text{mhos/cm}} \frac{1410}{2802} = \frac{18.7}{1342-1484} \frac{1342-1484}{2628-2905}$ $\frac{1}{1000} = 12000000000000000000000000000000000000$				µmhos/cm	161		132 - 162	
2765 $\mathcal{S}(130i03-3c)$ μ mhos/cm 2802 2628-2905hZobell's solution $20B2:045-1$ mV $429\cdot5$ $18\cdot8$ $925\cdot8-445\cdot8$ issolved OxygenNANAmg/L 9.20 $19\cdot8$ $\pm 10\%$ Theoretical: 9.09 urbidity10 NTU $AG272$ NTU 9.75 $ 9-11$ $L.2020$		1412	102	µmhos/cm	1410	18.7	1342 - 1484	
issolved Oxygen NA NA mg/L 9.20 $/9.8$ $\pm 10\%$ Theoretical: 9.09 4 urbidity 10 NTU AG272 NTU 9.75 $ 9-11$ 1.2020 $-$		2765	50130103-36	µmhos/cm	2802		2628 - 2905	
issolved Oxygen NA NA mg/L 9.20 /Y·B Theoretical: 9.09 Y urbidity 10 NTU AG272 NTU 9.75 - 9-11 L.2020 CM	h	Zobell's solution	20821045-1	mV	429.5	18.8	925.8-445.3	
	Dissolved Oxygen	NA	NA	mg/L	9.20	19.8		Ŧ
	Furbidity	10 NTU	A(272	NTU	9.75	-	9 - 11	L. 2020 - CHL
	urbidity lotes:	10 NTU	A6272	NTU	9.75	-	9 - 11	L. 2020 - CHL
								1

Project Name:	0	MBLP/Shira	as ASD & GW	Monitoring		Monitoring Location	1:	_MW	11	
Project Number:		180827			_	Sample ID:		NA		
Site Location:		Marquette,	, MI		_	Well Type:		2" 54	luan 2d	
Weather/Temp.:		74°	, som	clos ds	-	Key Number:		_ 035	6	_
INSPECTION	f Hat him	101 N. 104			ani - Alka	ion Sheet Med 1				
Label on well?			YES / NO / R	EMEDIED		Is cement pad in goo	d repair?		YES / NO / RE	MEDIED N/A
Is reference mark v	isible?		YES / NO/ R	EMEDIED		Is protective casing lo	ocked and in goo	d repair?	NO / RE	MEDIED
Standing water pre	sent?	-	YES / NO / R			ls inner cap in place a	and properly seal	ing well?	YESDNO / REI	MEDIED
Indication of surfac	e runoff in we	117	YE INO/ R	EMEDIED		ls well casing in visib	ly good repair?		(10 / RE	MEDIED
Repair Notes:										
STATIC WATER LEV	/EL	472 S. T	DATE:	5/20/18		TIME: 1209	45 Au-4			에 발망하지, 사람이
Top of Casing Elev	ation:		M	ft		Measured with:	C	Electronic tape	/ Chalked tape / Other:	
Depth to Water:		+0.	30	ft		Well depth verified?		CEST NO		
Elevation of Water			•):	ft						
WELL PURGING		net a s	DATE: 5	130/18	osti den s	TIME: 12:12		장 영화 나는	Starffield and a	
CALCULATION OF 3	CASING VOLU	JMES				PURGE METHOD:				
Depth of well from	тос	29.	44	ft		Bailer / Grundfos / P	eristaltic / Bladde	er / Other:	while	
Depth to water		+(0	. 30	-ft		Equipment #:	603	-		
Height of water col	umn	= 29	.74	Int				7		
Conversion factor		×(Q.	49	1		Conversion Factor	rs (gallons/ft)	1		
3 Water volumes		= -	1.57	gallons		1.25" well -0.20	4" well - 1.96			
Actual volume purg	ged:	~10	0	gallons		2" well - 0_49	8" well - 7,83			
WATER QUALITY S	TABILIZATION	(If required	d)			15000793013				김희 방문 문문에
Time	Volume F		рН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
12:12	(-start)	ourge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
12:15	3		7.56	NA	NA	(AQ)	NA	1000		
12:19	4		8.11	NA	NA	NA 13.4	NA	Sta 118	sweed do .	t ~ beal
1339	orsta-L	une.		NA	NA	NA	NA	NA	1	" " God
1341	X	1.0	7.77	NA	NA	Mr 9.4	NA	HAT1267		
1342	10		9.54	NA	NA	NA 9.6	NA	ptx 951	sweed to	at 10 acl t
				NA	NA		NA	NA	- Sicono	1 s-ftenat
FIELD ANALYSES	通過 18台		DATE:	E PRIMA		TIME:	- 말문 문 때	Peak line		
Temperature:			NA	°C		Carbon	n Dioxide:	NA	mg/L HACH CA-DT	RL = 10mg/L)
pH:				S.U.		Sulfide		NA	mg/L HACH HS-WR	(RL = 0.0Smg/L)
Specific Conductan	ce:		NA	_µmhos/cm		Ferrou	s 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 COLLECTIO	ON		DATE:			TIME:		within Salahan		
Sample appearance	e: 🔪							Duplicate samp	le collected?	YES / NO
Collection method:		Bailer / Gru	Indfos / Peris	staltic / Bladder /	Other:			MS/MSD samp	le collected?	YES / NO
Equipment #:								Chain of Custo	dy Number;	
Filter used:		0.45 µm (8	100) / 0.45 µ	m (8200) / NONE						
Quantity	Size	Тұре	Filtered		Preservati	ve			Parameters	
	40 mL	Glass	Yes No	None	Construction of the second sec	H ₂ SO ₄ NaOH	-			
	250 mL	Plas c	YEN	A NOT	MTH9/	TO NOT		-		
	500 mL	Plas c	1. NE	1 16.2	H.O.		-			
	500 mL	Plastic	Yes No	None	HCI HNO₃	H₂SO₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO₃	H₂SO₄ NaOH				•
SAMPLING PERSO	and a second second			-						

						COLLECTION				
Project Name:			as ASD & GW	Monitoring	.	Monitoring Location	:	-MW-	<u> </u>	
Project Number:		180827			5	Sample ID:		NA	LAND I	
Site Location:		Marquette,			. ;	Well Type:			alvanized	
Weather/Temp.:		70, 50	my			Key Number:		0350		
INSPECTION	Control in St	w	512181			anti g _{el} geografi	Meen St	A Hoger		nikersi retenin
Label on well?			YES OR / RI	EMEDIED		ls cement pad in goo	d repair?		YES / NO / F	
is reference mark	visible?		YES 100 / RI	EMEDIED		Is protective casing I	ocked and in goo	d repair?	YBY NO / F	REMEDIED
Standing water pr	esent?		B/NO/RI			ls inner cap in place	and properly seal	ing well?	(YES/NO/F	REMEDIED
Indication of surfa	ice runoff in w	ell?	YES OO / RI	EMEDIED		is well casing in visib	ly good repair?		CE / NO / F	REMEDIED
Repair Notes:										
STATIC WATER LE	VEL			120/18		TIME: 11.43	1169,508,7		Reins - I Adei	
Top of Casing Elev	ation:	-	РМ	ft		Measured with:	C		/ Chalked tape / Oth	er:
Depth to Water:		0	.70	ft		Well depth verified?		YES/NO		
Elevation of Wate	er:	. <u></u>		ft						- C
WELL PURGING	di Mananin		DATE: 5/	30/18	- 2 1 0 2	TIME: 145				
CALCULATION OF			0.5			PURGE METHOD:				
Depth of well from	n TOC		.92	ft		Bailer / Grundfos / P		er / Other:	whale	
Depth to water			.70	ft		Equipment #:	607	-		
Height of water co	lumn			ft				1		
Conversion factor		X(0.49	1		Conversion Facto				
3 Water volumes		-12	2.8 5	gallons		1.25" well - 0.20	4" well - 1.96	-		
Actual volume pu		-	5+3)	gallons		2" well - 0.49	8" well - 7,83]		
WATER QUALITY		and the second se		Spee Card	Dissolved O ₂	Tarran	E.	Trucksoften		
Time	Volume		рН (с.н.)	Spec Cond		Temperature	Eh	Turbidity		
1145	←start		(S.U.) 8.0	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
1149	5		8.01	NA	NA	HA 12.9	NA	א רטר אי	pursed day	nt ~ Jgal
1320	ristant	purge	50	NA	NA	NA LO D	NA	NA	4	
1321			7.59		NA	NA 10.0	NA	MA25041	2	
1322	¥		8.28	NA	NA	I.CI MA	NA	NA 10.55 M		time.
				NA	NA	NA	NA	NA	- ncond	7102
FIELD ANALYSES	出版。 相關。		DATE:		INA	TIME:		INA	AND REAL PROPERTY.	
Temperature:			NA	°C			n Dioxide:	NA	mg/L HACH CA-D	T (RL = 10mg/L)
pH:		-		- S.U.		Sulfid		NA		/R (RL = 0.05mg/L)
Specific Conducta	nce:		NA	µmhos/cm		Ferrol	s Iron (Fe ⁺²):	NA	mg/L HACH IR-18	C (RL = 0.2mg/L)
Eb:			NA	mV						
Dissolved O ₂ :		2	NA	mg/L						
Turbidity:			NA	NTU						
SAMPLE COLLECT	ION	iliyini .	DATE: ~	in a spect	in kan	TIME:			Sfaster Pres	이 이는 물 수는 지원한
Sample appearance	ce:). 					6	Duplicate samp	le collected?	YES / NO
Collection method	1:	Bailer / Gru	Indfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	le collected?	YES / NO
Equipment #:		-		3í				Chain of Custo	ly Number:	
Filter used:		0.45 μm (8	100) / 0.45 µ	m (8200) / NON						
Quantity	Size	Түре	Filtered		Reservation	/e			Parameters	
	40 mL	Glass	Yes No	None		NaOH				
	250 mL	Plas	Y=NT-	1 Ngr	H OT	TO NOT	5			
	500 mL	Plasic	S. NC	7-10.2].7HQ,7	201211	-			
	500 mL	Plastic	Yes No	None	HCI HNO3 I	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3 I	H₂SO₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO3 I	H ₂ SO ₄ NaOH				
								STATE OF STREET	In a shuft of the	
SAMPLING PERSO	INNEL		7						and the second sec	and the second se

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Project Name:		MBLP/Shira	s ASD & GW			Monitoring Locat	ion:	M	W-3	
Project Number:		180827				Sample ID:		NA		
ite Location:		Marquette,	МІ		-	Well Type:		2"	alumized	
Weather/Temp.:	10	2			-	Key Number:		035	6	
NSPECTION	Ball She		2 ¹ .999	TWEAT IL	program			ang at the	ly shrennuð	
abel on well?			YES MO / RE	MEDIED		ls cement pad in g	ood repair?		YES / NO / F	REMEDIED NA
reference mark vi	sible?		YES NO/ RE			ls protective casin	g locked and in goo	od repair?	CAR / NO / F	REMEDIED
tanding water pres	ent?		10 / NO / RE			ls inner cap in pla	ce and properly sea	ling well?	YES / NO / F	REMEDIED
ndication of surfac	e runoff in we	-	YES NO/ RE			Is well casing in vi	sibly good repair?		(YES / NO / H	REMEDIED
Repair Notes:										
TATIC WATER LEV	EL			30/18		TIME: 11.10		210-11		19-2-2-14 P (1940)
op of Casing Eleva	tion:	2	M ·	ft		Measured with:	(Electronic tape	/ Chalked tape / Oth	er:
Depth to Water:		0.1	9	ft		Well depth verifie	d?	YES / NO		
Elevation of Water		-		ft						
VELL PURGING	15.5.1	- He Hearthe	DATE: 5	130/18	w i an i	TIME: 1120		1-2-5-57	A semician dis	
ALCULATION OF 3	CASING VOLU					PURGE METHOD:				
Depth of well from			10.1	ft			/ Peristaltic / Bladd	ler / Other:	whele	
Depth to water		-(D	.90	ft		Equipment #:	603			
leight of water col	JMU	= 28		ft			1000	-		
onversion factor	1	×(0,				Conversion Fa	ctors (gallons/ft)			
Water volumes	2	= 13	/	gallons		1.25" well - 0.20				
ctual volume purg	ed:	5	109	gallons tot	۹	2" well - 0.49	8" well - 7.83			
VATER QUALITY S	ABILIZATION	lif required	10	ALES ULA	IS MURAN	UNER AUX DESCRIPTION		in second	A Statistics	
Time	Volume P		pН	Spec Cond	Dissolved C	D ₂ Temperature	Eh	Turbidity	I	
	←start g		(S.U.)	(µmhos/cm)	(mg/L)	(10)	(mV)	(NTU)	il.	
1124	()(())	-	8.61	NA	NA		NA	PA3671	pryed day	2 Seel
103 5	restart			NA	NA	NA	- NA	NA	Frank	
304	6	3m.se	6.95	NA	NA	NA 11.2	NA	NA 1 4+93	44	
1305	5		7.82	NA	NA	WA 8.7	NA	NA 98 NTU		A Qualli
1205	-		1.05	NA	NA	NA	NA	NA	po per comp	A 9 salli
				NA	NA	NA	NA	NA		
FIELD ANALYSES			DATE:	a state of the	. J.E P. Down	TIME:	Terres all as all a			
Cemperature:			NA	°C		Car	bon Dioxide:	NA	mg/L HACH CA-D	T (RL = 10mg/L)
pH:				s.U.		Sul	fide:	NA	- mg/L HACH H5-V	VR (RL = 0.05 mg/L)
Specific Conductan	ce:		NA	- μmhos/cm		Fer	rous Iron (Fe ⁺²):	NA	- mg/L HACH IR-18	3C (RL = 0.2mg/L)
Eh:			NA	mV						
Dissolved O ₂ :			NA	- mg/L						
Furbidity:			NA	NTU						
AMPLE COLLECTIO	ON		DATE:			TIME:				
ample appearance								Duplicate sam	ple collected?	YES / NO
Collection method:		Bailer / Gru	undfos / Peris	taltic / Bladder ,	/ Other:			MS/MSD samp	-	YES / NO
Equipment #:	1		-,	,				Chain of Custo		
Filter used:		0.45 um /8	100) / 0.45 1	m (8200) / NON	E					
			and a second particular part	,,//						
Quantity	Size	Туре	Filtered		Preserva	itive			Parameters	
	40 mL	Glass	Yes No	None	HCI HNO3	HISON NOOH				
	250 mL	Plas 🤇	YON	Ner	HO HO	120- N=	The			
	\$00 mL	Plas c	1.7 NL-	1 18.2	т. Но,	1.20.0.21	(her	~		
	S00 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3	H₂SO₄ N∂OH				
	1000 mL	Plastic 2	Yes No	None	HCI HNO₃	H₂SO₄ NaOH				
SAMPLING PERSO	NNEL 1			/	Section (1991년 - 18 <u>11</u> 년 -	
Name (SIGNATUR	VI	0	-			Name (SIGNATU				

Project Name:	22	MBLP/Shira	as ASD & GW	Monitoring	-	Monitorin	g Location	n:	MW	1-4		
Project Number:		180827			2	Sample ID: Well Type:			-N/A	-		
Site Location:	-1	Marquette			2			2 PUL	2" NL FM			
Weather/Temp.:	/eather/Temp.: <u>64° and and</u>		-	Key Number:N		_N/A						
INSPECTION		1. CONTRACTOR			1602635		4			net of the second	1012	i dan i
Label on well?			YES NO / R			Is cement	pad in goo	od repair?		(YES)	NO / REME	DIED
Is reference mark v	/isible?		(B) NO / R	MEDIED		ls protecti	ve casing	ocked and in goo	d repair?	YES	NO / REME	DIED
Standing water pre	sent?		YES 🔊 / R	MEDIED		ls inner ca	p in place	and properly sea	ling well?	CYESY	NO / REME	DIED
Indication of surfac	e runoff in wel	11?	YES NO/ R	MEDIED		ls well cas	ing in visib	oly good repair?		CES	NO / REME	DIED
STATIC WATER LEV	/EL			30/18		TIME:	128		1.0.1.0			
Top of Casing Elev	ation:	NI		ft		Measured	with:	(Electronic tape	Chalked tape	/ Other:	
Depth to Water:	34	15	35	ft		Well dept	n verified?		YES/NO			
Elevation of Water	n	-	<u> </u>	ft								
WELL PURGING	and Argenting	hi li e	DATE: 5	30/18	TE THE	TIME:	301	(1940 (APS)	14 IC-10	1 ¹¹ 1 ¹¹ ~ 1 ¹ m	" n"-v	Silvestille 9
CALCULATION OF 3	CASING VOLU	MES				PURGE MI	THOD:	\smile				
Depth of well from	тос	46.	73	ft		Bailer / Gr	undfos / P	Peristaltic / Bladdo	er / Other:	whole		
Depth to water	1	-(15	.35	9		Equipmen	t#:	603	2			
Height of water col	lumn r	= 31	. 34 .	ft					-			
Conversion factor	2	X (🛛 🔊	.49)	1		Conver	sion Facto	rs (gallons/ft)	* 14:41	- purget topic at (3.dd	dry	9 200
3 Water volumes	1	= 15.	39 1	gallons		1.25" w	ell - 0.20	4" well - 1.96		the at	8.5	(t
Actual volume purp	ged: 8.5(5.	5+3)	gallons		2" well -	0.49	8" well - 7.83		13.11	Hend	aloni
WATER QUALITY S	TABILIZATION	(if require	d)	4 6 - 2	4 7 E Y 1 A		1000	9-4-48 - 6			1.0 1.1	Janois
Time	Volume Pu	urged	pН	Spec Cond	Dissolved O ₂	Tempe	erature	Eh	Turbidity			
910	←start p	urge	(S.U.)	(µmhos/cm)	(mg/L)	AD (°	C)	(mV)	(NTU)			
0946	5.5		7.46	NA	NA	NA //	.6	NA	NA 23.6	+ PURGES	pry (25.55
-AAA	++		NM	NA	NA	NA		NA	NA-	WILL LET		
- 1/4 -	40.5	-	NM	NA	NA	NA		NA	NA	SAMPLE		
1446	restation	me		NA	NA	NA		NA	NA	++ PETU	ENED T	o pure
1447	7	0	7.50	NA	NA	NA 9	9	NA	WA 401	Day A =		
14/15	8		7.70	NA	NA	NA G.	7	NA	NA 30 2	SUL= ZZ	. 33	
FIELD ANALYSES	an a	i liereet	DATE: -		S. E. J. B. L.	TIME:	- instit	The second		CAN SIN		
Temperature:			NA	°C			Carbo	n Dioxide:	NA	mg/L HACH	CA-DT (RL	= 10mg/L)
pH:	-	A	14	s.u.			Sulfide	e:	NA	_mg/L HACH	HS-WR (RL	= 0.05mg/L)
Specific Conductan	ice:		NA	µmhos/cm			Ferrou	us 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 COLLECTIO	ON	Second 1	DATE:	N Sain Sin		TIME:	-	Asser Nucley		and an interest	118-2.41	tenres au
Sample appearance	e: _							-	Duplicate sam	ple collected?	•	YES / NO
Collection method		Bailer / Gru	undfos / Peris	taltic / Bladder ,	/ Other:				MS/MSD samp	ole collected?		YES / NO
Equipment #:		_		-					Chain of Custo	dy Number:		
Filter used:		0.45 µm (8	1100) / 0.45 µ	m (8200) / NON	E							
Quantity	Size	Туре	Filtered	1	Preservat	ve				Parameters		
	40 mL	Glass	Yes No	None	HCI HNO3	H ₂ SO ₄ Nat	ЭН					
	250 mL	Plas c	Y-N	/ Ngr	HO HO	2 4 1 3		ū				
	\$00 mL	Plas c	N. VINC	1 10.2	1.2 н.о,	30.10	11	L				
						11.00						
	500 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ Na(Л					
		Plastic Plastic	Yes No Yes No	None	HCI HNO3	H ₂ SO ₄ Nat H ₂ SO ₄ Nat						

Project Name:		MBLP/Shir	ras ASD & GW	/ Monitoring	- 1	Monitoring Locatio	on:	MW-S	5
Project Number:		180827				Sample ID:		NA	
Site Location:		Marquette	e, MI		-	Well Type:		2" PI	
Weather/Temp.:		63°,	overast		-	Key Number:		N/A	
INSPECTION	14n8 = 44m			11. 12.			n his south is		
Label on well?			YES / NO / A	EMEDIED		ls cement pad in go	od repair?		NO / REMEDIED
ls reference mark	visible?	- 3	TES / NO / R			ls protective casing		od repair?	VES) NO / REMEDIED
Standing water p	esent?		YES NO/ R	EMEDIED		ls inner cap in place			YES/ NO / REMEDIED
Indication of surf	ace runoff in w	/ell?	YES / NOT R	EMEDIED		ls well casing in visi			(YES/ NO / REMEDIED
Repair Notes:			1.554						
STATIC WATER L	VEL	16 N N	DATE: 5	130/18	A DUNCTION	TIME: 8:50	120-11 R 117		Weight and the state of the state of the
Top of Casing Ele	vation:	-	÷.	ft		Measured with:		Electronic tap	/ Chalked tape / Other:
Depth to Water:		14	,79	ft		Well depth verified	?	YESYNO	
Elevation of Wate	er:			_ft				\mathcal{O}	
WELL PURGING		(ha sann	DATE: S	130118	(90 <u>,9171</u>)	TIME: \$:59	- 1. I. I. I 7		
CALCULATION OF	3 CASING VOL	UMES				PURGE METHOD:			
Depth of well from	n TOC	40	1.75	ft		Bailer / Grundfos / I	Peristaltic / Bladd	er / Other: 🔥	WHALE
Depth to water		-114	1.79	-17		Equipment #:	# 603	=0	
Height of water co	olumn	= 29	96	ft					
Conversion factor		X(0.4	19	2/		Conversion Facto	ors (gallons/ft)]	
3 Water volumes		= 14	. 68 .	gallons		1.25" well - 0.20	4" well - 1.96		
Actual volume pu	rged:	17	.D	gallons		2" well - 0.49	8" well - 7.83]	
WATER QUALITY	STABILIZATIO	N (if require	d)		اللا الكاريا	Tele In cardo.	nar an la fo	VIII A	
Time	Volume	Purged	рH	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	TURSHONY: TOBAN, TEMP: 11.192
8708	10		7.48	NA	NA	NA	NA	NA	TU 2011 17 199 NTO TEMPII.0 "L
5215	15		7.42	NA	NA	NA	NA	NA	TUR. 11.5 NTS TENS: 6.7"
				NA	NA	NA	NA	NA	
				NA	NA	NA	NA	NA	1
				NA	NA	NA	NA	NA	
FIELD ANALYSES	Verticator II	1 10 21	DATE: 51	30/13	NE (PAS)E	TIME: 017		All Contraction	
Temperature:		10.2 -		°C		Carbo	on Dioxide:	NA	_mg/L HACH CA-DT (RL = 10mg/L)
pH:		7.41	v	S.U.		Sulfid	e:	NA	_mg/L HACH HS-WR (RL = 0.0Smg/L)
Specific Conducta	nce:		NA	_µmhos/cm		Ferro	us Iron (Fe ⁺²):	NA	mg/L HACH IR-18C (RL = 0.2mg/L)
Eh:			NA	mV					
Dissolved O ₂ :			NA	_mg/L					
Turbidity:	7	12.8 -	NA	NTU .	÷				
SAMPLE COLLECT	ON	HE CE	DATE:		18 E SHARE	TIME:			
Sample appearance	e:						2	Duplicate sam	ple collected? YES / NO
Collection method	:	Bailer / Gru	Indfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	le collected? YES / NO
Equipment #:								Chain of Custo	dy Number:
Filter used:		0,4S µm (8	100) / 0,4S µ	m (8200) / NONE					
Quantity	Size	Түре	Filtered		Preservativ	/e			Parameters
	40 mL	Glass	Yes No	None	HCI HNO, H	H₂SO₄ NaOH			
	250 mL	Plas c	YIN	Ner:	MTH O'	205 N. 4	b		0
	500 mL	Plasc	1. NC -	1-00	<u>-</u> 2HQ7.	2012211	4-		
	500 mL	Plastic	Yes No	None	HCI HNO3 H	1₂SO₄ NaOH			
	500 mL	Plastic	Yes No	None	HCI HNO3 H	I ₂ SO ₄ NaOH			
1	1000 mL	Plastic	Yes No	None	HCI HNO3 H	l₂SO₄ NaOH			
SAMPLING PERSO	NNEL	/	e				建也是历时		
Name (SIGNATU	RE): The	1 5	>			Name (SIGNATURE)			

		MBLP/Shiras	ASD & GW Monit	oring	Monitoring Lo	ation:	MW-1			
Project Numbe	er:	180827			Sample ID:		MBLPS-18-0S-N	IW-1(I/MS/MS	D)	
Site Location:		Marquette, N	41		Well Type:		2" as	varied		
Weather/Temp	p:	75 SWA	my some	chirds	Key Number:		03	varied 56		-
NSPECTION	in series in	-					Store Providence	11. 15	web form	
abel on well?			YES /MO/ R	EMEDIED	Is cement pad	in good repair?			YES / NO / REN	AEDIED NA
reference ma	ark visible?		YES / NOT R		ls protective ca	ising locked and ir	good repair?		(NO / REN	AEDIED
tanding water	present?		NO / R	EMEDIED	ls inner cap in	place and properly	sealing well?		AND / REN	AEDIED
ndication of su	urface runoff i	n well?	YES / 🐼 / R	EMEDIED	Is well casing i	visibly good repa	ir?		YES NO / REN	AEDIED
epair Notes:	casing	full ;	of nation		ted out	Appeo 1	$2^{\circ} \alpha = M.i$	t.		
TATIC WATER		the loss	DATE: 5/3)	118	TIME: 150	-3	qual de "tar"	h un un	radia en	W. S. W. S. S.
Fop of Casing E	Elevation:	NM	ft	/	Measured with		Electronic tape	/ Chalked tape	/ Other:	
Depth to Wate	er:	0.04	ft		Well depth ver	ified?	YES / QO			
levation of W	'ater:	-	ft	* 7.0	LED P A		S			
VELL PURGING	G		DATE: 5/31		TIME: 15		TOE IN P	105 10 #	178/0"[[US'TADILIZE
urge Method:		PERISTALIC		O BLADDER / OTHER:			2.5	ft from	TOC or 🗸 t	ottom
quipment No.:			52	,		,			`	
Aeasured well		29.44		- Screen length:	5	ft	Depth to screer	n midnoint:	26.94	ft
		r 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)
1618	6.)	ч	6.10	140	7.64	14.3	1357	14.0	472	0.29
621	6		6.11	140	7.63	14.9	134	21.0	471	0.30
624	6.1		6.11	140	7.62	14.9	1378	21.)	471	0.36
1627	6.1		6.11	140	7.62	14.8	1370	20.0	470	0.29
/olume:	2.1	(Gallons)		Stabilization Criteria:	±0,1	±3%	±3%	±10% for values >20	±10 mV	±10%
IELD ANALYSE	s	応告書	DATE: 431	118	TIME: 162	8	문지 문이 전자			
emperature:		14.9	•c	Carbon Di	ioxide:	NA	_mg/L	HACH CA-DT (RL = 10 mg/L)	
DH:		7.62	s.u.	Sulfide (S	⁻²):	NA	mg/L	HACH HS-WR	(RL = 0.0S mg/L)	
Specific Conduc	ctance:	1367	µmhos/cm	Ferrous Ir	on (Fe ⁺²):	NA	mg/L	HACH IR-18C	(RL = 0.2 mg/L)	~
ih:		469	mV							
issolved Oxyge	en:	0.29	mg/L							
urbidity:		14.5	NTU							
AMPLE COLLE	CTION	Huitsine -	DATE: 5/ ?	1/18	TIME:) 62	91			企业上标	
	ance:	-ila	ar			-1	Duplicate samp	le collected?		YES /MO
	hod: 🏑	PERISTALTIC	BLADDER / MICF	O BLADDER / OTHER:			MS/MSD samp			YES / NO
Sample appeara			52	-			Chain of Custoo	dy Number: Ap	PXIN GOU	20361
Sample appeara		0.45 um (810)0) / 0.45 μm (820	DINNONE			Chain of Custo	dy Number: Ap	px IV	0000
ample appeara										2060 CR-
ample appeara collection meth quipment No.: ilter used:								Para	ameters	
ample appeara ollection meth quipment No.:	Size	Түре	Filtered		Preservative	NaOH				
ample appeara ollection meth quipment No.: Iter used:	Size 40 mL	Type Glass	Yes No	None HCI	HNO3 H2SO		1	ALLEAN		
ample appeara ollection meth quipment No.: Iter used: Quantity	Size 40 mL 125 mL	Type Glass Plastic	Yes No Yes No		HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂		6	041501		
ample appears ollection meth quipment No.: lter used: Quantity 3	Size 40 mL 125 mL 500 mL	Type Glass Plastic Plastic	Yes No Yes No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None		6		Fl Calcium	~¥
ample appears ollection meth quipment No.: lter used: Quantity 3 3	Size 40 mL 12S mL 500 mL 500 mL	Type Glass Plastic Plastic Plastic	Yes No Yes No No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None		6	Boron	n, Calcium 🖌	
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3	Size 40 mL 125 mL S00 mL S00 mL S00 mL	Type Glass Plastic Plastic Plastic Plastic	Yes No Yes No No No	None HCI	HNO ₃ H ₂ SO, HNO ₃ H ₂ SO, None None HNO ₃			Boron Cl, Fl, p	n, Calcium 🖌 H, TDS, SO ₄	
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3 3 3	Size 40 mL 125 mL S00 mL S00 mL S00 mL S00 mL	Type Glass Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None HNO ₃			Boron Cl, Fl, p Ba, Be, Cd, Cr,	n, Calcium H, TDS, SO₄ Co, Pb, Hg, Mo,	Se, TI, LI
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3	Size 40 mL 12S mL S00 mL S00 mL 500 mL 1000 mL	Type Glass Plastic Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No No No	None HCl None HCl	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None HNO ₃ HNO ₃	NaOH		Boron Cl, Fl, p Ba, Be, Cd, Cr,	n, Calcium 🖌 H, TDS, SO ₄	Se, TI, LI
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3 3 3	Size 40 mL 12S mL 500 mL 500 mL 500 mL 1000 mL 1000 mL	Type Glass Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None HNO ₃	NaOH		Boron Cl, Fl, p Ba, Be, Cd, Cr,	n, Calcium H, TDS, SO₄ Co, Pb, Hg, Mo,	Se, Tl, Li

Appendix B

User Selected Options Date/Time of Computation From File Full Precision

ProUCL 5.17/27/2018 2:26:36 PM WorkSheet_a.xls 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)?

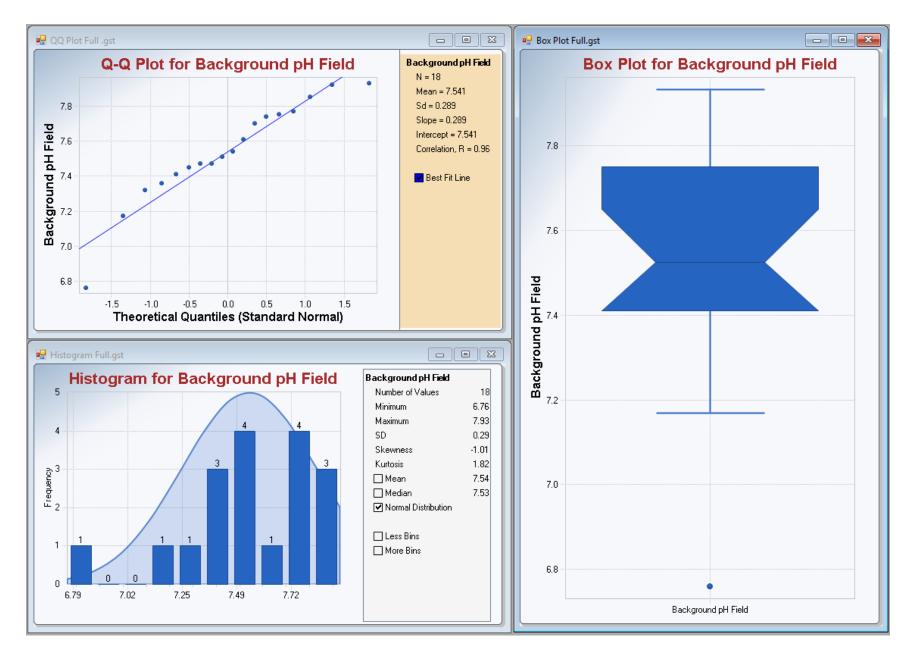
Test Statistic: 0.131

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		
Character MARIL Track Charlester	0.000 Charles Mills COF Tast	

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 Statistics	
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

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	6.56
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

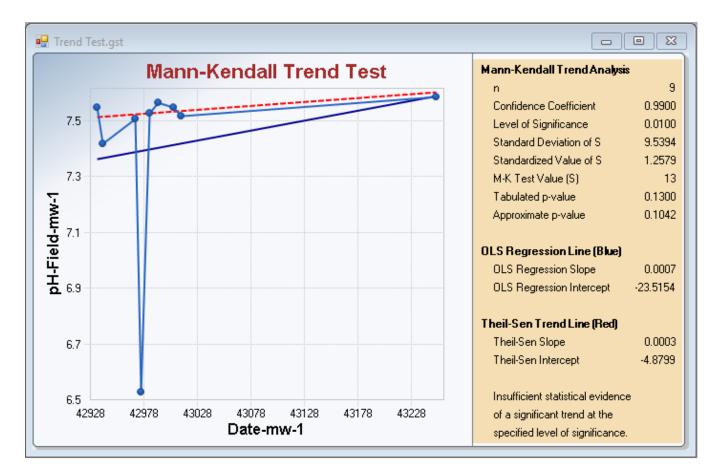
Insufficient evidence to identify a significant trend at the specified level of significance.

pH-mw-3

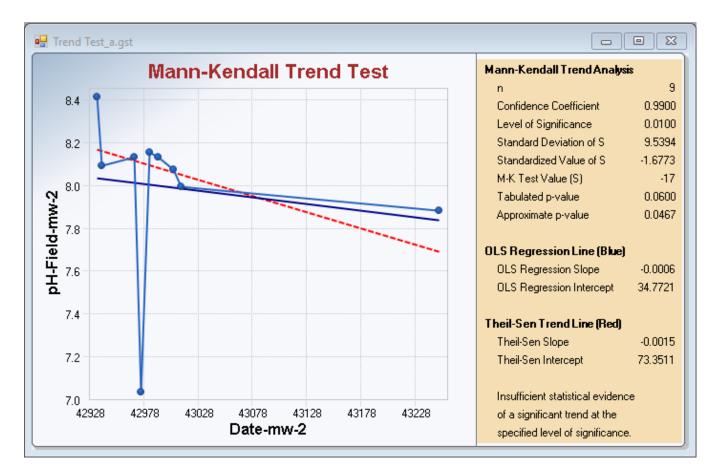
General Statistics	
Number of Events Reported (m)	9
Number of Missing Events	0
Number or Reported Events Used	9
Number Values Reported (n)	9
Minimum	6.32
Maximum	8.1
Mean	7.763
Geometric Mean	7.744
Median	7.86
Standard Deviation	0.556
Coefficient of Variation	0.0716

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

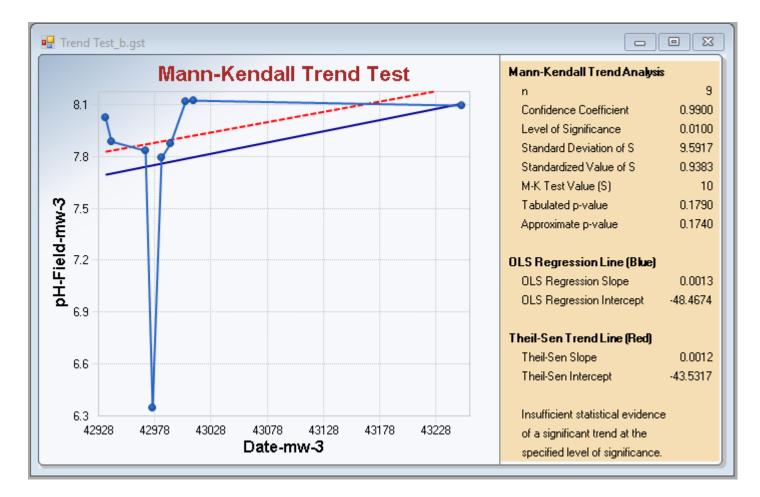
Insufficient evidence to identify a significant trend at the specified level of significance.



Trend Analysis for MW-1



Trend Analysis for MW-1



Trend Analysis for MW-1

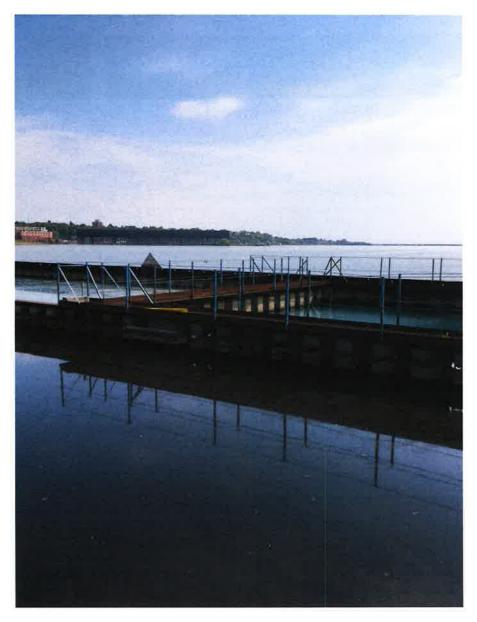
Appendix B

Fishbeck, Thompson, Carr & Huber, Inc.

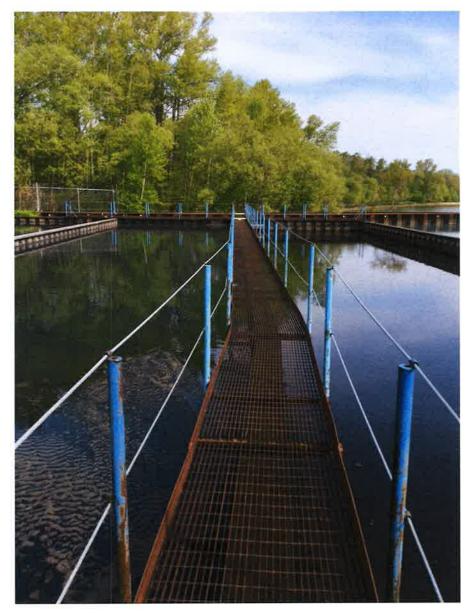
MBLP/Shiras ASD & GW Monitoring.

Marquette, MI





Retention ponds, facing NNW.



Retention ponds, facing W.



180827

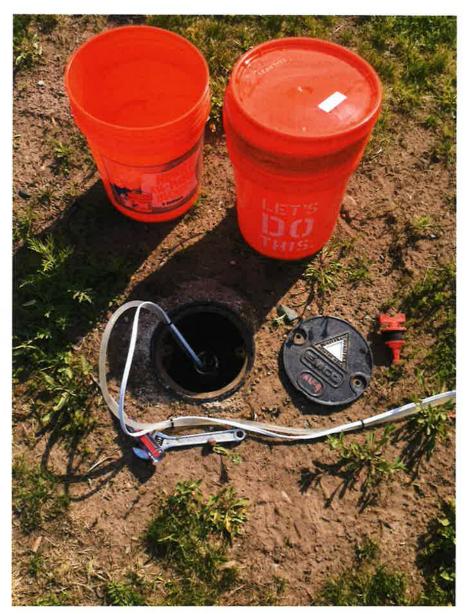
Date: 5/31/2018

18 Project Name:

MBLP/Shiras ASD & GW Monitoring.



Well development (MW-4)



Well development (MW-4)



Project No.: 180827

Date: 5/31/2018

018 Project Name:

MBLP/Shiras ASD & GW Monitoring.



Equipment decon between locations.

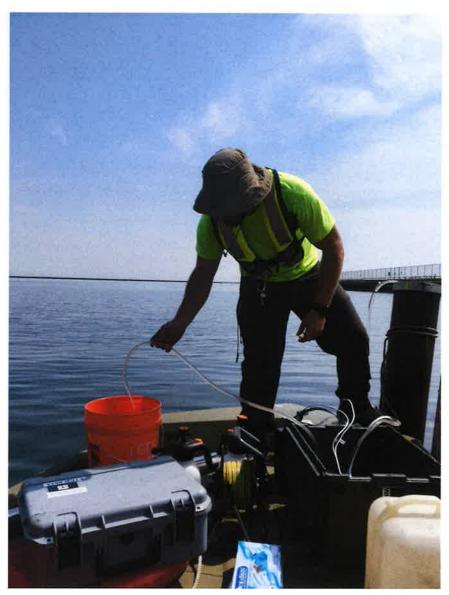


Dumping of development water.





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)



e: 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	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		4709695-11077	S.U.	7.06	21.1	6.9 - 7.1	4513
	10.00	442504-01117	S.U.	9.99		9.9 - 10.1	010
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	4410
Notes:							#41D

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827		2				
Date/Time:	5/30/18 123	25	• •				
Initials:	AD		«			NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
pН	7.00	4709645-110817	S.U.	7.02	23.2	6.9 - 7.1	YSI PP
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:							
	~						



Project Name:		& GW Monitoring	-				
Project Number:	180827		-				
Date/Time:	5130118 1500						
Initials:	<u>A</u> [3		-			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	13, P.P. # 55551
Specific Conductance	1412		µmhos/cm			1342 - 1484	
Eh	Zobell's solution		mV				
Dissolved Oxygen	NA	NA	mg/L			±10% Theoretical:	
Turbidity	10 NTU	A6272	NTU	9.22	NA	9 - 11	1. 2020 We #450
Notes:							
		×					
			24				
			÷				

EQUIPMENT CALIBRATION FORM

ate/Time: $5/31/1/8 \ jooo$ NA = Not ApplicableNA = Not ApplicableNA = Not ApplicableParameterCalibration Verification Acceptance WindowParameterStandardLot NumberUnitsMeasured ValueCalibration Verification Acceptance WindowH7.00 $4/0/6/25 - 1/0/277S.U.3.9 \cdot 4.17.004/0/6/25 - 1/0/277S.U.3.9 \cdot 4.17.004/10/6/25 - 1/0/2777S.U.3.9 \cdot 4.17.004/10/6/25 - 1/0/2777S.U.3.9 \cdot 4.17.0941/856.9 \cdot 7.19.9 \cdot 10.19/51 \ P.?.ecificonductance1475/180208 \cdot 1/C2/180208 \cdot 2/A2/180208 \cdot 2/A2/180208 \cdot 2/A2/180208 \cdot 2/A2/180208 \cdot 2/A2/180208 \cdot 2/A2/180208 \cdot 2/2622 \cdot 2/26$	Project Name:	MBLP/Shiras ASD	& GW Monitoring	-				
AFSNA = Not ApplicableParameterStandardLot NumberUnitsMeasured ValueCalibration Verification Acceptance WindowInstrument Model NumberH4.0046/28/4/-0.011/7S.U.3.98 7.0018.53.9-4.1 6.9-7.1YS 1 P.P.H7.0046/28/9/-0.011/7S.U.7.04 9.9-10.118.56.9-7.1 9.9-10.1YS 1 P.P.pecific onductance147\$6/80208-1/2 1265µmhos/cm1/4/1 28/02-28-2A18.7132-162 26/2132-162 26/2hZobell's solution208208-7/2 2013-3-22µmhos/cm1/4/0 28/0218.8132-8-4445.81issolved OxygenNANAmg/L9.231/9-8110% Theoretical: 7.094urbidity10 NTUAc272NTU9.75-9.11L-202-4444	Project Number:	180827						
ParameterStandardLot NumberUnitsMeasured ValueMeasurement Temperature (°C)Calibration Verification Acceptance WindowInstrument Model NumberH 4.00 $4(23941 - 6(11/7)$ S.U. 3.98 1.000 $3.9 - 4.1$ $3.9 - 4.1$ $3.9 - 4.1$ 7.00 $4704035 - 110937$ S.U. 7.04 1.85 $6.9 - 7.1$ $9.9 - 10.1$ $9.9 - 10.1$ 10.00 $4612804 - 0111(7)$ S.U. 10.920 $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ pecific onductance 147 $5(180208 - 1c)$ $1/4/10$ 18.7 $132 - 162$ 1412 $5(180208 - 2A)$ μ mhos/cm $1/4/10$ 18.7 $1342 - 1484$ 2765 $5(13010^3 - 3c)$ μ mhos/cm 2802 $2628 - 2905$ hZobell's solution $2082045 - 1$ mV $423 \cdot 5$ 18.8 $925 \cdot 8 - 4445 \cdot 8$ issolved OxygenNANAmg/L 9.20 19.8 110% urbidity 10 NTU $A(a272)$ NTU 9.75 $ 9-11$ $L.202 \cdot 444$	Date/Time:	5131/18 10	00	-				
ParameterStandardLot NumberUnitsMeasured ValueTemperature (°C)Verification Acceptance WindowInstrument Model NumberH 4.00 $4612841-6111/7$ S.U. 3.98 $3.9-4.1$ $9.9-4.1$ $9.9-4.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ $9.9-10.1$ <t< th=""><th>Initials:</th><th>APS</th><th></th><th></th><th></th><th></th><th>NA = Not</th><th>Applicable</th></t<>	Initials:	APS					NA = Not	Applicable
H 7.00 $4703035 - 1102917$ S.U. 7.04 185 $6.9 - 7.1$ $YS1 \ P.P.$ 10.00 $4412804 - 011117$ S.U. 10.200 $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $9.9 - 10.1$ $132 - 162$ $132 - 162$ $132 - 162$ $132 - 162$ 18.7 $1342 - 1484$ 9.1 9.1 9.1 9.1 9.1 $9.1 - 202 - 9.1$ 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 <t< th=""><th>Parameter</th><th>Standard</th><th>Lot Number</th><th>Units</th><th>Measured Value</th><th>Temperature</th><th>Verification</th><th>instrument Model/IC Number</th></t<>	Parameter	Standard	Lot Number	Units	Measured Value	Temperature	Verification	instrument Model/IC Number
$\frac{1000}{1000} = \frac{11000}{1000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{110000}{10000} + \frac{100000}{100000} + \frac{1000000}{10000000} + 1100000000000000000000000000000000000$		4.00	4612941-61117	S.U.	398		3.9 - 4.1	
$ \begin{array}{ c c c c c c c } \hline 10.00 & 4672804 - 011117 & S.U. & 10.20 & 9.9 - 10.1 & 14729 \\ \hline 1412 & 56780208 - 1C & \mu mhos/cm & 1/61 & 18.7 & 132 - 162 \\ \hline 1412 & 56780208 - 2A & \mu mhos/cm & 1/4/0 & 18.7 & 1342 - 1484 \\ \hline 2765 & 5673073 - 3C & \mu mhos/cm & 2802 & 2628 - 2905 & 2628 - 2905 \\ \hline h & Zobell's solution & 2082045 - 1 & mV & 429 - 5 & 18.8 & 425 - 8 - 445 - 3 & 18.7 & 10.00 & 10.00 & 10.00 & mg/L & 9.20 & 19.9 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 10.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.00 & 0.0$	эΗ	7.00		S.U.	7.04	185	6.9 - 7.1	
147 $\frac{50180208 - 1C}{100208 - 2A}$ μ mhos/cm $\frac{161}{1410}$ 132 - 162 1412 $\frac{50180208 - 2A}{2765}$ μ mhos/cm $\frac{1410}{1410}$ $\frac{132 - 1484}{2628 - 2905}$ h $2082 \times 045 - 1$ mV $\frac{429 \cdot 5}{18.8}$ $\frac{18.7}{18.8}$ $\frac{125 \cdot 8 - 4445 \cdot 8}{110\%}$ issolved Oxygen NA NA mg/L $\frac{9.20}{1.20}$ $\frac{19.7}{18.8}$ $\frac{110\%}{1342 - 1484}$ urbidity 10 NTU $A_{62}272$ NTU 9.75 $ 9-11$ $L-202 - 4245 \cdot 4$		10.00		S.U.	10.00		9.9 - 10.1	#429
$\frac{1412}{\text{onductance}} = \frac{1412}{2765} \frac{5c/B020B-2A}{5c/B020B-3-3c} \frac{\mu\text{mhos/cm}}{\mu\text{mhos/cm}} \frac{1410}{2802} = \frac{18.7}{1342-1484} \frac{1342-1484}{2628-2905}$ $\frac{1}{1000} = 12000000000000000000000000000000000000$				µmhos/cm	161		132 - 162	
2765 $\mathcal{S}(130i03-3c)$ μ mhos/cm 2802 2628-2905hZobell's solution $20B2:045-1$ mV $429\cdot5$ $18\cdot8$ $925\cdot8-445\cdot8$ issolved OxygenNANAmg/L 9.20 $19\cdot8$ $\pm 10\%$ Theoretical: 9.09 urbidity10 NTU $AG272$ NTU 9.75 $ 9-11$ $L.2020$		1412	102	µmhos/cm	1410	18.7	1342 - 1484	
issolved Oxygen NA NA mg/L 9.20 $/9.8$ $\pm 10\%$ Theoretical: 9.09 4 urbidity 10 NTU AG272 NTU 9.75 $ 9-11$ 1.2020 $-$		2765	50130103-36	µmhos/cm	2802		2628 - 2905	
issolved Oxygen NA NA mg/L 9.20 /Y·B Theoretical: 9.09 Y urbidity 10 NTU AG272 NTU 9.75 - 9-11 L.2020 CM	h	Zobell's solution	20821045-1	mV	429.5	18.8	925.8-445.3	
	Dissolved Oxygen	NA	NA	mg/L	9.20	19.8		Ŧ
	Furbidity	10 NTU	A(272	NTU	9.75	-	9 - 11	L. 2020 - CHL
	urbidity lotes:	10 NTU	A6272	NTU	9.75	-	9 - 11	L. 2020 - CHL
								1

Project Name:	MBLP/Shiras ASD	& GW Monitoring	_				
Project Number:	180827		_			2	
Date/Time:	5/31/18 113	0	<u>_</u>				
Initials:	APS		-			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 INTIAL	S.U.	7.07	19.8	6.9 - 7.1	151 P.P. #43
Specific Conductance	1412	CAL.	µmhos/cm	1870	19.9	1342 - 1484	
Eh	Zobell's solution		mV	427.8	17.8	424.5.444.5	
Dissolved Oxygen	NA	NA	mg/L	9.93	15.8	±10% Theoretical: <i>9.8</i> 7	t
Turbidity	10 NTU	¥	NTU	10.67	NA	<mark>9 - 11</mark>	L. 2020 4 \$6
Notes:							
						-	
		1					
		the second second					
-							

EQUIPMENT CALIBRATION FORM

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5131/18	(0:20					
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	VSI PP
рН	7.00	4709695-11081	ר, S.U.	7.01	19.4	6.9 - 7.1	
	10.00	4612804-01117	S.U.	9.97	l	9.9 - 10.1	# 513
Specific	147	50180208-10	µmhos/cm	157.6		132 - 162	
Conductance	1412	5480208-23	µmhos/cm	1371	19.2	1342 - 1484	
	2765	56180103-30	µmhos/cm	2663		2628 - 2905	
Eh	Zobell's solution	ZOB21045-1	mV	427.5	19.5	424.5-444.5	
Dissolved Oxygen	NA	NA	mg/L	1.50	(1.0	±10% Theoretical: 9.28	J
Turbidity	10 NTU	A6272	NTU	9.52		9 - 11	Latotle 2000 x 410
Notes:							

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	5/31/18 1	345					
Initials:	AD		2			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	YSI 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: १.87	J.
Turbidity	10 NTU	~	NTU	10.6	NA	9 - 11	Lattothe 2020we
Notes:							2410
		: 					

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	YSIPP # SIB
Specific Conductance	1412	cel. [µmhos/cm	1478	21.4	1342 - 1484	
Eh	Zobell's solution		mV	427.3	17.10	427.1 - 447.1	
Dissolved Oxygen	NA	NA	mg/L	9.04	16.6	±10% Theoretical: 9.67	
Turbidity	10 NTU	¥	NTU	4.7	NA	9 - 11	- 2020 WE #4/0
Notes:							
	_						

Project Name:	0	MBLP/Shira	as ASD & GW	Monitoring		Monitoring Location	1:	_MW	11	
Project Number:		180827			_	Sample ID:		NA		
Site Location:		Marquette,	, MI		_	Well Type:		2" 54	luan 2d	
Weather/Temp.:		74°	, som	clos ds	-	Key Number:		_ 035	6	_
INSPECTION	f Hat him	101 N. 104			ani - Alta	ion Sheet Med 1				
Label on well?			YES / NO / R	EMEDIED		Is cement pad in goo	d repair?		YES / NO / RE	MEDIED N/A
Is reference mark v	isible?		YES / NO/ R	EMEDIED		Is protective casing lo	ocked and in goo	d repair?	NO / RE	MEDIED
Standing water pre	sent?	-	YES / NO / R			ls inner cap in place a	and properly seal	ing well?	YESDNO / REI	MEDIED
Indication of surfac	e runoff in we	117	YE INO/ R	EMEDIED		ls well casing in visib	ly good repair?		(10 / RE	MEDIED
Repair Notes:										
STATIC WATER LEV	/EL	472 S. T	DATE:	5/20/18		TIME: 1209	45 Au-4			에 발망하지, 사람이
Top of Casing Elev	ation:		M	ft		Measured with:	C	Electronic tape	/ Chalked tape / Other:	
Depth to Water:		+0.	30	ft		Well depth verified?		CEST NO		
Elevation of Water			•):	ft						
WELL PURGING		ted to a	DATE: 5	130/18	osti den s	TIME: 12:12			Starffield and a	
CALCULATION OF 3	CASING VOLU	JMES				PURGE METHOD:				
Depth of well from	тос	29.	44	ft		Bailer / Grundfos / P	eristaltic / Bladde	er / Other:	while	
Depth to water		+(0	. 30	-ft		Equipment #:	603	-		
Height of water col	umn	= 29	.74	Int				7		
Conversion factor		×(Q.	49	1		Conversion Factor	rs (gallons/ft)	1		
3 Water volumes		= -	1.57	gallons		1.25" well -0.20	4" well - 1.96			
Actual volume purg	ged:	~10	0	gallons		2" well - 0_49	8" well - 7,83			
WATER QUALITY S	TABILIZATION	(If required	d)			150003184618				김희 방문 문문에
Time	Volume F		рН	Spec Cond	Dissolved O ₂	Temperature	Eh	Turbidity		
12:12	(-start)	ourge	(S.U.)	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
12:15	3		7.56	NA	NA	(AQ)	NA	1000		
12:19	4		8.11	NA	NA	NA 13.4	NA	Sta 118	sweed do .	t ~ beal
1339	orsta-L	une.		NA	NA	NA	NA	NA	1	" " God
1341	X	1.0	7.77	NA	NA	Mr 9.4	NA	HAT1267		
1342	10		9.54	NA	NA	NA 9.6	NA	ptx 951	sweed to	at 10 acl t
				NA	NA		NA	NA	- Sicono	1 s-ftenat
FIELD ANALYSES	通過 18台		DATE:	E PRIMA		TIME:	- 말문 문 때	Peak line		
Temperature:			NA	°C		Carbon	n Dioxide:	NA	mg/L HACH CA-DT	RL = 10mg/L)
pH:				S.U.		Sulfide	:	NA	mg/L HACH HS-WR	(RL = 0.0Smg/L)
Specific Conductan	ce:		NA	_µmhos/cm		Ferrou	s 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 COLLECTIO	ON		DATE:			TIME:		within States		
Sample appearance	e: 🔪							Duplicate samp	le collected?	YES / NO
Collection method:		Bailer / Gru	Indfos / Peris	staltic / Bladder /	Other:			MS/MSD samp	le collected?	YES / NO
Equipment #:								Chain of Custo	dy Number;	
Filter used:		0.45 µm (8	100) / 0.45 µ	m (8200) / NONE						
Quantity	Size	Тұре	Filtered		Preservati	ve			Parameters	
	40 mL	Glass	Yes No	None	Construction of the second sec	H ₂ SO ₄ NaOH	-			
	250 mL	Plas c	YEN	A NOT	MTH9/	TO NOT		-		
	500 mL	Plas c	1. NE	1 16.2	H.O.		-			
	500 mL	Plastic	Yes No	None	HCI HNO₃	H₂SO₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO₃	H₂SO₄ NaOH				•
SAMPLING PERSO	and a second second			-						

						COLLECTION				
Project Name:			as ASD & GW	Monitoring	.	Monitoring Location	:	-MW-	<u> </u>	
Project Number:		180827			5	Sample ID:		NA	LAND I	
Site Location:		Marquette,			. ;	Well Type:			alvanized	
Weather/Temp.:		70, 50	my			Key Number:		0350		
INSPECTION	Control in St	w	512181			anti g _{el} geografi	Meen St	A Hoger		nikersi retenin
Label on well?			YES OR / RI	EMEDIED		ls cement pad in goo	d repair?		YES / NO / F	
is reference mark	visible?		YES 100 / RI	EMEDIED		Is protective casing I	ocked and in goo	d repair?	YBY NO / F	REMEDIED
Standing water pr	esent?		B/NO/RI			ls inner cap in place	and properly seal	ing well?	(YES/NO/F	REMEDIED
Indication of surfa	ice runoff in w	ell?	YES OO / RI	EMEDIED		is well casing in visib	ly good repair?		CE / NO / F	REMEDIED
Repair Notes:										
STATIC WATER LE	VEL			120/18		TIME: 11.43	1169,508,7		Reins - I Adei	
Top of Casing Elev	ation:	-	μм	ft		Measured with:	C		/ Chalked tape / Oth	er:
Depth to Water:		0	.70	ft		Well depth verified?		YES/NO		
Elevation of Wate	er:	. <u></u>		ft						- C
WELL PURGING	di Mananin		DATE: 5/	30/18	- 2 1 0 2	TIME: 145				
CALCULATION OF			0.5			PURGE METHOD:				
Depth of well from	n TOC		.92	ft		Bailer / Grundfos / P		er / Other:	whale	
Depth to water			.70	ft		Equipment #:	607	-		
Height of water co	lumn			ft				1		
Conversion factor		X(0.49	1		Conversion Facto				
3 Water volumes		-12	2.8 5	gallons		1.25" well - 0.20	4" well - 1.96	-		
Actual volume pu		-	5+3)	gallons		2" well - 0.49	8" well - 7,83]		
WATER QUALITY		and the second se		Spee Card	Dissolved O ₂	Tarran	E.	Trucksoften		
Time	Volume		рН (с.н.)	Spec Cond		Temperature	Eh	Turbidity		
1145	←start		(S.U.) 8.0	(µmhos/cm)	(mg/L)	(°C)	(mV)	(NTU)		
1149	5		8.01	NA	NA	HA 12.9	NA	א רטר אי	pursed day	nt ~ Jgal
1320	ristant	purge	50	NA	NA	NA LO D	NA	NA	4	
1321			7.59		NA	NA 10.0	NA	MA25041	2	
1322	¥		8.28	NA	NA	I.CI MA	NA	NA 10.55 M		time.
				NA	NA	NA	NA	NA	- ncond	7102
FIELD ANALYSES	出版。 相關。		DATE:		INA	TIME:		INA	AND REAL PROPERTY.	
Temperature:			NA	°C			n Dioxide:	NA	mg/L HACH CA-D	T (RL = 10mg/L)
pH:		-		- S.U.		Sulfid		NA		/R (RL = 0.05mg/L)
Specific Conducta	nce:		NA	µmhos/cm		Ferrol	s Iron (Fe ⁺²):	NA	mg/L HACH IR-18	C (RL = 0.2mg/L)
Eb:			NA	mV						
Dissolved O ₂ :		2	NA	mg/L						
Turbidity:			NA	NTU						
SAMPLE COLLECT	ION	iliyini .	DATE: ~	in a spect	in kan	TIME:			Sfaster Pres	이 이는 물 수는 지원한
Sample appearance	ce:). 					6	Duplicate samp	le collected?	YES / NO
Collection method	1:	Bailer / Gru	Indfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	le collected?	YES / NO
Equipment #:		-		3í				Chain of Custo	ly Number:	
Filter used:		0.45 μm (8	100) / 0.45 µ	m (8200) / NON						
Quantity	Size	Түре	Filtered		Reservation	/e			Parameters	
	40 mL	Glass	Yes No	None		NaOH				
	250 mL	Plas	Y=NT-	1 Ngr	H OT	TO NOT	5			
	500 mL	Plasic	S. NC	7-10.2].7HQ,7	201211	-			
	500 mL	Plastic	Yes No	None	HCI HNO3 I	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3 I	H₂SO₄ NaOH				
	1000 mL	Plastic	Yes No	None	HCI HNO3 I	H ₂ SO ₄ NaOH				
								STATE OF STREET	In a shuft of the	
SAMPLING PERSO	INNEL		7						and the second sec	and the second se

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Project Name:		MBLP/Shira	s ASD & GW			Monitoring Locat	ion:	M	W-3	
Project Number:		180827				Sample ID:		NA		
ite Location:		Marquette,	МІ		-	Well Type:		2"	alumized	
Weather/Temp.:	10	2			-	Key Number:		035	6	
NSPECTION	Ball She		2 ¹ .999	TWEAT IL	forces factor			ang at the	le sinérinak	
abel on well?			YES MO / RE	MEDIED		ls cement pad in g	ood repair?		YES / NO / F	REMEDIED NA
reference mark vi	sible?		YES NO/ RE			ls protective casin	g locked and in goo	od repair?	CAR / NO / F	REMEDIED
tanding water pres	ent?		10 / NO / RE			ls inner cap in pla	ce and properly sea	ling well?	YES / NO / F	REMEDIED
ndication of surfac	e runoff in we	-	YES NO/ RE			Is well casing in vi	sibly good repair?		(YES / NO / H	REMEDIED
Repair Notes:										
TATIC WATER LEV	EL			30/18		TIME: 11.10		217-11		
op of Casing Eleva	tion:	2	M ·	ft		Measured with:	(Electronic tape	/ Chalked tape / Oth	er:
Depth to Water:		0.1	9	ft		Well depth verifie	d?	YES / NO		
Elevation of Water		-		ft						
VELL PURGING	15.3.1	- IL ILSCHE	DATE: 5	130/18	w i an i	TIME: 1120		1-2-5-57	A semician dis	
ALCULATION OF 3	CASING VOLU					PURGE METHOD:				
Depth of well from			10.1	ft			/ Peristaltic / Bladd	ler / Other:	whele	
Depth to water		-(D	.90	ft		Equipment #:	603			
leight of water col	JMU	= 28		ft			1000	-		
onversion factor	1	×(0,				Conversion Fa	ctors (gallons/ft)			
Water volumes	2	= 13	/	gallons		1.25" well - 0.20				
ctual volume purg	ed:	5	109	gallons tot	۹	2" well - 0.49	8" well - 7.83			
VATER QUALITY S	ABILIZATION	lif required	10	ALES UIA	IS MURAN	UNER AUX DESCRIPTION		in second	A Statistics	
Time	Volume P		pН	Spec Cond	Dissolved C	D ₂ Temperature	Eh	Turbidity	I	
	←start g		(S.U.)	(µmhos/cm)	(mg/L)	(0.0)	(mV)	(NTU)	il.	
1124	()(())	-	8.61	NA	NA		NA	PA3671	pryed day	2 Seel
103 5	restart			NA	NA	NA	NA NA	NA	Frank	
304	6	3m.se	6.95	NA	NA	NA 11.2	NA	NA 1 4+93	44	
1305	5		7.82	NA	NA	WA 8.7	NA	NA 98 NTU		A Qualli
1205	-		1.05	NA	NA	NA	NA	NA	po per comp	A 9 salli
				NA	NA	NA	NA	NA		
FIELD ANALYSES			DATE:	a state of the	. J.E P. Down	TIME:	Terres all as all a			
Cemperature:			NA	°C		Car	bon Dioxide:	NA	mg/L HACH CA-D	T (RL = 10mg/L)
pH:				s.U.		Sul	fide:	NA	- mg/L HACH HS-V	VR (RL = 0.05 mg/L)
Specific Conductan	ce:		NA	- μmhos/cm		Fer	rous Iron (Fe ⁺²):	NA	- mg/L HACH IR-18	3C (RL = 0.2mg/L)
Eh:			NA	mV						
Dissolved O ₂ :			NA	- mg/L						
Furbidity:			NA	NTU						
AMPLE COLLECTIO	ON		DATE:			TIME:				
ample appearance								Duplicate sam	ple collected?	YES / NO
Collection method:		Bailer / Gru	undfos / Peris	taltic / Bladder ,	/ Other:			MS/MSD samp	-	YES / NO
Equipment #:	1		-,	,				Chain of Custo		
Filter used:		0.45 um /8	100) / 0.45 1	m (8200) / NON	E					
			and a second particular part	,,//						
Quantity	Size	Туре	Filtered		Preserva	itive			Parameters	
	40 mL	Glass	Yes No	None	HCI HNO3	HISON NOOH				
	250 mL	Plas 🤇	YON	Ner	HO HO	120- N=	The			
	\$00 mL	Plas c	1.7 NL-	1 18.2	т. Но,	1.20.0.21	(her	~		
	S00 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ NaOH				
	500 mL	Plastic	Yes No	None	HCI HNO3	H₂SO₄ N∂OH				
	1000 mL	Plastic 2	Yes No	None	HCI HNO₃	H₂SO₄ NaOH				
SAMPLING PERSO	NNEL 1		din din E	/	Section (1991년 - 18 <u>11</u> 년 -	
Name (SIGNATUR	VI	0	-			Name (SIGNATU				

Project Name:	22	MBLP/Shira	as ASD & GW	Monitoring	-	Monitorin	g Location	n:	MW	1-4		
Project Number:		180827			2	Sample ID	:		-N/A	-		
Site Location:	-1	Marquette			2	Well Type	:		2 PUL	FM		
Weather/Temp.:	3 .	64%	andimit	- 7	-	Key Numb	er:		_N/A			
INSPECTION		1. CONTRACTOR			1602635		4			net of the second	1012	i dan i
Label on well?			YES NO / R			Is cement	pad in goo	od repair?		(YES)	NO / REME	DIED
Is reference mark v	/isible?		(B) NO / R	MEDIED		ls protecti	ve casing	ocked and in goo	d repair?	YES	NO / REME	DIED
Standing water pre	sent?		YES 🔊 / R	MEDIED		ls inner ca	p in place	and properly sea	ling well?	CYESY	NO / REME	DIED
Indication of surfac	e runoff in wel	11?	YES NO/ R	MEDIED		ls well cas	ing in visib	oly good repair?		CES	NO / REME	DIED
STATIC WATER LEV	/EL			30/18		TIME:	128		1.0.1.0			
Top of Casing Elev	ation:	NI		ft		Measured	with:	(Electronic tape	Chalked tape	/ Other:	
Depth to Water:	34	15	35	ft		Well dept	n verified?		YES/NO			
Elevation of Water	n	-	<u> </u>	ft								
WELL PURGING	and Argenting	hi li e	DATE: 5	30/18	TE THE	TIME:	301	(1940 (APS)	14 IC-10	1 ¹¹ 1 ¹¹ ~ 1 ¹ m	" n"-v	Silvestille 9
CALCULATION OF 3	CASING VOLU	MES				PURGE MI	THOD:	\smile				
Depth of well from	тос	46.	73	ft		Bailer / Gr	undfos / P	Peristaltic / Bladdo	er / Other:	whole		
Depth to water	1	-(15	.35	9		Equipmen	t#:	603	2			
Height of water col	lumn r	= 31	. 34 .	ft					-			
Conversion factor	2	X (🛛 🔊	.49)	1		Conver	sion Facto	rs (gallons/ft)	* 14:41	- purget topic at (3.dd	dry	9 200
3 Water volumes	1	= 15.	39 1	gallons		1.25" w	ell - 0.20	4" well - 1.96		the at	8.5	(t
Actual volume purp	ged: 8.5(5.	5+3)	gallons		2" well -	0.49	8" well - 7.83		13.11	Hend	aloni
WATER QUALITY S	TABILIZATION	(if require	d)	4 6 - 2	4 7 E Y 1 A		1000	9-4-48 - 5			1.0 1.1	Janois
Time	Volume Pu	urged	pН	Spec Cond	Dissolved O ₂	Tempe	erature	Eh	Turbidity			
910	←start p	urge	(S.U.)	(µmhos/cm)	(mg/L)	AD (°	C)	(mV)	(NTU)			
0946	5.5		7.46	NA	NA	NA //	.6	NA	NA 23.6	+ PURGES	pry (25.55
-AAA	++		NM	NA	NA	NA		NA	NA-	WILL LET		
- 1/4 -	40.5	-	NM	NA	NA	NA		NA	NA	SAMPLE		
1446	restation	me		NA	NA	NA		NA	NA	++ PETU	ENED T	o pure
1447	7	0	7.50	NA	NA	NA 9	9	NA	WA 401	Day A =		
14/15	8		7.70	NA	NA	NA G.	7	NA	NA 30 2	SUL= ZZ	. 33	
FIELD ANALYSES	an a	i liereet	DATE: -		S. E. J. B. L.	TIME:	- instit	The second		CAN SIN		
Temperature:			NA	°C			Carbo	n Dioxide:	NA	mg/L HACH	CA-DT (RL	= 10mg/L)
pH:	-	A	14	s.u.			Sulfide	e:	NA	_mg/L HACH	HS-WR (RL	= 0.05mg/L)
Specific Conductan	ice:		NA	µmhos/cm			Ferrou	us 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 COLLECTIO	ON	program (DATE:	N Sain Sin		TIME:	-	Asser Nucley		and an interest	11/8-2.41	tenres au
Sample appearance	e: _							-	Duplicate sam	ple collected?	•	YES / NO
Collection method		Bailer / Gru	undfos / Peris	taltic / Bladder ,	/ Other:				MS/MSD samp	ole collected?		YES / NO
Equipment #:		_		-					Chain of Custo	dy Number:		
Filter used:		0.45 µm (8	1100) / 0.45 µ	m (8200) / NON	E							
Quantity	Size	Туре	Filtered	1	Preservat	ve				Parameters		
	40 mL	Glass	Yes No	None	HCI HNO3	H ₂ SO ₄ Nat	ЭН					
	250 mL	Plas c	Y-N	/ Ngr	HO HO	2 4 1 3		ū				
	\$00 mL	Plas c	N. VINC	1 10.2	1.2 н.о,	30.10	11	L				
						11.00						
	500 mL	Plastic	Yes No	None	HCI HNO3	H ₂ SO ₄ Na(Л					
		Plastic Plastic	Yes No Yes No	None	HCI HNO3	H ₂ SO ₄ Nat H ₂ SO ₄ Nat						

Project Name:		MBLP/Shir	ras ASD & GW	/ Monitoring	- 1	Monitoring Locatio	on:	MW-S	5
Project Number:		180827				Sample ID:		NA	
Site Location:		Marquette	e, MI		-	Well Type:		2" PI	
Weather/Temp.:		63°,	overast		-	Key Number:		N/A	
INSPECTION	14n8 = 44m			11. 12.			n his south is		
Label on well?			YES / NO / A	EMEDIED		ls cement pad in go	od repair?		NO / REMEDIED
ls reference mark	visible?	- 3	TES / NO / R			ls protective casing		od repair?	VES) NO / REMEDIED
Standing water p	esent?		YES NO/ R	EMEDIED		ls inner cap in place			YES/ NO / REMEDIED
Indication of surf	ace runoff in w	/ell?	YES / NOT R	EMEDIED		ls well casing in visi			(YES/ NO / REMEDIED
Repair Notes:			1.554						
STATIC WATER L	VEL		DATE: 5	130/18	R IL MENT	TIME: 8:50	120-11 R 117		Weight and the state of the state of the
Top of Casing Ele	vation:	-	÷.	ft		Measured with:		Electronic tap	/ Chalked tape / Other:
Depth to Water:		14	,79	ft		Well depth verified	?	YESYNO	
Elevation of Wate	er:			_ft				\mathcal{O}	
WELL PURGING		(ha senna	DATE: S	130118	(90 <u>,9171</u>)	TIME: \$:59	- 1. I. I. I 7		
CALCULATION OF	3 CASING VOL	UMES				PURGE METHOD:			
Depth of well from	n TOC	40	1.75	ft		Bailer / Grundfos / I	Peristaltic / Bladd	er / Other: 🔥	WHALE
Depth to water		-114	1.79	-17		Equipment #:	# 603	=0	
Height of water co	olumn	= 29	96	ft					
Conversion factor		X(0.4	19	2/		Conversion Facto	ors (gallons/ft)]	
3 Water volumes		= 14	. 68 .	gallons		1.25" well - 0.20	4" well - 1.96		
Actual volume pu	rged:	17	.D	gallons		2" well - 0.49	8" well - 7.83]	
WATER QUALITY	STABILIZATIO	N (if require	d)		اللا الكاريا	Tele In cardo.	nar an la fo	VIII A	
Time	Volume	Purged	рH	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	TURSHONY: TOBAN, TEMP: 11.192
8708	10		7.48	NA	NA	NA	NA	NA	TU 2011 17 199 NTO TEMPII.0 "L
5215	15		7.42	NA	NA	NA	NA	NA	TUR. 11.5 NTS TENS: 6.7"
				NA	NA	NA	NA	NA	
				NA	NA	NA	NA	NA	1
				NA	NA	NA	NA	NA	
FIELD ANALYSES	Verticator II	1 10 21	DATE: 51	30/13	VE UNASIE	TIME: 017		All Contraction	
Temperature:		10.2 -		°C		Carbo	on Dioxide:	NA	_mg/L HACH CA-DT (RL = 10mg/L)
pH:		7.41	v	S.U.		Sulfid	e:	NA	_mg/L HACH HS-WR (RL = 0.0Smg/L)
Specific Conducta	nce:		NA	_µmhos/cm		Ferro	us Iron (Fe ⁺²):	NA	mg/L HACH IR-18C (RL = 0.2mg/L)
Eh:			NA	mV					
Dissolved O ₂ :			NA	_mg/L					
Turbidity:	7	12.8 -	NA	NTU .	÷				
SAMPLE COLLECT	ON		DATE:		18 E SHAR	TIME:			
Sample appearance	e:						2	Duplicate sam	ple collected? YES / NO
Collection method	:	Bailer / Gru	Indfos / Peris	taltic / Bladder /	Other:			MS/MSD samp	le collected? YES / NO
Equipment #:								Chain of Custo	dy Number:
Filter used:		0,4S µm (8	100) / 0,4S µ	m (8200) / NONE					
Quantity	Size	Түре	Filtered		Preservativ	/e			Parameters
	40 mL	Glass	Yes No	None	HCI HNO, H	H₂SO₄ NaOH			
	250 mL	Plas c	YIN	Ner:	MTH O'	205 N. 4	b		0
	500 mL	Plasc	1. NC -	1-00	<u>-</u> 2HQ7.	2012211	<u>k</u>		
	500 mL	Plastic	Yes No	None	HCI HNO3 H	1₂SO₄ NaOH			
	500 mL	Plastic	Yes No	None	HCI HNO3 H	I ₂ SO ₄ NaOH			
1	1000 mL	Plastic	Yes No	None	HCI HNO3 H	l₂SO₄ NaOH			
SAMPLING PERSO	NNEL	/	e				建也是历时		
Name (SIGNATU	RE): The	1 5	>			Name (SIGNATURE)			

		MBLP/Shiras	ASD & GW Monit	oring	Monitoring Lo	ation:	MW-1			
Project Numbe	er:	180827			Sample ID:		MBLPS-18-0S-N	IW-1(I/MS/MS	D)	
Site Location:		Marquette, N	41		Well Type:		2" as	varied		
Weather/Temp	p:	75 SWA	my some	chirds	Key Number:		03	varied 56		-
NSPECTION	in series in	-					Store Providence	11. 15	web form	
abel on well?			YES /MO/ R	EMEDIED	Is cement pad	in good repair?			YES / NO / REN	AEDIED NA
reference ma	ark visible?		YES / NOT R		ls protective ca	ising locked and ir	good repair?		(NO / REN	AEDIED
tanding water	present?		NO / R	EMEDIED	ls inner cap in	place and properly	sealing well?		AND / REN	AEDIED
ndication of su	urface runoff i	n well?	YES / 🐼 / R	EMEDIED	Is well casing i	visibly good repa	ir?		YES NO / REN	AEDIED
epair Notes:	casing	full ;	of nation		ted out	Appeo 1	$2^{\circ} \alpha = M.i$	t.		
TATIC WATER		the loss	DATE: 5/3)	118	TIME: 150	-3	qual de "tar"	h un un	radia en	W. S. W. S. S.
Fop of Casing E	Elevation:	NM	ft	/	Measured with		Electronic tape	/ Chalked tape	/ Other:	
Depth to Wate	er:	0.04	ft		Well depth ver	ified?	YES / QO			
levation of W	'ater:	-	ft	* 7.0	LED P A		S			
VELL PURGING	G		DATE: 5/31		TIME: 15		TOE IN P	105 10 #	178/0"[[US'TADILIZE
urge Method:		PERISTALIC		O BLADDER / OTHER:			2.5	ft from	TOC or 🗸 t	ottom
quipment No.:			52	,		,			`	
Aeasured well		29.44		- Screen length:	5	ft	Depth to screer	n midnoint:	26.94	ft
		r 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)
1618	6.)	ч	6.10	140	7.64	14.3	1357	14.0	472	0.29
621	6		6.11	140	7.63	14.9	1341	21.0	471	0.30
624	6.1		6.11	140	7.62	14.9	1378	21.)	471	0.36
1627	6.1		6.11	140	7.62	14.8	1370	20.0	470	0.29
/olume:	2.1	(Gallons)		Stabilization Criteria:	±0,1	±3%	±3%	±10% for values >20	±10 mV	±10%
IELD ANALYSE	s	応告書	DATE: 431	118	TIME: 162	8	문지 문이 전자			
emperature:		14.9	•c	Carbon Di	ioxide:	NA	_mg/L	HACH CA-DT (RL = 10 mg/L)	
DH:		7.62	s.u.	Sulfide (S	⁻²):	NA	mg/L	HACH HS-WR	(RL = 0.0S mg/L)	
Specific Conduc	ctance:	1367	µmhos/cm	Ferrous Ir	on (Fe ⁺²):	NA	mg/L	HACH IR-18C	(RL = 0.2 mg/L)	~
ih:		469	mV							
issolved Oxyge	en:	0.29	mg/L							
urbidity:		14.5	NTU							
AMPLE COLLE	CTION	Huitsine -	DATE: 5/ ?	1/18	TIME:) 62	91			企业上标	
	ance:	-ila	ar			-1	Duplicate samp	le collected?		YES /MO
	hod: 🏑	PERISTALTIC	BLADDER / MICF	O BLADDER / OTHER:			MS/MSD samp			YES / NO
Sample appeara			52	-			Chain of Custoo	dy Number: Ap	PXIN GOU	20361
Sample appeara		0.45 um (810)0) / 0.45 μm (820	DINNONE			Chain of Custo	dy Number: Ap	px IV	2012
ample appeara										2060 CR-
ample appeara collection meth quipment No.: ilter used:								Para	ameters	
ample appeara ollection meth quipment No.:	Size	Түре	Filtered		Preservative	NaOH				
ample appeara ollection meth quipment No.: Iter used:	Size 40 mL	Type Glass	Yes No	None HCI	HNO3 H2SO		1	ALLEAN		
ample appeara ollection meth quipment No.: Iter used: Quantity	Size 40 mL 125 mL	Type Glass Plastic	Yes No Yes No		HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂		6	041501		
ample appears ollection meth quipment No.: lter used: Quantity 3	Size 40 mL 125 mL 500 mL	Type Glass Plastic Plastic	Yes No Yes No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None		6		Fl Calcium	~¥
ample appears ollection meth quipment No.: lter used: Quantity 3 3	Size 40 mL 12S mL 500 mL 500 mL	Type Glass Plastic Plastic Plastic	Yes No Yes No No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None		6	Boron	n, Calcium 🖌	
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3	Size 40 mL 125 mL S00 mL S00 mL S00 mL	Type Glass Plastic Plastic Plastic Plastic	Yes No Yes No No No	None HCI	HNO ₃ H ₂ SO, HNO ₃ H ₂ SO, None None HNO ₃			Boron Cl, Fl, p	n, Calcium 🖌 H, TDS, SO ₄	
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3 3 3	Size 40 mL 125 mL S00 mL S00 mL S00 mL S00 mL	Type Glass Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None HNO ₃			Boron Cl, Fl, p Ba, Be, Cd, Cr,	n, Calcium H, TDS, SO₄ Co, Pb, Hg, Mo,	Se, TI, LI
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3	Size 40 mL 12S mL S00 mL S00 mL 500 mL 1000 mL	Type Glass Plastic Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No No No	None HCl None HCl	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None HNO ₃ HNO ₃	NaOH		Boron Cl, Fl, p Ba, Be, Cd, Cr,	n, Calcium 🖌 H, TDS, SO ₄	Se, TI, LI
ample appears ollection meth quipment No.: ilter used: Quantity 3 3 3 3 3 3	Size 40 mL 12S mL 500 mL 500 mL 500 mL 1000 mL 1000 mL	Type Glass Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No No	None HCI	HNO ₃ H ₂ SO ₂ HNO ₃ H ₂ SO ₂ None None HNO ₃	NaOH		Boron Cl, Fl, p Ba, Be, Cd, Cr,	n, Calcium H, TDS, SO₄ Co, Pb, Hg, Mo,	Se, Tl, Li

Project Name:		MBLP/5hiras	s ASD & GW Monito	oring	Monitoring Loca	tion:	MW-2			
Project Numbe	r:	180827			Sample ID:		MBLPS-18-05-	****		
Site Location:		Marquette,			Well Type:		2" Jak 0356	mitel		
Weather/Temp		76,	some cland	5	Key Number:		_0356			
INSPECTION										前沿建筑里
Label on well?			YES NO / RE		Is cement pad in	good repair?			YES / NO / REM	IEDIED WAR
Is reference ma	ark visible?		YES (NO/ RE		Is protective cas	ing locked and in	good repair?		CTES / NO / REM	IEDIED
Standing water		2	CO CO RE			ace and properly	-		ARE / NO / REM	
Indication of su		(14) I I I I I I I I I I I I I I I I I I I	YES AND / RE		Is well casing in	visibly good repai	r?		NO / REM	IEDIED
Repair Notes:	àd	ded	1' Master	Lex.					200	51
STATIC WATER	LEVEL	"Eath failt	DATE: 5/31	118	TIME: 142					
Top of Casing E	Elevation:	NM	_ft		Measured with:	<	Electronic tape	/ Chalked tape	e / Other:	
Depth to Wate	er:	1.09	ft		Well depth verif	ied?	YES /NO			
Elevation of W	ater:	_	ft	to owed	at high	rate for	Sminute	s to the	to statiliza	Hia la
WELL PURGING	; .		DATE: 5131	118	TIME: 14	3	(Seal) in a	1-1-	1 AG II D	
Purge Method:			BLADDER / MICR	O BLADDER / OTHER:			2.5	ft from	_TOC orb	ottom
Equipment No.	0		552			5				
Measured well	depth: 💈	8.92	ft	Screen length:	5	ft	Depth to scree	n midpoint:	26.42	ft
		Level	Trawdown	Pumping Rate	рН	Temp	5pec Cond	Turbidity	Eh	D.O.
Time		et)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1447		61	4.52	160	7.88	12.0	578	493	28.493	0.26
1450	5.		4.72	100	7.88	12.3	574	17.8	492	0.26
1453		85	4.76	/00	7.88	13.3	571	18.2	491	0.26
1456		89	4.80	100	7.88	13.6	576	19.7	490	0,26
1459	5.		4.81	100	7.88	14.0	575	20.8	459	0.27
1502	5.1		4.85	100	7.89	13.9	577	231	488	0.26
1505	5-9	/	4.88	100	7.89	14.1	\$75	26 0	487	0.25
Volume:	1.0	(Gallons)		5tabilization Criteria:	±0.1	±3%	±300	±10% for	±10 mV	±10%
FIELD ANALYSE	1.75	(Gunons)	DATE: 5/3	51/19	TIME: 1 50 0		136	values >20	110	110,0
Temperature:	5	14.1		Carbon Di		NA	mg/L		RL = 10 mg/L)	Oly 2 Sugar
pH:		7.88	1.00	Sulfide (S	_	NA	mg/L		(RL = 0.05 mg/L)	
Specific Conduc	tance:		_µmhos/cm	Ferrous Ir	· ·	NA	mg/L		(RL = 0.2 mg/L)	
Eh:		487	and the second se				•			
Dissolved Oxyg	en:	0.24			down a		and a	id of	5725.1.24	2
furbidity:		24.4	NTU		45 man	3				
SAMPLE COLLE	CTION		DATE: \$13	1/10	TIME: 150	71		3 2 3 J V 6 1		
Sample appear	ance:		da	1			Duplicate sam	ple collected?	(YESNO
Collection meth	nod:	PERISTALTIC	BLADDER / MICR	O BLADDER / OTHER:			MS/MSD samp	ole collected?		YES
Equipment No.		C	52			¥	Chain of Custo	dy Number: Ap	px III 60420	036 V
Filter used:			00) / 0.45 µm (8200	ILNONE			Chain of Custo	dy Number: Ap	px IV 60420	60 /
	r		í				· · · ·		uplicate location	
Quantity	Size	Туре	Filtered		Preservative	NEOU		Par	ameters	
	40 mL	Glass	Yes No		HNO ₃ H ₂ SO ₄	NaOH				
	125 mL	Plastic	Yes No	None HCI		NaOH				
2	500 mL	Plastic	No		None				Fl 🖉	/
2	S00 mL	Plastic	No		None				n, Calcium 🛛 🚩	
2	S00 mL	Plastic	No		HNO3		ch A		H, TDS, SO4	
6	500 mL	Plastic	No No		HNO3		Sb, As		, Co, Pb, Hg, Mo,	se, II, LI 🚩
U	1000 mL 1000 mL	Plastic Glass	Yes No	Nona UCI		NaOH		Radium 22	26, Radium 228	V
	1000 mL	36810	ies NO	None HCI	HNO ₃ H ₂ SO ₄	NaOH		The second second	A CONTRACTOR OF THE	
SAMPLING PER	CONINE									

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Project Name:		M8LP/5hiras	A5D & GW Monito	oring	Monitoring Loc	ation:	MW-3			-
Project Numbe	r:	180827			Sample ID:		MBLP5-18-05-1			-
Site Location:		Marquette, M	MI		Well Type:		2" B	Cogalu	inzel	-
Weather/Temp	;	70, 4	ondy		Key Number:		-0356	0		
INSPECTION	571 19-1-1	H. Marson-		on Hoge Print		s fallación a	n ^{ll} shine y ^{ll}		tea ", spine	din Sila
Label on well?			YES NO RE	MEDIED	Is cement pad i	n good repair?			YES / NO / REM	IEDIED ~ K
is reference ma	ark visible?		YES NO/ RE		Is protective ca	sing locked and in	good repair?	C	YB / NO / REM	IEDIED
5tanding water	present?	A	0 99/00 / RE	MEDIED	ls inner cap in p	lace and properly	sealing well?	<	YES NO / REN	IEDIED
Indication of su	irface runoff ir	well?	YES ANO/ RE	MEDIED	Is well casing in	visibly good repa	ir?	(YEST NO / REM	IEDIED
Repair Notes:										2
STATIC WATER	LEVEL		DATE: 5/31	118	TIME: 125	Ø			Size and	12 0 1 2
Top of Casing E	Elevation:	NM	ft		Measured with:	<	Electronic tape	Chalked tape	/ Other:	
Depth to Wate	er:	0.25	ft		Well depth veri	fied?	YES / NO			
Elevation of W	ater:	~	ft *Pur	UED CHILL	ANTE EN	DSMAN		To \$774.711	The the	IDEL
WELL PURGING			DATE: 5/31		TIME: 12 5		10 104	- Sirrarp	a neo	acre
Purge Method:	6	PERISTALTIC		O BLADDER / OTHER:			2.5	ft from	TOC or b	ottom
Equipment No.:	1.00		52	-						
Measured well	depth:	29.01		Screen length:	5	ft	Depth to scree	n midpoint:	26.51	ft
Time		Level	Drawdown (feet) Ҟ	Pumping Rate	pH (ELL)	Temp	5pec Cond	Turbidity	Eh	D.O.
1323	(fe		5.43	(mL/min) 100	(5.U.)	(°C)	(µmhos/cm)	(NTU) 💏	(mV)	(mg/L)
1226	5.4		5.45	100	8.08	14.5	489	20.0	and the second se	0.66
1329			6.06	100	80.8	14.9		16.7	547	0.66
132	6.0		6.20	100	0.07	15.1	488	18.6	542	D.66
1335	6.6		6.27	100	8 07	14.6	446	20.6	538	0.65
1338		15	6. 2 .	100	5.07	149	490	16.6	535	
1220			6.		0.01	19.1	110	10.2	525	0.67
Volume:	1.5	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%
FIELD ANALYSE	s	에비트나트	DATE: 5/31	/18	TIME: 13.	10		Values >20	S. C. Barris	
Temperature:		14.9	•c	Carbon Di	ioxide:	NA	mg/L	HACH CA-DT (R	RL = 10 mg/L)	
pH:		8.07	s.u.	5ulfide (5	-2):	NA	mg/L	HACH H5-WR (RL = 0.05 mg/L)	
Specific Conduc	ctance:	491	µmhos/cm	Ferrous Ir	on (Fe ⁺²):	NA	mg/L	HACH IR-18C (F	RL = 0.2 mg/L)	
Eh:		535	mV							
Dissolved Oxyg	en:	0.62	_mg/L	#DID NOT S	17ABI 219E 1	W 45 MM	11			
Turbidity:		14.0	NTU							
SAMPLE COLLE	CTION		DATE: 5/31	118	TIME: 13	411	USE (loop)			1.2.11
Sample appeara	ance:		det			-	Duplicate samp	le collected?		YES / 10
Collection meth	nod:	PERISTALTIC		O BLADDER / OTHER:			MS/MSD samp			YES NO
Equipment No.:			552			Y	Chain of Custor		× III 🧳 04	203
Filter used:		0.45 µm (810	00) / 0.45 µm (8200	NONE			Chain of Custor	dy Number: App	×111 G 04 ×1V G 04	2059
Quantity	5ize	Түре	Filtered		Preservative			Para	meters	
	40 mL	Glass	Yes No	None HCI	HNO ₃ H ₂ 5O ₄	NaOH				
	125 mL	Plastic	Yes No	None HCI	HNO₃ H₂5O₄	NaOH				
4	SDD mL	Plastic	No		None				FI /	
1	5DD mL	Plastic	No		None			Boron,	Calcium 🖌	
1		Plastic	No		HNO ₃			Cl, Fl, pH	I, TDS, SO₄ 🖌	
	5DD mL		No		HNO₃		Sb, As,	Ba, Be, Cd, Cr,	Co, Pb, Hg, Mo, S	Se, Tl, Li 🗸
1	5DD mL 500 mL	Plastic	NO							
1 1		Plastic Plastic	No		HNO ₃			Radium 226	, Radium 228	/
1 1	500 mL			None HC1		NaOH		Radium 226	i, Radium 228	/

Project Name:		MBLP/Shiras	ASD & GW Monite	oring	Monitoring Loc	ation:	MW-4			
roject Number	r:	180827		12	Sample ID:		MBLPS-18-0S-N	1W-4(I)		
ite Location:		Marquette, N	MI		Well Type:		2" PVL 1			-0
Weather/Temp		SUN. 65			Key Number:		NONE			20
reaction from p		1010 : 025								12
NSPECTION	NAMES AND A	ACLEY, APP	0		AV TRASSING				->	Shield St.
abel on well?			(VES/NO/R		Is cement pad in	n good repair?			YES / NO / REM	
s reference ma	rk visible?		(NO / R		Is protective cas	sing locked and in	good repair?	C C	YES NO / REN	
Standing water	present?		YES NOT RI		Is inner cap in p	lace and properly	sealing well?	-	YES/ NO / REM	
ndication of su	rface runoff ir	n well?	YES NO/ RI	EMEDIED	Is well casing in	visibly good repa	ir?	0	YES/ NO / REM	IEDIED
epair Notes:										
TATIC WATER	LEVEL	1, 배원 부분	DATE: 5/31	1.8	TIME:1021					
Top of Casing E		-	ft		Measured with:		Electronic tape	/ Chalked tape /	Other:	
Depth to Wate		15.10	ft		Well depth verif		YES INO	(/ - /	1.0 1.0	
Elevation of Wa			ft		tren deptil tern	incut.	1000			
Contrading to the local day	With Colorest	CONTRACTOR OF			1. IV.			COLUMN STREET	and the second in	
WELL PURGING		0	DATE: 5/3//		TIME: 1022				1	and the second
Purge Method: Equipment No.:		HERISTALFIC 39		O BLADDER / OTHER:		Pump intake @	2.3	ft from	100 or	ottom
Measured well	depth:		ft	Screen length:		_ft	Depth to scree	n midpoint:		ft
	Water	r Level	Drawdown	Pumping Rate	pН	Temp	Spec Cond	Turbidity	Eh	D.O.
Time	(fe	et)	(feet) 🐴	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1100	24.5	53	9.48	100	7.61	11.3	1735	13.5	143	0.37
1103	24.8	0	9.70	100	7.61	11.5	1735	12.5	144	0.34
1106	25.17	2	10.02	100	7.61	11.4	1778	11-4 C	143	0.33
					1			12.4		
	9 <u> </u>						1			
/olume: /	.6	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%
the second second		(Gallons)	DATE: 3)</td <td></td> <td></td> <td>J</td> <td>±3%</td> <td>±10% for values >20</td> <td>±10 mV</td> <td>±10%</td>			J	±3%	±10% for values >20	±10 mV	±10%
FIELD ANALYSE	and the second	AUC musica	DATE: 5/31	/13	TIME: 1107			values >20		±10%
FIELD ANALYSE Temperature:	and the second	11.4	°C	/13 / Carbon D	TIME: /107	NA	_mg/L	values >20 HACH CA-DT (RI	L = 10 mg/L)	±10%
FIELD ANALYSE Femperature: pH:	S	11.4 7.61	°C S.U.	/13 Carbon D Sulfide (S	TIME: ////// ioxide: -2):	NA NA	_mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R	L = 10 mg/L) RL = 0.05 mg/L)	±10%
FIELD ANALYSE Femperature: oH: Specific Conduc	S	11.4 7.61 1739	°C S.U. µmhos/cm	/13 Carbon D Sulfide (S	TIME: /107	NA	_mg/L	values >20 HACH CA-DT (RI	L = 10 mg/L) RL = 0.05 mg/L)	±10%
FIELD ANALYSE Femperature: oH: Specific Conduc	S :tance:	11.4 7.61 1733 144	°C S.U. µmhos/cm mV	/13 Carbon D Sulfide (S	TIME: // 07 ioxide: - ²): ron (Fe ⁺²):	NA NA NA	_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L)	±10%
FIELD ANALYSE Femperature: oH: specific Conduction Sh: Dissolved Oxyge	S :tance:	11-4 7.61 1733 144 0.84	°C S.U. µmhos/cm mV mg/L	Carbon D Sulfide (S Ferrous II	TIME: // 07 ioxide: - ²): ron (Fe ⁺²):	NA NA NA	_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L)	±10%
IELD ANALYSE Temperature: hH: pecific Conduc h: Dissolved Oxygo furbidity:	S :tance: en:	11.4 7.61 1733 144	°C S.U. µmhos/cm mV mg/L NTU	/13 Carbon D Sulfide (S Ferrous li	TIME: /107 ioxide: -2); ron (Fe*2);		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (Ri HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L)	
FIELD ANALYSE Femperature: pH: ipecific Conduc ih: Dissolved Oxygo furbidity: SAMPLE COLLE	s :tance: en: CTION	11-4 7.61 1733 144 0.84	°C S.U. µmhos/cm mV mg/L NTU DATE: 5//3.	Carbon D Sulfide (S Ferrous II	TIME: // 07 ioxide: - ²): ron (Fe ⁺²):		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (Ri HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L)	
FIELD ANALYSE Femperature: 5H: 5pecific Conduct 5h: 5bissolved Oxyge Furbidity: 5AMPLE COLLER 5ample appear	S etance: en: CTION ance:	11.4 7.61 1733 144 0.84 11.4	°С S.U. µmhos/cm mV mg/L NTU DATE: 5/3. Сселяя	/13 Carbon D Sulfide (S Ferrous II * > > > > > > > > > > > > > > > > > >	TIME: /107 ioxide: -2); ron (Fe*2);		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (Ri HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L)	
FIELD ANALYSE Femperature: 5H: 5pecific Conduct 5h: Dissolved Oxyge Furbidity: 5AMPLE COLLER 5ample appear Collection meth	S :tance: en: CTION ance: nod:	11.4 7.61 1733 144 0.84 11.4 PERISTAR	°C S.U. μmhos/cm mV mg/L NTU DATE: 5/3 CLEARS / BLADDER / MICE	/13 Carbon D Sulfide (S Ferrous li	TIME: /107 ioxide: -2); ron (Fe*2);		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (Ri HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L)	
FIELD ANALYSE Femperature: 5H: Specific Conduct 5h: Dissolved Oxyge Furbidity: SAMPLE COLLE Sample appears Collection meth Equipment No.	S :tance: en: CTION ance: nod:	<u>11.4</u> 7.с. 1733 144 0.84 <u>11.4</u> репізталяс 33	°C S.U. µmhos/cm mV mg/L NTU DATE: 5/3. CLEASE / BLADDER / MICF	Carbon D Sulfide (S Ferrous li T Done Down R RO BLADDER / OTHER:	TIME: /107 ioxide: -2); ron (Fe*2);		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (Ri HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L)	
IELD ANALYSE remperature: HI: specific Conduct in: Dissolved Oxyge furbidity: SAMPLE COLLE sample appear collection meth iquipment No.	S :tance: en: CTION ance: nod:	<u>11.4</u> 7.с. 1733 144 0.84 <u>11.4</u> репізталяс 33	°C S.U. μmhos/cm mV mg/L NTU DATE: 5/3 CLEARS / BLADDER / MICE	Carbon D Sulfide (S Ferrous li T Done Down R RO BLADDER / OTHER:	TIME: /107 ioxide: -2); ron (Fe*2);		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (Ri HACH HS-WR (R HACH IR-18C (R	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L)	
IELD ANALYSE remperature: HI: specific Conduct in: Dissolved Oxyge furbidity: SAMPLE COLLE sample appear collection meth iquipment No.	S :tance: en: CTION ance: nod: Size	<u>//.4</u> 7.с. 1733 /44 0.84 /1.4 Репізтаріс 33.7 0.45 µm (810	°C S.U. µmhos/cm mV mg/L NTU DATE: 5/3 Сисал / BLADDER / MICF D0) / 0.45 µm (820 Filtered	Carbon D Sulfide (S Ferrous li Carbon D Sulfide (S Ferrous Li	TIME: //// ioxide: -2): ron (Fe ⁺²): >:9		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R , as a second sec	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L)	
TELD ANALYSE Temperature: Temperature: Temperature: Temperature: Turbidity: Turbidity: Temple appeara Collection methat Collection methat	S tance: en: crion ance: nod: Size 40 mL	<u>//.4</u> 7.с. 1733 /44 0.84 //.4 //.4 0.45 µт (810 Туре Glass	°C S.U. µmhos/cm mV mg/L NTU DATE: 5/3 CLEARE / BLADDER / MICF DO) / 0.45 µm (820 Filtered Yes No	Carbon D Sulfide (S Ferrous II Carbon D Sulfide (S Ferrous II Sulfide (S Ferrous III Sulfide (S Ferrous II Sulfide	TIME: /107 ioxide:	NA NA NA TABILI X NA NA	_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R , as a second sec	L = 10 mg/L) KL = 0.05 mg/L) L = 0.2 mg/L) (III <i>CO42</i> (IV <i>CO42</i>	
IELD ANALYSE emperature: H: pecific Conduc h: issolved Oxyge urbidity: AMPLE COLLE ample appeara ollection meth quipment No.: ilter used:	S :tance: en: CTION ance: nod: Size	<u>//.4</u> 7.с. 1733 /44 0.84 /1.4 Репізтаріс 33.7 0.45 µm (810	°C S.U. µmhos/cm mV mg/L NTU DATE: 5/3 Сисал / BLADDER / MICF D0) / 0.45 µm (820 Filtered	Carbon D Sulfide (S Ferrous li Carbon D Sulfide (S Ferrous Li	TIME: /107 ioxide:		_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R ACC	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L) (III <i>L</i> 04/2 (IV <i>L</i> 04/2 neters	YES NO YES NO P36 / OSS
IELD ANALYSE emperature: H: pecific Conduc h: issolved Oxyge urbidity: AMPLE COLLE ample appeara ollection meth quipment No.: ilter used:	S tance: en: crion ance: nod: Size 40 mL	<u>//.4</u> 7.с. 1733 /44 0.84 //.4 //.4 0.45 µт (810 Туре Glass	°C S.U. µmhos/cm mV mg/L NTU DATE: 5/3 CLEARE / BLADDER / MICF DO) / 0.45 µm (820 Filtered Yes No	Carbon D Sulfide (S Ferrous II Carbon D Sulfide (S Ferrous II Sulfide (S Ferrous III Sulfide (S Ferrous II Sulfide	TIME: /107 ioxide:	NA NA NA TABILI X NA NA	_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R ACC	L = 10 mg/L) KL = 0.05 mg/L) L = 0.2 mg/L) KL = 0.2 mg/L) KL = 0.2 mg/L) L = 0.2 mg/L) L = 0.2 mg/L) L = 0.2 mg/L) L = 0.05 mg/L) L = 0.02 mg/L) L =	
IELD ANALYSE emperature: H: pecific Conduc h: bissolved Oxyge urbidity: AMPLE COLLER ample appeara collection meth iquipment No.; ilter used: Quantity	S en: CTION ance: nod: Size 40 mL 125 mL S00 mL S00 mL	<u>//.4</u> 7.с. 1733 /44 0.84 <u>//.4</u> <u>//.4</u> <u>//.4</u> 0.84 <u>луре</u> Glass Plastic	C S.U. μmhos/cm mV mg/L NTU DATE: 5/3. CLEASE / BLADDER / MICF DO() / 0.45 μm (820) Filtered Yes No Yes No	Carbon D Sulfide (S Ferrous II Carbon D Sulfide (S Ferrous II Sulfide (S Ferrous III Sulfide (S Ferrous II Sulfide	TIME: // // // // // // // // // // // // //	NA NA NA TABILI X NA NA	_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R ,	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L) (III <i>L</i> 04/2 (IV <i>L</i> 04/2 neters	YES NO YES NO P36 / OSR /
IELD ANALYSE emperature: H: pecific Conduc h: vissolved Oxyge urbidity: AMPLE COLLER ample appeara collection meth quipment No, ilter used: Quantity 1	S ttance: en: CTION ance: nod: Size 40 mL 125 mL S00 mL	<u>//.4</u> 7.с. 17733 /444 0.844 /1.4 0.854 /1.4 0.45 µт (810 Саза Ріазтіс Ріазтіс Ріазтіс	*C S.U. μmhos/cm mV mg/L NTU DATE: 5/3 CLEARS / BLADDER / MICF DO) / 0.45 μm (820 Filtered Yes No Yes No No	Carbon D Sulfide (S Ferrous II Carbon D Sulfide (S Ferrous II Sulfide (S Ferrous III Sulfide (S Ferrous II Sulfide	TIME: // // // // // // // // // // // // //	NA NA NA TABILI X NA NA	_mg/L _mg/L _mg/L	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R ,	L = 10 mg/L) RL = 0.05 mg/L) L = 0.2 mg/L) (III <i>CO4/2</i> (IV <i>CO4/2</i> neters	YES NO YES NO P36 / OSR /
IELD ANALYSE Temperature: IH: Specific Conduct Sh: Dissolved Oxyge Furbidity: SAMPLE COLLER Sample appears Collection mether Squipment No,: Iter used: Quantity 1 1 1	S en: CTION ance: nod: Size 40 mL 125 mL S00 mL S00 mL	<u>//.4</u> 7.с. 7733 /44 0.84 /1.4 0.84 /1.4 Репізтаційс 337 0.45 µт (810 Туре Glass Plastic Plastic Plastic	°C S.U. μmhos/cm mV mg/L NTU DATE: 5/3 CLEARS / BLADDER / MICF DO) / 0.45 μm (820 Filtered Yes No Yes No No No	Carbon D Sulfide (S Ferrous li Carbon D Sulfide (S Ferrous Li	TIME: // // // // // // // // // // // // //	NA NA NA TABILI X NA NA	mg/L mg/L mg/L Duplicate samp MS/MSD samp Chain of Custor Chain of Custor	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R ,	L = 10 mg/L) L = 0.05 mg/L) L = 0.2 mg/L) L = 0.2 mg/L) (III <i>LO412</i> (IV <i>LO412</i> neters FI Calcium , TDS, SQ4	YES NO VES NO D34 ~ OST
FIELD ANALYSE Femperature: SPE: Specific Conduct Specific Cond	s ttance: en: CTION ance: hod: Size 40 mL 125 mL S00 mL S00 mL S00 mL	<u>//.4</u> 7.С.1 7733 /444 0.854 /1.4 0.854 /1.4 0.45 µт (810 Туре Glass Plastic Plastic Plastic Plastic Plastic	°C S.U. µmhos/cm mV mg/L NTU DATE: 5/3 CLEARE / BLADDER / MICF DO) / 0.45 µm (820 Filtered Yes No Yes No No No	Carbon D Sulfide (S Ferrous li Carbon D Sulfide (S Ferrous Li	TIME: // // // // // // // // // // // // //	NA NA NA TABILI X NA NA	mg/L mg/L mg/L Duplicate samp MS/MSD samp Chain of Custor Chain of Custor	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R ,~~~~ ,~~~) de collected? de collected? dy Number: App> dy Number: App> Paran Paran Boron, Cl, Fl, pH , Ba, Be, Cd, Cr, C	L = 10 mg/L) L = 0.05 mg/L) L = 0.2 mg/L) L = 0.2 mg/L) (III <i>LO412</i> (IV <i>LO412</i> neters FI Calcium , TDS, SQ4	YES NO VES NO D34 ~ OST
IELD ANALYSE Femperature: HI: pecific Conduct th: Dissolved Oxyge furbidity: Collection meth c	s ttance: en: CTION ance: nod: Size 40 mL 125 mL S00 mL S00 mL S00 mL S00 mL	//.4 7.С.1 7.33 /44 0.84 /1.4 0.84 /1.4 0.45 µт (810 Туре Glass Plastic Plastic Plastic Plastic Plastic Plastic	°C S.U. µmhos/cm mV mg/L NTU DATE: 5/3 Сислас / BLADDER / MICF D0) / 0.45 µm (820 Filtered Yes No Yes No No No No	Carbon D Sulfide (S Ferrous li Carbon D Sulfide (S Ferrous Li	TIME: /////iv tioxide:	NA NA NA NA TARILIZE NA NA NA NA NA NA NA NA NA NA	mg/L mg/L mg/L Duplicate samp MS/MSD samp Chain of Custor Chain of Custor	values >20 HACH CA-DT (RI HACH HS-WR (R HACH IR-18C (R ,~~~~ ,~~~) de collected? de collected? dy Number: App> dy Number: App> Paran Paran Boron, Cl, Fl, pH , Ba, Be, Cd, Cr, C	L = 10 mg/L) KL = 0.05 mg/L) L = 0.2 mg/L) (III <i>CO4/2</i> (IV <i>CO4/2</i> (IV <i>CO4/2</i> (IV <i>CO4/2</i> (IV <i>CO4/2</i> (IV <i>CO4/2</i> (IV <i>CO4/2</i> (III	YES NO VES NO D34 ~ OST

Project Name:		MBLP/5hiras	A5D & GW Monito	oring	Monitoring Loc	ation:	MW-5			-
P roject Numbe	r:	180827			Sample ID:		MBLP5-18-05-N	/W-5(I)		
Site Location:		Marquette, M	MI.		Well Type:		2" PUC			20
Weather/Temp	:	65°,	condy		Key Number:					e /
INSPECTION		- Subo-12		a gu stai						ine View
Label on well?			YES NO / RE	EMEDIED	Is cement pad i	n good repair?		<	YES / NO / REM	IEDIED
s reference ma	rk visible?		YES/NO/R	EMEDIED	Is protective ca	sing locked and i	in good repair?	(YES NO / REM	
Standing water	present?		YE5 (10)/ RI			lace and proper			YES/ NO / REM	
Indication of su	rface runoff i	n well?	YE5 / OV RI	EMEDIED	Is well casing in	visibly good rep	air?	<	YE? / NO / REM	IEDIED
Repair Notes:										2 -
STATIC WATER	LEVEL	State of	DATE: 5/3	/18	TIME: 10:2	13	1000			
Top of Casing B	levation:	NM	ft		Measured with:		Electronic tape	/ Chalked tape	/ Other:	
Depth to Wate	r:	14.78	ft		Well depth veri	fied?	YES / MO>			
Elevation of W	ater:		ft							
WELL PURGING		The section	DATE: 5/31	/18	TIME: 10 3		CU2-ONE 2		MRI 24 Sa	
Purge Method:		PERISTALTIC	/ BLADDER / MICR	O BLADDER / OTHER:		Pump intake @	25	ft from	TOC or 🖊 b	ottom
Equipment No.		_ <5	<u>``</u>	-						
Measured well	depth: L	14.75	ft	5creen length:	_5	ft	Depth to scree	n midpoint:	42.25	ft
		r Level	Drawdown	Pumping Rate	pH	Temp	5pec Cond	Turbidity	Eh	D.O.
Time	(fe	eet)	(feet)	(mL/min)	(5.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
1109	16	51	159	120	7.47	11.0	1102	8.79	489.5	3-16
1112		.37	1.59	220	7.47	11.0	11 02	8.17	491.6	3.18
Ins		37	1.59	220	7.47	11.1	1103	6.91	463.2	3.17
1118	16.	57	1.57	220	7.47	<u></u>	103	7.45	494.9	3,19
						<u> </u>	_			<u> </u>
						-				
/olume:)	.5	(Gallons)		5tabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%
	Service and service of the service o	18 20	DATE: 5/30	115	TIME: 11 19			values >20	4 S. 1. 1.	FIFT SA
Temperature:		11.0	1.22	Carbon D		NA	mg/L	HACH CA-DT (F	RL = 10 mg/L)	
:Hc		7.47		5ulfide (5	⁻²):	NA	mg/L		RL = 0.05 mg/L)	
Specific Conduc	tance:	200	μmhos/cm	Ferrous Ir		NA	mg/L	HACH IR-18C (I		
h:	13	4455	••••••••••••••••••							
Dissolved Oxyg	en:	3.19	- 200700							
furbidity:		6.76	NTU							
AMPLE COLLE	CTION	- 1. Take	DATE: 5/31	115	TIME: 112	2				
Sample appear	ance:		clew				Duplicate samp	ole collected?	_	YES /
Collection met	nod: 🤇	PERISTALTIC	BLADDER / MICR	O BLADDER / OTHER:		_	MS/MSD samp	le collected?		YES A
quipment No.			-2				Chain of Custo	dy Number: App	xIII 6047	
ilter used:			00) / 0.45 μm (8200	D) NOND			Chain of Custo	dy Number: App	NIV Logica	059 V
				-						-57 -
Quantity	5ize	Туре	Filtered		Preservative		1.0	Para	meters	
	40 mL	Glass	Yes No	None HCl	HNO ₃ H ₂ 5O ₄					
	125 mL	Plastic	Yes No	None HCI	HNO ₃ H ₂ 5O ₄	NaOH				
	500 mL	Plastic	No		None				Fl 🗸	
1		Plastic	No		None				, Calcium	
1	500 mL				HNO ₃			CI, FI, pł	⊣, TDS, SO₄ 🛛 🖌	
1	500 mL	Plastic	No	4			CL 4	Do Do CH C	Co Dh U- M	So TL 11 - 🖊
1 1 1	500 mL 500 mL	Plastic	No	(i.	HNO ₃		Sb, As		Co, Pb, Hg, Mo, S	Se, Tl, Li
1	500 mL 500 mL 1000 mL	Plastic Plastic	No No	Need 100	HNO ₃	Naou	Sb, As		Co, Pb, Hg, Mo, 5 6, Radium 228	Se, TI, Li
1 1 1	500 mL 500 mL 1000 mL 1000 mL	Plastic	No	None HCI	HNO ₃	NaOH	Sb, As			Se, TI, Li

EQUIPMENT CALIBRATION FORM

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	9/20118	かつみつ					
Initials:	ARS					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.	3.9B	-	3.9 - 4.1	451 P.P.
рН	7.00	4728-110817	S.U.	7.08	16.3	6.9 - 7.1	#373
	10.00	467804-01117	S.U.	10.10		9.9 - 10.1	0
Cassifia	147	SCIBOTIS -IC	µmhos/cm	149		132 - 162	
Specific Conductance	1412	50180103-20	µmhos/cm	1413	15-8	1342 - 1484	
	2765	56180713-30	µmhos/cm	2756		2628 - 2905	
Eh	Zobell's solution	20326882-2	mV	(135.3	14.5	431.0-451.0	
Dissolved Oxygen	NA	NA	mg/L	10.00	14.5	±10% Theoretical: <i>10-0</i> 3	\forall
Turbidity	10 NTU	A6272	NTU	10,23	-	9 - 11	L. 2020 ~ \$6
Notes:		19					ю Ж
· · · · · · · · · · · · · · · · · · ·							

Project Name:	-	& GW Monitoring					v
Project Number:	180827						
	9/20/15 1	1:53	-			NA Not Any Real-	
Initials:	AO					NA = Not Applicable	
Parameter	Standard	Lot Number	Units	Measured Value	Measurement Temperature (°C)	Calibration Verification Acceptance Window	Instrument Model/ ID Number
pН	7.00	some as initial cal.	S.U.	7.10	15-8	6.9 - 7.1	151 PP #513
Specific Conductance	1412		µmhos/cm	1409	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 . <i>9</i> 5	
Turbidity	10 NTU	¥.	NTU	10.00	NA	9 - 11	L.M. H 2020 We 6
Notes:							
					2		
							V2.

Project Name:	MBLP/Shiras ASD	& GW Monitoring					
Project Number:	180827						
Date/Time:	9/20/18 14Z	5					
Initials:	APS					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 CNUTCHE	S.U.	7.10	15-9	6.9 - 7.1	451 P.P. #513
Specific Conductance	1412	Cor	µmhos/cm	1406	15.3	1342 - 1484	
Eh	Zobell's solution		mV	430.3	15.9	429,7-4149.7	
Dissolved Oxygen	NA	NA	mg/L	9.70	13.1	±10% Theoretical: /0.54	t
Turbidity	10 NTU	¥	NTU	9.09	NA	9 - 11	2-220 4 #6
Notes:					1	- 2 .	
				1			
						N	
	0	14					
		-					1. And the second se

		MRI D/Shires	ASD & GW Monito					0.11		
Project Name: Project Numbe		180827	ASD & GW MONITO	n'ing	Monitoring Loc Sample ID:	ation:	MW-1	and the second of		-
Site Location:		Marquette, I	MI		Well Type:			MW-1(I/ MS/M S	AR (I) AR	2
Weather/Tem	D:	C1"	doudy		Key Number:		2" Galv 356			2
Concernation of the			array				330		Colored Street	-
INSPECTION	19100 1			MEDIED			in the second	C. 10116-170		
Label on well?			YES / MO/ RI		ls cement pad i					NEDIED NA
Is reference ma Standing water			YES / MO / RI			sing locked and in	•		NO / REN	
Indication of su			VES / NO / RI			lace and properly			VEST NO / REA	
Repair Notes:	unace runon	in weir	YES / NO/ RI	IMEDIED	is well casing in	visibly good repa	11F?		VEV NO / REN	NEDIED
										-0
STATIC WATER	LEVEL	e Lena	DATE: -1/20	119	TIME: 11	04			milita in	
Top of Casing I	Elevation:	NM	ft		Measured with:	0	Electronic tap	/ Chalked tape	e / Other:	
Depth to Wate	er:	0.10	ft		Well depth veri	fied?	YES /NOP			
Elevation of W	/ater:	-	ft							
WELL PURGING	G	W.W.EAT	DATE: 9/20	115	TIME: 11:0	6		in sa	nings- Spi	
Purge Method:	1.	PERISTALTIC		O BLADDER / OTHER:		Pump intake @	5	ft from	TOC or 🗸 b	ottom
Equipment No.	24	39				, -				
Measured well		21.44		Screen length:	_5	_ft	Depth to scree		26.94	ft
Time	1	er Level eet)	Drawdown (feet)	Pumping Rate (mL/min)	рН (S.U.)	Temp (°C)	Spec Cond (µmhos/cm)	Turbidity (NZQ)	Eh (mV)	D.O. (mg/L)
11:27		26	2.16	100	7.00	13.8	1358	4301	3.9 430	0.15
11:31		38	2.25	120	7.79	13.8	1358	180	430	0.16
11:34	2	51	241	100	7.79	13.7	1359	17.7	430	0.16
11:27	2.	57	2.47	100	7.79	137	1358	17.4	430	0.16
11:40	Ĵ.	67	157	100	7.77	13 7	1358	12.9	430	0.16
11:43	2.	76	2.66	100	7.79	137	1358	13.8	430	0.17
11:46	2.	80	2.70	100	7.79	13.8	1356	117	430	0.17
11:49	<u> </u>	87	2.77	100	7.77	13.7	1357	9.2	430	0.17
Volume:	1.0	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%
IELD ANALYSE	and the second second		DATE: 9/2	0/18	TIME: 115	D	a strailing 7	values >20	National Anna	
Cemperature:		13.8		Carbon Di		NA	mg/L	HACH CA-DT (I	RL = 10 mg/L)	
oH:		12-0024	s.u.	Sulfide (S	²):	NA	mg/L		(RL = 0.05 mg/L)	
Specific Conduc	ctance:	1356	µmhos/cm	Ferrous Ire	on (Fe ⁺²):	NA	mg/L	HACH IR-18C (
Eh:		430	mV						<i>67 - 7</i>	
Dissolved Oxyge	en:	0.17	mg/L							
furbidity:		9.8	NTŰ			22				
AMPLE COLLE	CTION		DATE: 9/20	118	TIME: 115	1		100		
ample appeara	ance:	lea				2	Duplicate samp	le collected?		YES /
Collection meth	nod: 🧹	PERISTALTIC	/ BLADDER / MICR	D BLADDER / OTHER:		-	MS/MSD samp			YES / O
quipment No.:			a7						xIII COHZI	
ilter used:		0.4S μm (810	10) / 0.45 μm (8200)/		3	-Chain of Custo		10-1-CI	and h
				_					S/MSD location	to MW
Quantity	Size	Түре	Filtered		Preservative				meters	
	40 mL	Glass	Yes No		HNO ₃ H ₂ SO ₄	NaOH				
	125 mL	Plastic	Yes No		HNO3 H2SO4	NaOH				
	Der.	Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOH			1	1
	2S0 mL				HNO₃			Tota	l; B, Ca 🗸	1
816	250 mL	Plastic	No							
816	250 mL 500 mL	Plastic	No		None			Cl, Fl, pH	I, TDS, SO₄ 🖌	
4 . 1011	250 mL 500 mL 500 mL	Plastic Plastic	No Yes No		HNO3 H2SO4	NaOH		Cl, Fl, pH	I, TDS, SO₄ 🖌	
4 . 1011	250 mL 500 mL	Plastic	No	None HCI		NaOH NaOH NaOH		Cl, Fl, pH	I, TDS, SO₄ 🖌	

5

Project Numb	per:	180827			Monitoring Lo Sample ID:		MW-2 MBLPS-18-09-	-MW-2(I) & (D)	1	-
Site Location:		Marquette,	MI		Well Type:		2" Galv	and zin detail		-
Weather/Ten	np:	e7	Joudy		Key Number:		356			
	2012 11 22 21 10		- 1	Contract of the second state of the	,	(550			
INSPECTION				callo astrolaritida			DW 2.8 TH			
Label on well			YES / NO / RE		ls cement pad i				YES / NO / RE	MEDIED N/A
Is reference n			YES TO RE			sing locked and i			E NO / RE	. ,
Standing wate	1.0		YES /NO7 RE		Is inner cap in p	lace and proper	y sealing well?		(YES / NO / RE	MEDIED
Indication of s		f in well?	YES (NO / RE	MEDIED	Is well casing in	visibly good rep	air?		VEN NO / RE	MEDIED
Repair Notes:	ji <u></u> ij									
		- Aches	A / 1			20000				
STATIC WATE				0/18	TIME: 10 1					できた。文書語
Top of Casing Depth to Wat		NM	ft		Measured with	-		/ Chalked tape	e / Other:	
		0.03	_ft		Well depth veri	fied?	YES TO			1
Elevation of V	vater:		ft							
WELL PURGIN	G		DATE: 9/20		TIME: 10	3		i fe cau		
Purge Methoc	1:		-	BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC or	bottom
Equipment No	i.:	39	7							
Measured wel	ll depth:	28.9	ft	Screen length:	5	ft	Depth to scree	n midpoint:	26.42	ft
	Wat	er Level	Drawdown	Pumping Rate	pH	Temp	Spec Cond	Turbidity	_	¥
Time		feet)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	Eh (mV)	- D.O. (mg/L)
10:23	1.	21	1.18	100	7.95	13.4	563	57	424	0.17
10:37	1.	79	1.76	100	7.95	13.5	560	4.2	418	015
12:40	2.	02	1.99	100	1.95	13.5	563	2,1	428	0.14
10:43		26	1.23	100	7.95	13.1	561	2.5	429	0.11
10:46	2.	50	2.47	100	7.95	13.1	560	1 2	429	0.11
10:49	2.	69	6.61	100	7.95	13.1	500	1.7		
10:52).	96	ROL 6 2.5		7.95	13.0	560	1.7	430	0.11
	-		C 10 0 0 0 0		1-13	15.0	100	1. /	431	0.09
Volume: 1	1	(Gallons)	·	itabilization Criteria:	±0.1	±3%	±3%	±10% for	110	
FIELD ANALYSI	FS	In the second second	DATE: 9/20	115	TIME: 10:5		1 2576	values >20	±10 mV	±10%
Temperature:		13.1	°C	Carbon Di						
рН		7.95	-	Sulfide (S		NA	mg/L	HACH CA-DT (F	0/ -/	
Specific Condu	ctance:		μmhos/cm			NA	_mg/L		RL = 0.05 mg/L)	
Eh:	ctance.	<u>431</u>	ту жи .	Ferrous Ir	on (Fe):	<u>NA</u>	_mg/L	HACH IR-18C (I	RL = 0.2 mg/L)	
Dissolved Oxyg	en.		mg/L	this in rica	1,72 to 1	Nandow	570-1.26	404		
Turbidity:	cn.	0.1		ntus in readi	D.O. 60	1 whish	stire a	100 A	~L/m.n	IN US MU
in or on one of the		1.0					_			
SAMPLE COLLE	CTION		DATE: 0/20/	18	TIME: 10: 5	541				Play Suffrance
Sample appear	ance:	_ clea					Duplicate samp	le collected?		YES NO
Collection met	hod:	PERISTAL	/ BLADDER / MICRO	BLADDER / OTHER:			MS/MSD samp!	e collected?		YES / NO
Equipment No.	:	397					Chain of Custod	y Number: App	xIII bailzis	21
		0.4S μm (810	00) / 0.4S µm (8200)	NONE			-Ghain of Custod		x++ (i	
ilter used:									plicate-location	moved Mw-
Filter used:		Туре	Filtered	F	Preservative				neters	P1W-1
ilter used: Quantity	Size		Yes No	None HCl	HNO ₃ H ₂ SO ₄	NaOH				
	Size 40 mL	Glass				NaOH				
		Glass Plastic	Yes No	None HCI	HNO ₃ H ₂ SO ₄	NaOII				
	40 mL					NaOH				14
	40 mL 125 mL	Plastic	Yes No					Total	; B, Ca 🖌	-
	40 mL 125 mL 250 mL	Plastic Plastic	Yes No Yes No		HNO ₃ H ₂ SO ₄					
	40 mL 125 mL 250 mL 250 mL	Plastic Plastic Plastic	Yes No Yes No No	None HCI	HNO ₃ H ₂ SO ₄ HNO ₃ None				; B, Ca 🗸	1
	40 mL 125 mL 250 mL 250 mL 500 mL	Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No	None HCI	HNO ₃ H ₂ SO ₄ HNO ₃ None HNO ₃ H ₂ SO ₄	NaOH				/
	40 mL 125 mL 250 mL 250 mL 500 mL 500 mL	Plastic Plastic Plastic Plastic Plastic	Yes No Yes No No No Yes No	None HCI None HCI None HCI	HNO ₃ H ₂ SO ₄ HNO ₃ None HNO ₃ H ₂ SO ₄	NaOH NaOH				

Project Name:									0
	-	ASD & GW Monito	ring	Monitoring Loca	ation:	MW-3			-
Project Number:	180827	4		Sample ID:		MBLPS-18-09-N	VIV-3(I)		-
Site Location:	Marquette, M			Well Type:		2" Galv			-
Weather/Temp:	-55-	doudy		Key Number:		356			
NSPECTION						Sur and			
abel on well?		YES /NO/ RE	MEDIED	Is cement pad in	good repair?			YES / NO / RE	MEDIED NO/A
s reference mark visible?		YES / NO7 RE	MEDIED	Is protective cas	ing locked and in	n good repair?		(YES/ NO / RE	MEDIED
standing water present?		YES /NOV RE		ls inner cap in pl	lace and properly	sealing well?		YES NO / RE	
ndication of surface runof	f in well?	YES (NO/ RE	MEDIED	Is well casing in	visibly good repa	ir?		(YES) NO / RE	MEDIED
epair Notes:			H						
TATIC WATER LEVEL	izienie hinioja	DATE: 4/20	18	TIME: 1:0	00	un Sohne F	all the state	al al l'	A MARCEN M
Top of Casing Elevation:	NM	ft		Measured with:	<	Electronic take	/ Chalked tape	/ Other:	
Depth to Water:	0.	ft		Well depth verif	ied?	YES NO	7		
Elevation of Water:		ft				\smile			
WELL PURGING	干面包盖	DATE: 9/20/	115	тіме: 9:0	1	100		的新进步	5955 AM
Purge Method:			D BLADDER / OTHER:		Pump intake @	2.5	ft from	TOC or 🗸	bottom
Equipment No.:	31	47							
Measured well depth:	29.01	ft	Screen length:	_ 5	ft	Depth to scree	n midpoint:	26.51	ft
		CDrawdown	Pumping Rate	рН	Temp	Spec Cond	Turbidity	Eh	D.O.
	(feet)	(feet)	(mL/min)	(S.U.)	(°C)	(µmhos/cm)	(NTU)	(mV)	(mg/L)
9:21 2	.69	2.59	100	8.15	13.2		3.0	440	0.39
9:24 2.	2.810	2.84	100	8.16	13.1	615	1.9	439	0.37
9:22 32	iu er	324	100	8.1/	13.1	60 Y	2.2	440	0.34
	55	3.45	102	0.17	13.2	604	1.7	440	0.12
4.53 3.0	17	3.47	100	8.17	11.5	640	11.4	437	0.38
9.56 3.7	16	3.66	130	8.17	12.4	629	11.1	437	0.41
9:59 3.	71	3.87	100	8.18	12.9	621	9.7	437	0.39
							±10% for		
/olume: 0.9	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	values >20	±10 mV	±10%
	The second second	DATE: 9/20/		TIME: 10				10.	1. 1
		*C	Carbon D		NA	mg/L	HACH CA-DT (RL = 10 mg/L)	
Cemperature:	13.0			⁻²).	NA	mall	HACH HS-WŖ	(RL = 0.0S mg/L))
FIELD ANALYSES	8.18	s.u.	Sulfide (S			mg/L			
'emperature: oH:	5.18		Ferrous Ir	ron (Fe ⁺²):		mg/L	HACH IR-18C	RL = 0.2 mg/L)	45 400
emperature: H: pecific ² Conductance: h:	8.18 620 437	S.U. μmhos/cm mV X		ron (Fe ⁺²):		-	HACH IR-18C	RL = 0.2 mg/L	1 45 MU
emperature: H: pecific ² Conductance: h: bissolved Oxygen:	8.18 620 437 0.38	S.U. μmhos/cm mV γ mg/L	Ferrous Ir	ron (Fe ⁺²):		mg/L	HACH IR-18C	RL = 0.2 mg/L)	1 45 MU
emperature: H: pecific ² Conductance: h: hissolved Oxygen:	8.18 620 437 0.38	S.U. μmhos/cm mV X	Ferrous Ir	ron (Fe ⁺²):		mg/L	насн ir-18с (ЭМ	RL = 0.2 mg/L)	1 45 MV
emperature: pH: ipecific ² Conductance: ih: Dissolved Oxygen: furbidity:	8.18 620 437 0.37 0.1	S.U. μmhos/cm mV γ mg/L	Ferrous Ir	ron (Fe ⁺²): ひと へ。		mg/L	HACH IR-18C (のかし	RL = 0.2 mg/L)	n 45 mu
emperature: ph: ipecific Conductance: h: Dissolved Oxygen: furbidity: SAMPLE COLLECTION	8.18 620 437 0.37 0.1	S.U. μmhos/cm mV - χ mg/L NTU DATE: 9/ γ-0	Ferrous Ir	ron (Fe ⁺²): ひと へ。	NA F Stzb.li-	mg/L	(0) ML	RL = 0.2 mg/L)	η Υ.S. Μ Υ YES / (G)
emperature: pecific Conductance: h: Dissolved Oxygen: furbidity: CAMPLE COLLECTION Sample appearance:	8.18 620 437 0.37 9.1	S.U. μmhos/cm mV * mg/L NTU DATE: 9/ 2-0	Ferrous Ir	ron (Fe ⁺²): ひと へ。	NA F Stzb.li-	mg/L 76	(o) nl	RL = 0.2 mg/L)	調査の項目
emperature: pH: ppecific ² Conductance: th: Dissolved Oxygen: furbidity: SAMPLE COLLECTION Sample appearance: Collection method:	\$.18 620 437 0.39 9.1 PERISTALTIC	S.U. µmhos/cm mV * mg/L NTU DATE: 1/2-0) BLADDER / MICRO	Ferrous Ir * drawdown	ron (Fe ⁺²): ひと へ。	NA F Stzb.li-	mg/L Z > Duplicate samp MS/MSD samp	(o) ml	-1210 :	YES / O
Femperature: pH: specific ² Conductance: Eh: Dissolved Oxygen: furbidity: SAMPLE COLLECTION Sample appearance: Collection method: Equipment No.:	5.18 620 437 0.37 9.1 PERISTALTIC 3 9 7	S.U. µmhos/cm mV * mg/L NTU DATE: 1/2-0) BLADDER / MICRO	Ferrous Ir A dawdown // S D BLADDER / OTHER:	ron (Fe ⁺²): ひと へ。	NA F Stzb.li-	mg/L Z > Duplicate samp MS/MSD samp	() ML	px III 6042	YES / O
emperature: pecific ² Conductance: h: Dissolved Oxygen: 'urbidity: CAMPLE COLLECTION Sample appearance: Collection method: aquipment No.: ilter used:	\$.18 6.20 437 0.37 0.37 9.1	S.U. μmhos/cm mV * mg/L NTU DATE: 1/2-0) BLADDER / MICRO 7)0) / 0.45 μm (8200	Ferrous Ir Anwdown / 18 D BLADDER / OTHER:) / NOT	ron (Fe*2): drel ∼o, <u>TIME: 10:</u>	NA F Stzb.li-	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 ML ole collected? de collected? dy Number: Ap dy Number: Ap	DX III COH2	YES / O
emperature: H: pecific ² Conductance: h: Dissolved Oxygen: urbidity: AMPLE COLLECTION ample appearance: collection method: quipment No.:	5.18 620 437 0.37 9.1 PERISTALTIC 3 9 7	S.U. µmhos/cm mV * mg/L NTU DATE: 1/2-0 DBLADDER / MICRO 7	Ferrous Ir Anwdown / (T D BLADDER / OTHER:) / NOTE	ron (Fe ⁺²): dr.d. ~~, <u>TIME: 10</u> Preservative	NA F Stzb.li-	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 ML ole collected? de collected? dy Number: Ap dy Number: Ap	px III 6042	YES / O
emperature: ipecific ² Conductance: ih: Dissolved Oxygen: 'urbidity: CAMPLE COLLECTION Cample appearance: Collection method: iquipment No.: Collection method: Collection Size Ouantity Size 40 mL	\$.18 6.20 437 0.37 0.37 0.137 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.45 µm (810 Type Glass	S.U. μmhos/cm mV * mg/L NTU DATE: 9/ 2-0 DELADDER / MICRO 7 200) / 0.4S μm (8200 Filtered Yes No	Ferrous Ir Content of the formation of	ron (Fe ⁺²): dr.d. ~~, <u>TIME:</u> 10 <u>Preservative</u> <u>HNO3</u> H ₂ SO4	NA + stabili 01 /	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 ML ole collected? de collected? dy Number: Ap dy Number: Ap	DX III COH2	YES / O
emperature: H: pecific Conductance: h: issolved Oxygen: urbidity: AMPLE COLLECTION ample appearance: follection method: quipment No.: ilter used: Quantity Size 40 mL 12S mL	\$.18 6.20 437 0.337 9.1 PERISTALTIC 3.97 0.45 μm (810 Type Glass Plastic	S.U. μmhos/cm mV * mg/L NTU DATE: 1/2-0 DBLADDER / MICRO 7 00) / 0.4S μm (8200 Filtered Yes No Yes No	Ferrous Ir Content of the formation of	ron (Fe ⁺²): d d d ~ ~ , TIME: 10 Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄	NA + Stzb, Ir OI - NaOH NaOH	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 ML ole collected? de collected? dy Number: Ap dy Number: Ap	DX III COH2	YES / O
emperature: H: pecific Conductance: h: bissolved Oxygen: urbidity: AMPLE COLLECTION ample appearance: collection method: quipment No.: ilter used: Quantity Size 40 mL 12S mL 2S0 mL	\$.18 6.20 437 0.337 9.1 PERISTALTIC 3.97 0.45 μm (810 Type Glass Plastic	S.U. μmhos/cm mV * mg/L NTU DATE: 1/2-0 DBLADDER / MICRO 7 D0) / 0.45 μm (8200 Filtered Yes No Yes No Yes No	Ferrous Ir Content of the formation of	ron (Fe ⁺²): d d d ~ ~ (TIME: 10 Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄	NA + stabili 01 /	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 M L ole collected? dy Number: Ap dy Number: Ap Par	px III 6042 px IV ameters	YES / O
emperature: pecific Conductance: h: Dissolved Oxygen: urbidity: CAMPLE COLLECTION Comple appearance: Collection method: Collection method:	\$.1\$ 6.20 4.37 0.337 9.1 Charlen 9.1 PERISTALTIC 3.97 0.45 μm (810 Type Glass Plastic Plastic Plastic	S.U. μmhos/cm mV * mg/L NTU DATE: 1/2-0 DBLADDER / MICRO 7 DD) / 0.4S μm (8200 Filtered Yes No Yes No Yes No No	Ferrous Ir Content of the formation of	ron (Fe ⁺²):	NA + Stzb, Ir OI - NaOH NaOH	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 M L ole collected? dy Number: Ap dy Number: Ap Par Tot	px III 6042 px IV ameters al; B, Ca	YES / O
emperature: pecific Conductance: h: bissolved Oxygen: 'urbidity: CAMPLE COLLECTION Collection method: collection method	\$.1\$ 6.20 4.37 0.37 0.37 9.1 PERISTALTIC 3.97 0.45 μm (810 Type Glass Plastic Plastic Plastic Plastic Plastic	S.U. μmhos/cm mV * mg/L NTU DATE: 1/2-0 DBLADDER / MICRO 7 D0) / 0.45 μm (8200 Filtered Yes No Yes No Yes No No No	Ferrous Ir Contraction of the ferrous of the ferrous of the ferrous of the ferrous of the ferroid of the ferro	ron (Fe ⁺²):	NA J SJZ5, IF O J J - NaOH NaOH	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 M L ole collected? dy Number: Ap dy Number: Ap Par Tot	px III 6042 px IV ameters	YES / O
Femperature: pH: Specific Conductance: Eh: Dissolved Oxygen: Furbidity: SAMPLE COLLECTION Sample appearance: Collection method: Equipment No.: Filter used: Ouantity Quantity Size 40 mL 12S mL 2S0 mL 1 S00 mL 1 S00 mL	S.18 620 437 0.37 9.1 PERISTALTIC 397 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic Plastic Plastic	S.U. µmhos/cm mV * mg/L NTU DATE: 1/200 DBLADDER / MICRO 7 00) / 0.45 µm (8200 Filtered Yes No Yes No No No Yes No	Ferrous Ir Contraction of the ferrous of the ferro	ron (Fe ⁺²): <i>d. d. mod.</i> TIME: <i>10</i> Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄	NA ST25, IT OI NaOH NaOH NaOH	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 M L ole collected? dy Number: Ap dy Number: Ap Par Tot	px III 6042 px IV ameters al; B, Ca	YES / O
remperature: Specific Conductance: Sh: Dissolved Oxygen: Furbidity: SAMPLE COLLECTION Sample appearance: Collection method: Siguipment No.: Silter used: Collection method: Siguipment No.: Silter used: Collection method: Source of the second	S.18 620 437 0.37 9.1 PERISTALTIC 397 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic Plastic Plastic Plastic	S.U. μmhos/cm mV * mg/L NTU DATE: 1/2-0 DBLADDER / MICRO 7 D0) / 0.45 μm (8200 Filtered Yes No Yes No Yes No No No	Ferrous Ir Contraction of the ferrous of the ferro	ron (Fe ⁺²): <i>d. d. mod.</i> TIME: <i>10</i> Preservative HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄ HNO ₃ H ₂ SO ₄	NA J SJZ5, IF O J J - NaOH NaOH	mg/L Duplicate samp MS/MSD samp Chain of Custo	(37 M L ole collected? dy Number: Ap dy Number: Ap Par Tot	px III 6042 px IV ameters al; B, Ca	YES / O

Project Name: MBLP/Shiras A5D & GW Monitoring					Monitoring Location:		MW-4			
Project Number:					Sample ID:	1	MBLPS-18-09-MW-4(I) + (D)			
Site Location:	77	Marquette, MI					2" PVC FM		/	•
Weather/Temp:		io" s			Well Type: Key Number:		NA			•
reamery remp.	97		~~~)	Dan in harry her		The second second		YEARS	No. 1 Laboration	1.5.1.2
INSPECTION	1000			rinde of the	alle Salt av 1	전망/태우는 - 2		UN CONS	22	
Label on well?						good repair?			YES NO / REN	
reference mark visible? (YES) NO / REMEDIED					Is protective cas	ing locked and ir	n good repair?		(E) / NO / REMEDIED	
itanding water present? YES (1997) REMEDIED					Is inner cap in pl	ace and properly	y sealing well?		(TES) NO / REMEDIED	
Indication of sur	face runoff in	well?	YES NO/ RE	MEDIED	Is well casing in	isibly good repa	air?		YE / NO / REM	NEDIED
Repair Notes:										- S
ING IN LODGE			61×-	1		2	NYT NEND	Tel Ti Lett		
STATIC WATER LEVEL DATE: 4/20/15					TIME: 130	4	000	/ Challend to a	(Othory	HILL STATE
Fop of Casing Elevation:ft					Measured with:		Electronic tane / Chalked tape / Other:			
Depth to Water		14.92			Well depth verif	ied?	VES / NO			
Elevation of Wa	ter: -		ft							
WELL PURGING	4.0	Support 1	DATE: 9/20	118	TIME: 133		i per a la seg			a calairs is
Purge Method:	0	PERISTALTIC	BLADDER / MICR	O BLADDER / OTHER:		Pump intake @	2.5	ft from	_TOC ort	ottom
Equipment No.:	-	34-	7							
Measured well o	lepth:	16.65	ft	Screen length:	_5	ft	Depth to scree	n midpoint:	44.15	ft
	Water	Level	Drawdown	Pumping Rate	рН	Temp	Spec Cond	Turbidity	Eh	D.O.
Time	(fee	t)	(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	016
1356	14.	31	4.39	100	7.71	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	. در		5.26	100	7.67	12.1	1849	7.35		0.16
1405	ž ə. e	55	5.64	100	7.66	12.1	1837	7.67	78.8	0.14
1408	30,0	11	6.00	(00	7.65	12.3	1828	9.49	78.3	0.13
1411	21.,	20		100	7.64	12.3	1830	8.18	77.7	0.13
								1400.4		
Volume:	6.1.	Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for values >20	±10 mV	±10%
FIELD ANALYSES	5 P. 8 2 0 4		DATE: 9/2	0/18	TIME: 141.	2	La Comme			section in the
Temperature:		12.3	°C	Carbon D	ioxide:	NA	mg/L	HACH CA-DT	RL = 10 mg/L)	
pH:	10	7.65		Sulfide (S	^{•2}):	NA	mg/L HACH HS-WR (RL = 0.05 mg/L)			, II
Specific Conduc	tance:	1830		Ferrous I	ron (Fe ⁺²):	NA	mg/L	HACH IR-18C	(RL = 0,2 mg/L)	
Eh:		77.5								
Dissolved Oxyge	en:	0.13	2							
Turbidity:	-	6.23								
CAMPLE COLLE	-			21/18	TIME: 141	21	W. F. F. Mar		Burnesin - A	
SAMPLE COLLEG		11.1	UNIC. 1/	11	191	2 .	Duplicate sam	ple collected?		YES / NO
Sample appearance: Collection method: PERISTALD2 / BLADDER / MICRO BLADDER / OTHER:						-	MS/MSD samp		,	YES
						Chain of Custody Number: Appx III Courses				
Equipment No.: Filter used:		うらつ 0.45 um (810	0) / 0.45 μm (8200	U / MONP				dy Number: Ap		2192
niter useu.		o⊶o μπ (στυ	-ο, / ο,-ο μιι (σ20)				11-C110111-0-0112-0110	עת	17.95182	/
Quantity	Size	Туре	Filtered		Preservative				ameters	
	40 mL	Glass	Yes No	None HCl	HNO3 H ₂ SO4	NaOH	_			
	125 mL	Plastic	Yes No	None HCl		NaOH				
	250 mL	Plastic	Yes No	None HCI		NaOH				
622	250 mL	Plastic	No		HNO ₃			Tot	al; B, Ca 🛛 🗸	
0,	S00 mL			None					CI, FI, pH, TDS, SO4	
12	500 mL			None HC				.,,		
	1000 mL	Plastic	Yes No	None HCI		NaOH				
		Glass	Yes No	None HCl		NaOH				
	1000 ml I									
SAMPLING PER	1000 mL	Glass	105 110	Hone Her	11103 112504	Haon	2.000			1000

2

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3

Project Name: MBLP/5hiras A5D & GW Monitoring Project Number: 180827 Site Location: Marquette, MI Weather/Temp: 58°, classing					MW-5							
							MBLPS-18-09-MW-50 (1/M5/M5D) 2" PVC					
			and y		Key Number:		NA			5		
SPECTION	THE FAMILY								a literation	B.Land F.		
abel on well?			(YES) NO / RE		Is cement pad in	good repair?			NO / REM	IEDIED		
s reference mark visible?					Is protective casi							
Standing water present? YES REMEDIED					Is inner cap in pla	ce and properly						
ndication of surf			YES NO RE		Is well casing in visibly good repair?							
epair Notes: -	REPLA	UED C	" OF M.	F						-		
	10 imi	Carlotter Torre	A		TIME: 1235			18-2021	1.0012-061	- d'initia		
TATIC WATER L		NM		118	Measured with:		electronic tabe	/ Chalked tape	/ Other:			
Top of Casing Elevation: <u>NM</u> ft Depth to Water: <i>19,64</i> ft					Well depth verifi	i She	YES / MO	ey charked tape y other.				
Elevation of Water	-		ft		Wen depth verm		9					
Elevation of wa					. 1	1			I LULIC, I	A. 46.219		
WELL PURGING	ond Filt		DATE: 9/20/		TIME: 123	1	2.5'	6. (TOCAL			
Purge Method:	\leq			BLADDER / OTHER:		rump intake @	<u> </u>	IC from		octom		
Equipment No.:	2	2,4					Death		10 7 -			
Measured well d	epth: 4	4.75	ft	Screen length:		ft	Depth to screer		42.25			
	Water	12 Mar 19	Drawdown	Pumping Rate	pH (SIL)	Temp (°C)	5pec Cond (µmhos/cm)	Turbidity (NTU)	Eh (mV)	D.O. (mg/t)		
Time	(fee		(feet)	(mL/min)	(5.0.)	11.60	1137	2.3	413	2-15		
1255	16.50		9.1.66	220	7.47	11.6	1138	1.3	4110	2.11		
1258	16.50		4.66	220	7.47	11.6	1133	1.03	417	1.51		
1301	16.50		1.60	220	7.47	11.6	1133	1:2	419	1.40		
1304	10.50		1		7.48	11.6	1133	1.1	419	1.38		
1307	16.50	2	1.60	220	1.98	11.0	11.33	1.1		1.20		
Volume: /.	-	(Gallons)		Stabilization Criteria:	±0.1	±3%	±3%	±10% for	±10 mV	±10%		
CONTRACTOR AND IN	2 65 61		DATE: 9/20/		TIME: 1300		nen u washin	values >20	and the second	nieres Senei		
FIELD ANALYSES		1	°C	Carbon D		NA	mg/L	HACH CA-DT (RL = 10 mg/L)			
Temperature:				5ulfide (S			mg/L		(RL = 0.05 mg/L)			
pH: Coolifie Coolum		<u>7.48</u> 1134	-		Iron (Fe ⁺²): NA		mg/L HACH IR-18C (RL = 0.2 mg/L)					
Specific Conduc Eh:	lance.	418		BUBBLE ON								
Dissolved Oxyge		1.38	mg/L		20.7							
Turbidity:		0.97										
rui biuicy.					12.0	/		12.00.000.00.20	ALL STRUCT	PSAR SHARE		
and the second second			DATE: 9/20,	18	TIME: /309		A STOLET STOLE			1000 L		
SAMPLE COLLEG	TION		1						Duplicate sample collected? YE5 / 1000 M5/M5D sample collected? (YE5) NO			
SAMPLE COLLEG			CUEAR									
	ince:	PERISTALTIC	BLADDER / MICF	O BLADDER / OTHER:			M5/M5D samp	le collected?				
5ample appeara	ince: iod:	PERISTALTIC 33	BLADDER / MICF				M5/M5D samp Chain of Custo	le collected? dy Number: Ap	900	(TES) NO		
5ample appeara Collection meth	ince: iod:	PERISTALTIC 33	BLADDER / MICF				M5/M5D samp Chain of Custo	ile collected? dy Number: Ap dy Number: Ap				
Sample appeara Collection meth Equipment No.: Filter used:	ince: od:	еткізтацие 33 0.45 µm (810	/ BLADDER / MICF - 7 00) / 0.45 μm (820		Precervative		M5/M5D samp Chain of Custo	ole collected? dy Number: Ap dy Number: Ap MS/MS				
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Sample appeara Collection meth Equipment No.: Filter used:	ince: iod: <u>Size</u> 40 mL	O.4S μm (810 Glass	/ BLADDER / MICF 7 10) / 0.45 μm (820 Filtered Yes No	None HC	HNO ₃ H ₂ 5O ₄		M5/M5D samp Chain of Custo	ole collected? dy Number: Ap dy Number: Ap MS/MS				
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Sample appeara Collection meth Equipment No.: Filter used: Quantity	5ize 40 mL 125 mL 250 mL	PERISTALTIC 33 0.4S μm (810 Type Glass Plastic Plastic	7 BLADDER / MICF 7 10) / 0.45 µm (820 Filtered Yes No Yes No Yes No	None HC	HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄		M5/M5D samp Chain of Custo	ile collected? dy Number: Ap dy Number: Ap M S/m S Par	px.LV ameters			
Sample appeara Collection meth Equipment No.: Filter used:	Size 40 mL 125 mL 250 mL	0.45 µm (810 Type Glass Plastic Plastic Plastic	7 BLADDER / MICF 2 00) / 0.45 µm (820 Filtered Yes No Yes No Yes No No	None HCl	HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄	NaOH	M5/M5D samp Chain of Custo	ole collected? dy Number: Ap dy Number: Ap M S/m S Para Para				
Sample appeara Collection meth Equipment No.: Filter used: Quantity	5ize 40 mL 125 mL 250 mL 500 mL	PERISTALTIC 33 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic	7 BLADDER / MICF 2 30) / 0.45 µm (820 Filtered Yes No Yes No Yes No No No	0) KOND None HCl None HCl None HCl	$\begin{array}{c c} HNO_3 & H_25O_4 \\ HNO_3 & H_25O_4 \\ HNO_3 & H_25O_4 \\ HNO_3 & \\ \end{array}$	NaOH NaOH	M5/M5D samp Chain of Custo	ole collected? dy Number: Ap dy Number: Ap M S/m S Para Para	ameters			
Sample appeara Collection meth Equipment No.: Filter used: Quantity	5ize 40 mL 125 mL 250 mL 500 mL 500 mL 500 mL	PERISTALING 33 0.45 µm (810 Type Glass Plastic Plastic Plastic Plastic Plastic	7 BLADDER / MICF 7 200) / 0.45 µm (820 Filtered Yes No Yes No No No Yes No	None HCl None HCl None HCl None HCl	HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ HNO ₃ H ₂ 5O ₄ None	NaOH NaOH NaOH	M5/M5D samp Chain of Custo	ole collected? dy Number: Ap dy Number: Ap M S/m S Para Para	ameters			
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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: Laboratory:	Metals 6010C, 6020A, 7470A General Chemistry 9040B, 9056A, SM2540C Radiological 9315, 9320, Ra226+Ra228 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	Field ID	Lab ID
MBLPS-18-05-MW-1(I)	240-96519-6	MBLPS-18-05-MW-3(I)	240-96519-3
	240-96519-7		240-96523-3
	240-96524-3		240-96523-3
MBLPS-18-05-MW-2(I)	240-96519-4	MBLPS-18-05-MW-4(I)	240-96519-1
	240-96524-1		240-96523-1
	240-96524-1		240-96523-1
MBLPS-18-05-MW-2(D)	240-96519-5	MBLPS-18-05-MW-5(I)	240-96519-2
	240-96524-2		240-96523-2
	240-96524-2		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.



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 $pH \le 2$.	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 🛛
The target analytes were detected in the method blanks at concentrations above the MDL but below the RL.	Yes 🗌 No 🛛

Exceptions:

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.

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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.

2.2 Mercury

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

2.2.1 Technical Holding Time and Sample Preservation

Samples were preserved with nitric acid to $pH \le 2$.	Yes 🛛	No 🗆	NA \square
Preserved samples were analyzed within 28 days of collection.	Yes 🛛	No 🗆	NA 🗆

Exceptions:

None.

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 was 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 RL.	Yes 🗌 No 🛛

Exceptions:

None.

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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



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 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 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 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 preserved with nitric acid to $pH \le 2$.	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.

Reconciliation with Data Quality Objectives 5.0

5.1 **Overall Precision and Sample Representativeness**

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

			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**

07/17/2018

Yes 🗆 LCS recoveries were met for all samples.

MS/MSD recoveries were met for 75% of the samples.

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

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No 🖂

Yes 🖂 No 🗆



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

September Lab Suite:	2018						CCR Appendix I	111											CCR Append	lix IV							
Lub Suite.									Total													T					
Parameter	:			Boron	Calcium	Chloride	Fluoride	Sulfate	Dissolved Solids	pH (lab)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226 & 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 N	ICL:			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	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 09/06/17		300 U 300 U	130,000	270 270	0.10 U 0.10 U	20 21	960 930	6.56 7.56	2.0 U 2.0 U	5.0 U 5.0 U	0.13	1.0 U 1.0 U	1.0 U 1.0 U	18 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 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		09/14/17		300 U	110,000	290	0.10 U	21	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 10/05/17	х	300 U 300 U	130,000	280 270	0.10 U	21 21	820 880	7.55 7.55	2.0 U 2.0 U	5.0 U 5.0 U	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 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
		05/31/18	^	66 J	120,000	310	0.10 U 0.046 J	21	770	7.55	2.0 U	5.0 U	0.14	1.0 U	1.0 U	2.1	0.77 J	0.042 J	1.0 U	10 0	0.20 U	1.6 J	0.516	0.409	1.00 U 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		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 08/23/17		300 U 300 U	63,000 51,000	59 62	0.38 U 0.10 U	21 26	350 190	8.09 8.13	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 240	10 U 10 U	0.20 U 0.20 U	50 U 50 U	1.56 1.00 U	1.00 U 1.00 U	1.56 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		08/29/17		300 U	52,000	61	0.10 U	20	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	300 350	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 5.0 U	2.0 U
		09/28/17 10/05/17		300 U 300 U	58,000 61,000	65 65	0.10 U 0.10 U	21 21	350	8.07 7.99	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 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 2.0 U
ŧ		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
ngra	N 414/ 2	09/20/18		55 J	64,000	85	0.058	29	310	8.0																	
Dow	MW-3	07/19/17 07/24/17		300 U 300 U	68,000 69,000	98 89	0.38 U 0.38 U	49 36	360 440	8.00 7.86	2.0 U 2.0 U	5.0 U 5.0 U	0.10 U 0.23	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 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		08/23/17		300 U	75,000	95	0.10 U	44	300	7.81	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	62,000	86	0.10 U	28	390	6.32	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	62,000	85	0.10 U	26	380	7.77	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.05	1.00 U	1.05	5.0 U	2.0 U
		09/14/17 09/14/17	х	300 U 300 U	57,000 56,000	83 84	0.10 U 0.10 U	25 24	380 380	7.85 7.85	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 10 U	0.20 U 0.20 U	50 U 50 U	1.17 1.00 U	1.00 U 1.00 U	1.17 1.00 U	5.0 U 5.0 U	2.0 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
	MW-4	09/20/18 07/19/17		41 J 300 U	70,000 93,000	92 260	0.055 0.38 U	22 19	340 700	8.1 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 08/29/17		300 U 300 U	100,000	300 340	0.10 U	24 47	830 1,000	7.93	2.0 U	5.0 U 5.0 U	0.10 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
		08/29/17 09/06/17		300 U 300 U	120,000 110,000	340	0.10 U 0.20	53	1,000	7.32	2.0 U 2.0 U	5.0 U	0.10 U 0.10 U	1.0 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	1.00 U	5.0 U	2.0 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	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	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 09/20/18		120	130,000 130,000	450 450	0.23	42	1,000 970	7.8	1.0 J 	1.4 J 	0.11	1.0 0	0.24 J	1.2 J 	0.48 J 	0.23	0.50 J	9.8	0.20 U 		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	Х	300 U	100,000	190	0.38 U	24	530 730	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 2.0 U
		07/24/17 08/23/17		300 U 300 U	100,000 110,000	190 210	0.38 U 0.10 U	21 19	590	7.17	2.0 U 2.0 U	5.0 U 5.0 U	0.16	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 1.44	1.00 U 1.00 U	1.00 U 1.44	5.0 U 5.0 U	2.0 U
		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
lient		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
ıgrac		09/06/17	v	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
цU		09/06/17 09/14/17	х	300 U 300 U	100,000 96,000	190 200	0.10 U 0.10 U	18 19	730 720	7.43	2.0 U 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 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
		09/28/17		300 U	120,000	190	0.10 U	15	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
L		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

Lab Suite:						(CCR Appendix												CCR Appendi	x IV							
Parameter	:			Boron	Calcium	Chloride	Fluoride	Sulfate	Total Dissolved Solids (TDS)	pH (lab)	Antimony	Antimony Arsenic Barium Beryllium Cadmium Chromium Choalt Fluoride Lead Lead Lithium Mercury Molybdenum Radium 226 & Radium 226 & Radium 228 & Radiu								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 N	ICL:			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	Duplicate																								
	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

Hes Brooks

Authorized for release by: 6/19/2018 4:48:46 PM

Kris Brooks, Project Manager II (330)966-9790 kris.brooks@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.

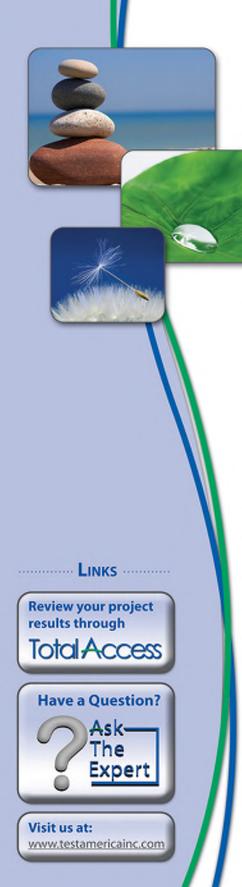


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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

Qualifiers

Metals

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 Ch	emistry	
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	

	5 1 5 5
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

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.

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.

<u>PH</u>

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.

Method Summary

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

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

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

Method Description

Preparation, Mercury

Anions, Ion Chromatography

Solids, Total Dissolved (TDS)

Preparation, Total Recoverable or Dissolved Metals

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

Metals (ICP) Metals (ICP/MS)

pН

Protocol References:

Laboratory References:

Mercury (CVAA)

Method

6010C

6020A

7470A

9040B

9056A

3005A

7470A

SM 2540C

Laboratory

TAL CAN

Protocol

SW846

SW846

SW846

SW846

SW846

SW846

SW846

SM

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8	
9	

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

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

Analyte	Result (Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
Boron	120		100	23	ug/L	1	6010C	Total
Calcium	130000		5000	310	ug/L	1	6010C	Recoverable Total Recoverable
рН	7.8 H	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	Method	Prep Type
Boron	42	J	100	23	ug/L	1	_	6010C	Total
									Recoverable
Calcium	100000		5000	310	ug/L	1		6010C	Total
									Recoverable
рН	7.6	HF	0.1	0.1	SU	1		9040B	Total/NA
Chloride	210		5.0	1.4	mg/L	5		9056A	Total/NA
Fluoride	0.043	J	0.050	0.024	mg/L	1		9056A	Total/NA
Sulfate	19		1.0	0.35	mg/L	1		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

Calcium

Boron

Result Qualifier RL MDL Unit Dil Fac D Method Prep Type 45 J 100 23 ug/L 1 6010C Total Recoverable 55000 5000 310 ug/L 1 6010C Total Recoverable 8.2 HF 0.1 0.1 SU 1 9040B Total/NA

pН Chloride 0.28 mg/L 9056A Total/NA 67 1.0 1 Fluoride 0.067 0.050 0.024 mg/L 9056A Total/NA 1 Sulfate Total/NA 20 1.0 0.35 mg/L 1 9056A 1 **Total Dissolved Solids** 290 10 7.8 mg/L SM 2540C Total/NA

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

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	74	J	100	23	ug/L	1	_	6010C	Total
									Recoverable
Calcium	68000		5000	310	ug/L	1		6010C	Total
									Recoverable
рН	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	0.056		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-2 (D)

Lab Sample ID: 240-96519-5

Lab Sample ID: 240-96519-4

Lab Sample ID: 240-96519-3

This Detection Summary does not include radiochemical test results.

Detection Summary

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) (Continued)

Lab Sample ID: 240-96519-5

Lab Sample ID: 240-96519-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	Method	Prep Type
Boron	75	J	100	23	ug/L	1	6010C	Total
								Recoverable
Calcium	70000		5000	310	ug/L	1	6010C	Total
								Recoverable
рН	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	Method	Prep Type
Boron	66	J	100	23	ug/L	1	_	6010C	Total
									Recoverable
Calcium	110000		5000	310	ug/L	1		6010C	Total
pН	7.8	HF	0.1	0.1	SU	1		9040B	Recoverable Total/NA
Chloride	310		5.0	1.4	mg/L	5		9056A	Total/NA
Fluoride	0.046	J	0.050	0.024	mg/L	1		9056A	Total/NA
Sulfate	25		5.0	1.7	mg/L	5		9056A	Total/NA
Total Dissolved Solids	770		10	7.8	mg/L	1		SM 2540C	Total/NA

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

Lab Sample ID: 240-96519-7

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 TestAmerica Job ID: 240-96519-1

Client Sample ID: MBLPS-18-05-MW-4 (I) Date Collected: 05/31/18 11:08

Date Received: 06/05/18 09:30

Lab Sample ID: 240-96519-1 Matrix: Water

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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
рН	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
	0.00		0.050	0.024	mg/L			06/18/18 10:15	1
Fluoride	0.23								
Fluoride Sulfate	0.23 42		1.0	0.35	mg/L			06/18/18 10:15	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-5 (I) Date Collected: 05/31/18 11:20

Date Received: 06/05/18 09:30

Lab Sample ID: 240-96519-2 Matrix: Water

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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
рН	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

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	45	J	100	23	ug/L		06/05/18 15:00	06/06/18 22:26	1
Calcium	55000		5000	310	ug/L		06/05/18 15:00	06/06/18 22:26	1
- 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	7.0	mg/L			06/07/18 10:44	

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) Date Collected: 05/31/18 15:07

Date Received: 06/05/18 09:30

Lab Sample ID: 240-96519-4 Matrix: Water

Analyte	Result	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
рН	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
Suitate	31			0.00					-

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

Lab Sample ID: 240-96519-5 Matrix: Water

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Analyte	Result	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
рН	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
0.15.4	31		1.0	0.35	mg/L			06/15/18 22:36	1
Sulfate	31		1.0	0.00	iiig/ L			00/10/10 22.00	

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
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 15:06	1
Chloride	310		5.0	1.4	mg/L			06/15/18 22:56	5
Fluoride	0.046	J	0.050	0.024	mg/L			06/18/18 12:19	1
riuuriue									
Sulfate	25		5.0	1.7	mg/L			06/15/18 22:56	5

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

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

TestAmerica Job ID: 240-96519-1

Lab Sample ID: 240-96519-7

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

Matrix: Water

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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	U	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	U	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 (CVAA)									
Analyte	Result	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	mg/L			06/15/18 23:59	1

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		le ID: M : Total												80141/1-A	Lab Sample ID: MB 240-3 Matrix: Water
3301	atch:	Prep Ba													Analysis Batch: 330488
												MB	MB		
Dil F		Analy	red	Pre	D		Unit			RL		Qualifier		R	Analyte
		06/06/18	15:00				ug/L			100			23		Boron
	21:31	06/06/18	15:00)6/05/ [,]			ug/L	310		5000		U	310		Calcium
Samp	ntrol S	Lab Co	e ID:	Samj	ient	Cli								30141/2-A	Lab Sample ID: LCS 240-
verab	Recov	: Total	Туре	Pre											Matrix: Water
3301	atch:	Prep Ba													Analysis Batch: 330488
		%Rec.					S	LCS	LCS	3	Spike				
		Limits		D %		Unit	alifier		Result		Added				Analyte
		80 - 120	05			ug/L			1050	5	1000				Boron
		80 - 120	98			ug/L			49200)	50000				Calcium
		BLPS-18			nt Sa	Clien								-6 MS	Lab Sample ID: 240-9651
		: Total		Pre											Matrix: Water
33014	atch:	Prep B										_			Analysis Batch: 330488
		%Rec.						MS			Spike	•		Sample	
		Limits		D %		Unit	alifier		Result		Added	lifier		Result	Analyte
		75 ₋ 125 75 ₋ 125				ug/L ug/L			1100 159000		1000 50000		J	66 110000	Boron Calcium
vorah		LPS-18			11 30	Clien									Matrix' Water
	Recov	SLPS-18 : Total Prep Ba %Rec.	Туре		11 34	Chen	D	MSI	MSD	•	Spike	nple	San	Sample	
33014 RI	Recov	: Total Prep Ba	Туре	Pre	n Se	Unit		-	MSD Result		Spike Added	•		Sample Result	Analysis Batch: 330488
33014 RI	Recover atch:	: Total Prep Ba %Rec.	Type ec	Pre				Qua	-	t	•	•		Result	Analysis Batch: 330488
33014 RI D Lir	Recover atch: RPE	: Total Prep Ba %Rec. Limits	Type	Pre		Unit		Qua	Result	t	Added	•	Qua J	Result	Analysis Batch: 330488 Analyte Boron
33014 RI D Lir 0 1 d Blai verab	Recov atch: 3 RPE	: Total Prep B: %Rec. Limits 75 - 125 75 - 125 Ie ID: M : Total	Type acc 04 89 Samp Type	Pre D % 		Unit ug/L		Qua	Result 1100	t	Added 1000	•	Qua J	Result 66 110000 s (ICP/MS	Analysis Batch: 330488 Analyte Boron Calcium Method: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water
33014 RI D Lir 0 1 d Blai verab	Recov atch: 3 RPE	: Total Prep B %Rec. Limits 75 - 125 75 - 125	Type acc 04 89 Samp Type	Pre D % 		Unit ug/L		Qua	Result 1100	t	Added 1000	lifier	Qua	Result 66 110000 s (ICP/MS	Analysis Batch: 330488 Analyte Boron Calcium Method: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water
33014 RI D Lir 0 1 d Blai verab 33014	Recov atch: RPE	: Total Prep Ba %Rec. Limits 75 - 125 75 - 125 Ie ID: M : Total Prep Ba	Type	Pre <u> </u>		Unit ug/L	alifier	Qua	Result 1100 157000		Added 1000	MB	Qua J	Result 66 110000 s (ICP/MS 60141/1-A	Analysis Batch: 330488 Analyte Boron Calcium Method: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498
33014 RI D Lir 0 1 d Blai verab	Recover	: Total Prep B: %Rec. Limits 75 - 125 75 - 125 Ie ID: M : Total Prep B: Analy	Type ecc 04 89 Samp Type red	Pre D % Clien Pre		Unit ug/L	Unit	MDL	Result 1100 157000	1 0 0 RL	Added 1000	MB Qualifier	MB esult	Result 66 110000 5 (ICP/MS 50141/1-A R	Analysis Batch: 330488 Analyte Boron Calcium Method: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte
33014 RI D Lir 0 1 d Blai verab 33014	Recov atch: RPE () () () () () () () () () () () () ()	: Total Prep B: %Rec. Limits 75 - 125 75 - 125 75 - 125 Ie ID: M : Total Prep B: Analy 06/06/18	Type 3ec 04 89 Samp Type red 15:00	Pre D % Clien Pre 06/05/		Unit ug/L	alifier Unit ug/L	MDL 0.75	Result 1100 157000	RL 5.0	Added 1000	MB Qualifier U	Qua J) MB esult 0.75	Result 66 110000 5 (ICP/MS 50141/1-A R	Analysis Batch: 330488 Analyte Boron Calcium Method: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte Arsenic
33014 RI D Lir 0 1 d Blai verab 33014	Recov atch: RPE ethoc Recov atch: 15:31 15:31	: Total Prep B %Rec. Limits 75 - 125 75 - 125 75 - 125 Ie ID: M : Total Prep B Analy 06/06/18 06/06/18	Type 2ec 04 89 Samp Type red 15:00 15:00	Pre D % 		Unit ug/L	Unit ug/L ug/L	MDL 0.75 2.2	Result 1100 157000	RL 5.0 5.0	Added 1000	MB Qualifier U U	Qua J MB esult 0.75 2.2	Result 66 110000 5 (ICP/MS 50141/1-A R	Analysis Batch: 330488 Analyte Boron Calcium Iethod: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte Arsenic Barium
33014 RI D Lir 0 1 d Blai verab 33014	Recov atch: 3 RPE () () () () () () () () () () () () ()	: Total Prep B %Rec. Limits 75 - 125 75 - 125 Ie ID: M : Total Prep B Maly 06/06/18 06/06/18	Type 2ec 04 89 Samp Type red 15:00 15:00	Pre D % 		Unit ug/L	Unit ug/L ug/L ug/L	MDL 0.75 2.2 0.31	Result 1100 157000	RL 5.0 5.0 1.0	Added 1000	MB Qualifier U U U	Qua J) (MB esult 0.75 2.2 0.31	Result 66 110000 5 (ICP/MS 50141/1-A R	Analysis Batch: 330488 Analyte Boron Calcium Iethod: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte Arsenic Barium Beryllium
33014 RI D Lir 0 1 d Blai verab 33014	RPE () ethoc Recov atch: 2 () () () () () () () () () ()	: Total Prep Ba %Rec. Limits 75 - 125 75 - 125 75 - 125 Ie ID: M : Total Prep Ba 06/06/18 06/06/18 06/06/18	Type acc 04 89 Samp Type red 15:00 15:00 15:00	Pre D % 		Unit ug/L	Unit ug/L ug/L ug/L ug/L	MDL 0.75 2.2 0.31 0.21	Result 1100 157000	RL 5.0 5.0 1.0 1.0	Added 1000	MB Qualifier U U U U	Qua J MB esult 0.75 2.2 0.31 0.21	Result 66 110000 s (ICP/MS 0141/1-A Re	Analysis Batch: 330488 Analyte Boron Calcium Iethod: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte Arsenic Barium Beryllium Cadmium
33014 RI D Lir 0 1 d Blai verab 33014	RPE () () () () () () () () () ()	: Total Prep Ba %Rec. Limits 75 - 125 75 - 125 75 - 125 Ie ID: M : Total Prep Ba 06/06/18 06/06/18 06/06/18 06/06/18	Type acc 04 89 Samp Type red 15:00 15:00 15:00 15:00 15:00	Pre D % Clien Pre Pre 06/05/- 06/05/- 06/05/- 06/05/- 06/05/-		Unit ug/L	Unit ug/L ug/L ug/L ug/L ug/L	MDL 0.75 2.2 0.31 0.21 0.19	Result 1100 157000	RL 5.0 5.0 1.0 1.0 1.0	Added 1000	MB Qualifier U U U U U U	MB esult 0.75 2.2 0.31 0.21 0.19	Result 66 110000 5 (ICP/MS 50141/1-A Re	Analysis Batch: 330488 Analyte Boron Calcium Iethod: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte Arsenic Barium Beryllium Cadmium Cobalt
33014 RI D Lir 0 1 d Blan verab 33014 Dil F	RPE () () () () () () () () () ()	: Total Prep Ba %Rec. Limits 75 - 125 75 - 125 75 - 125 Ie ID: M : Total Prep Ba 06/06/18 06/06/18 06/06/18	Type 2ec 04 89 Samp Type red 15:00 15:00 15:00 15:00 15:00 15:00	Pre D 9 		Unit ug/L	Unit ug/L ug/L ug/L ug/L	MDL 0.75 2.2 0.31 0.21 0.19 0.98	Result 1100 157000	RL 5.0 5.0 1.0 1.0	Added 1000	MB Qualifier U U U U U U U U	Qua J MB esult 0.75 2.2 0.31 0.21	Result 66 110000 5 (ICP/MS 50141/1-A Re	Analysis Batch: 330488 Analyte Boron Calcium Aethod: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte
	etho RF etho Reco atch	: Total Prep B: %Rec. Limits 75 - 125 75 - 125 75 - 125 Ie ID: M : Total Prep B: Analy 06/06/18	Type 3ec 04 89 Samp Type red 15:00	Pre D % Clien Pre 06/05/		Unit ug/L	alifier Unit ug/L	MDL 0.75	Result 1100 157000	RL 5.0	Added 1000	MB Qualifier U	Qua J) MB esult 0.75	Result 66 110000 5 (ICP/MS 50141/1-A R	Calcium Method: 6020A - Metal Lab Sample ID: MB 240-3 Matrix: Water Analysis Batch: 330498 Analyte Arsenic

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

TestAmerica Canton

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

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

Prep Type: Total Recoverable

Prep Type: Total Recoverable

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

Lab Sample ID: LCS 240-330141/3-A Matrix: Water Analysis Batch: 330498				Clie		-	9: Lab Control Sample pe: Total Recoverable 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		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 Matrix: Water Analysis Batch: 330498

Analysis Batch: 330498	Sample	Sample	Spike	MS	MS				Prep Batch: 330141 %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	U	1000	984		ug/L		98	75 - 125
Thallium	0.20	U	250	253		ug/L		101	75 - 125

Lab Sample ID: 240-96519-7 MSD Matrix: Water Analysis Batch: 330498

Analysis Batch: 330498		. .	• •						Prep Ba	atch: 33	
	•	Sample	Spike	-	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	U	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

TestAmerica Canton

9

QC Sample Results

RL

0.20

Spike

Added

Added

1.00

5.00

MDL Unit

0.13 ug/L

LCS LCS

4.35

Result Qualifier

Result Qualifier

0.757 F1 F2

MB MB

0.13 U

Result Qualifier

0.13 UF1F2

Result Qualifier

Method: 7470A - Mercury (CVAA)

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

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

Matrix: Water

Matrix: Water

Analyte

Mercury

Analyte

Mercury

Analyte

Mercury

Analysis Batch: 330440

Analysis Batch: 330440

Client Sample ID: Method Blank

%Rec.

Limits

80 - 120

Limits

80 - 120

RPD

23

Limit

20

Prepared

D %Rec

87

%Rec

76

D

D

Unit

ug/L

Unit

ug/L

Prep Type: Total/NA

Prep Batch: 330150

9

Analyzed Dil Fac 06/05/18 15:00 06/06/18 15:23 1 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA Prep Batch: 330150

Lab Sample ID: 240-96519- Matrix: Water Analysis Batch: 330440		Somela	Spiko	ме	MS	Client	Samp	ole ID: N	IBLPS-18-05 Prep Type: Prep Batcl %Rec.	Total/NA
Analyte	•	Sample Qualifier	Spike Added		Qualifier	Unit	D	%Rec	Sincec.	
Mercury		U F1 F2	1.00	0.954		ug/L		95	80 - 120	
_ Lab Sample ID: 240-96519-	7 MSD					Client	Samp	ole ID: N	ABLPS-18-05	-MW-1 (I)
Matrix: Water									Prep Type:	Total/NA
Analysis Batch: 330440									Prep Batcl	n: 330150
-	Sample	Sample	Spike	MSD	MSD				%Rec.	RPD

Method: 9040B - pH

Lab Sample ID: LCS 240-330127/2 Matrix: Water Analysis Batch: 330127					Clie	nt Sar	nple ID	: Lab Contro Prep Type:		
Analysis Batch. 000127		Spike	LCS	LCS				%Rec.		
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits		
рН		9.19	9.2		SU		100	97 - 103		
Lab Sample ID: 240-96519-6 DU Matrix: Water Analysis Batch: 330127					Client	Samp	le ID: N	IBLPS-18-05 Prep Type:		
-	Sample		DU	DU						RPD
Analyte Result	Qualifier		Result	Qualifier	Unit	D		F	RPD	Limit
pH 7.8	HF		7.8	HF	SU				0.1	20

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-331676/3 Matrix: Water Analysis Batch: 331676	•					(Client Sam	ple ID: Method Prep Type: To	
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.28	U	1.0	0.28	mg/L			06/18/18 00:34	1
Fluoride	0.024	U	0.050	0.024	mg/L			06/18/18 00:34	1
Sulfate	0.35	U	1.0	0.35	mg/L			06/18/18 00:34	1

QC Sample Results

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

Lab Sample ID: LCS 240-331676/4

5 6

9

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

							nt Sar	- C.			
Matrix: Water									Prep Ty	pe: Tot	al/NA
Analysis Batch: 331676											
			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	51.5		mg/L		103	90 - 110		
_ab Sample ID: 240-96519	6 MS					Client	Samn		ABLPS-18	05 MM	. 4 (1)
	-0 1013					Chefit	Samp	IE ID. N			
Matrix: Water									Prep Ту		ai/NA
Analysis Batch: 331676	0	0	Omilia						0/ D = =		
	Sample		Spike	-	MS		_	~ -	%Rec.		
Analyte	0.046	Qualifier	Added		Qualifier	Unit	D	%Rec	Limits		
Fluoride	0.046	J	2.50	2.79		mg/L		110	80 - 120		
_ab Sample ID: 240-96519-	-6 MSD					Client S	Samp	le ID: N	IBLPS-18	-05-MV	/-1 (I)
Matrix: Water									Prep Typ	oe: Tot	al/NA
Analysis Batch: 331676											
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	•	Qualifier	Added		Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	0.046	·	2.50	2.74		mg/L		108	80 - 120	2	15
						0					
_ab Sample ID: MB 240-33	1714/3						Clie	nt Sam	nple ID: M	ethod I	Blank
Matrix: Water									Prep Typ	oe: Tot	al/NA
Analysis Batch: 331714											
-		MB MB									
Analyte	Re	sult Qualifier	F	RL	MDL Unit	0) Pr	repared	Analyz	zed I	Dil Fac
Chloride		0.28 U	1	.0	0.28 mg/L			-	06/15/18	21:13	1
		0.20 0	1								
		.024 U	0.0						06/15/18		1
Fluoride	0		0.0	50 C	0.024 mg/L 0.35 mg/L				06/15/18 06/15/18	21:13	1 1
Fluoride Sulfate	0	.024 U	0.0	50 C).024 mg/L				06/15/18	21:13 21:13	1
Fluoride Sulfate	0	.024 U	0.0	50 C).024 mg/L	Clier	nt Sar	nple ID	06/15/18 : Lab Cor	21:13 21:13 ntrol Sa	1 Imple
Fluoride Sulfate Lab Sample ID: LCS 240-3	0	.024 U	0.0	50 C).024 mg/L	Clier	nt Sar	nple ID	06/15/18	21:13 21:13 ntrol Sa	1 Imple
Fluoride Sulfate Lab Sample ID: LCS 240-3 Matrix: Water	0	.024 U	0.0	50 C).024 mg/L	Clier	nt Sar	nple ID	06/15/18 : Lab Cor	21:13 21:13 ntrol Sa	1 Imple
Fluoride Sulfate Lab Sample ID: LCS 240-3 Matrix: Water	0	.024 U	0.0	50 C .0).024 mg/L	Clier	nt Sar	nple ID	06/15/18 : Lab Cor	21:13 21:13 ntrol Sa	1 Imple
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714	0	.024 U	0.0 : 1	50 C .0 LCS	0.024 mg/L 0.35 mg/L	Clier		nple ID %Rec	06/15/18 : Lab Cor Prep Tyj	21:13 21:13 ntrol Sa	1 Imple
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte	0	.024 U	0.03 1 Spike	50 C .0 LCS	0.024 mg/L 0.35 mg/L LCS				06/15/18 : Lab Cor Prep Tyj %Rec.	21:13 21:13 ntrol Sa	1 Imple
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride	0	.024 U	0.03 1 Spike Added	50 C .0 LCS Result	0.024 mg/L 0.35 mg/L LCS	Unit mg/L		%Rec	06/15/18 Correp Correp Type Rec. Limits	21:13 21:13 ntrol Sa	1 mple
Sulfate Sulfate Lab Sample ID: LCS 240-3 Matrix: Water Analysis Batch: 331714 Analyte Chloride Suloride	0	.024 U	0.03 1 Spike Added 50.0	50 C .0 LCS Result 51.4	0.024 mg/L 0.35 mg/L LCS	Unit		%Rec 103	06/15/18 Calc Corr Prep Typ %Rec. <u>Limits</u> 90 - 110	21:13 21:13 ntrol Sa	1 Imple
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate	0 31714/4	.024 U	0.03 5 Spike Added 50.0 2.50	50 C .0 LCS Result 51.4 2.64	0.024 mg/L 0.35 mg/L LCS	Unit mg/L mg/L mg/L	<u>D</u>	%Rec 103 106 103	06/15/18 Carper Con Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110	21:13 21:13 otrol Sa oe: Tot	1 al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519	0 31714/4	.024 U	0.03 5 Spike Added 50.0 2.50	50 C .0 LCS Result 51.4 2.64	0.024 mg/L 0.35 mg/L LCS	Unit mg/L mg/L mg/L	<u>D</u>	%Rec 103 106 103	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 MBLPS-18	21:13 21:13 otrol Sa oe: Tot	1 mple al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water	0 31714/4	.024 U	0.03 5 Spike Added 50.0 2.50	50 C .0 LCS Result 51.4 2.64	0.024 mg/L 0.35 mg/L LCS	Unit mg/L mg/L mg/L	<u>D</u>	%Rec 103 106 103	06/15/18 Carper Con Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110	21:13 21:13 otrol Sa oe: Tot	1 al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water	0 31714/4 -6 MS	.024 U 0.35 U	0.03 Spike Added 50.0 2.50 50.0	50 0 .0 LCS Result 51.4 51.4	0.024 mg/L 0.35 mg/L LCS Qualifier	Unit mg/L mg/L mg/L	<u>D</u>	%Rec 103 106 103	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 MBLPS-18 Prep Typ	21:13 21:13 otrol Sa oe: Tot	1 al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water	0 31714/4 -6 MS Sample	.024 U 0.35 U	0.03 500 2.50 50.0 50.0	50 C .0 LCS Result 51.4 51.4 MS	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L mg/L	<u>D</u>	%Rec 103 106 103 Ie ID: N	06/15/18 2: Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 90 - 110 %BLPS-18 Prep Typ %Rec.	21:13 21:13 otrol Sa oe: Tot	1 al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714	0 31714/4 -6 MS Sample	.024 U 0.35 U	0.03 Spike Added 50.0 2.50 50.0	50 C .0 LCS Result 51.4 51.4 MS	0.024 mg/L 0.35 mg/L LCS Qualifier	Unit mg/L mg/L mg/L	<u>D</u>	%Rec 103 106 103	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 MBLPS-18 Prep Typ	21:13 21:13 otrol Sa oe: Tot	1 aimple al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte	0 31714/4 -6 MS Sample	.024 U 0.35 U	0.03 500 2.50 50.0 50.0	50 C .0 LCS Result 51.4 51.4 MS	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L mg/L Client S	DSamp	%Rec 103 106 103 Ie ID: N	06/15/18 2: Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 90 - 110 %BLPS-18 Prep Typ %Rec.	21:13 21:13 otrol Sa oe: Tot	1 aimple al/NA
Chloride Sulfate Analysis Batch: 331714 Analyte Chloride Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride	0 31714/4 -6 MS Sample Result	.024 U 0.35 U	0.03 5 pike Added 50.0 2.50 50.0 50.0	50 C .0 LCS Result 51.4 51.4 51.4 MS Result	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L Client S	DSamp	%Rec 103 106 103 le ID: N %Rec	06/15/18 2: Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 90 - 110 %Rec. Limits	21:13 21:13 otrol Sa oe: Tot	1 al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate	0 31714/4 -6 MS Sample <u>Result</u> 310 25	.024 U 0.35 U	0.03 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	50 C .0 LCS Result 51.4 51.4 51.4 SResult 542	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L Client S Unit mg/L mg/L	D Samp D	%Rec 103 106 103 Ie ID: N %Rec 93 101	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 90 - 110 MBLPS-18 Prep Typ %Rec. Limits 80 - 120 80 - 120	21:13 21:13 oe: Tot -05-MW oe: Tot	1 al/NA /-1 (I) al/NA
Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519	0 31714/4 -6 MS Sample <u>Result</u> 310 25	.024 U 0.35 U	0.03 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	50 C .0 LCS Result 51.4 51.4 51.4 SResult 542	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L Client S Unit mg/L mg/L	D Samp D	%Rec 103 106 103 Ie ID: N %Rec 93 101	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 %Rec. Limits 80 - 120 80 - 120 %BLPS-18	21:13 21:13 oe: Tot -05-MW oe: Tot	1 al/NA /-1 (I) al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water	0 31714/4 -6 MS Sample <u>Result</u> 310 25	.024 U 0.35 U	0.03 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	50 C .0 LCS Result 51.4 51.4 51.4 SResult 542	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L Client S Unit mg/L mg/L	D Samp D	%Rec 103 106 103 Ie ID: N %Rec 93 101	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 90 - 110 MBLPS-18 Prep Typ %Rec. Limits 80 - 120 80 - 120	21:13 21:13 oe: Tot -05-MW oe: Tot	1 al/NA /-1 (I) al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water	0 31714/4 -6 MS Sample <u>Result</u> 310 25	.024 U 0.35 U	0.03 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	50 C .0 LCS Result 51.4 51.4 51.4 SResult 542	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L Client S Unit mg/L mg/L	D Samp D	%Rec 103 106 103 Ie ID: N %Rec 93 101	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 %Rec. Limits 80 - 120 80 - 120 %BLPS-18	21:13 21:13 oe: Tot -05-MW oe: Tot	1 al/NA /-1 (I) al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water	0 31714/4 -6 MS Sample <u>Result</u> 310 25	.024 U 0.35 U 	0.03 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	50 0 .0 LCS Result 51.4 51.4 51.4 51.4 51.4 51.4 51.4	0.024 mg/L 0.35 mg/L LCS Qualifier MS	Unit mg/L mg/L Client S Unit mg/L mg/L	D Samp D	%Rec 103 106 103 Ie ID: N %Rec 93 101	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 %Rec. Limits 80 - 120 80 - 120 %BLPS-18	21:13 21:13 oe: Tot -05-MW oe: Tot	1 ample al/NA /-1 (I) al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714	0 31714/4 -6 MS Sample Result 310 25 -6 MSD Sample	.024 U 0.35 U 	0.03 5 5 5 5 0.0 2.50 5 0.0 5 5 0.0 5 5 0 2.50 5 0 2.50 5 0 2.50 5 0 0 2.50 5 0 0 2.50 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	50 0 .0 LCS Result 51.4 51.4 51.4 51.4 51.4 51.4 51.4 51.4	0.024 mg/L 0.35 mg/L LCS Qualifier MS Qualifier	Unit mg/L mg/L Client S Unit mg/L mg/L	D Samp D	%Rec 103 106 103 Ie ID: N %Rec 93 101	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 MBLPS-18 Prep Typ %Rec. Limits 80 - 120 80 - 120 MBLPS-18 Prep Typ	21:13 21:13 oe: Tot -05-MW oe: Tot	1 al/NA /-1 (l) al/NA
Fluoride Sulfate Lab Sample ID: LCS 240-33 Matrix: Water Analysis Batch: 331714 Analyte Chloride Fluoride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate Lab Sample ID: 240-96519 Matrix: Water Analysis Batch: 331714 Analyte Chloride Sulfate	0 31714/4 -6 MS Sample Result 310 25 -6 MSD Sample	.024 U 0.35 U Sample Qualifier	0.03 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	50 0 .0 LCS Result 51.4 51.4 51.4 51.4 51.4 51.4 51.4 51.4	0.024 mg/L 0.35 mg/L LCS Qualifier MS Qualifier	Unit mg/L mg/L Client S Unit mg/L mg/L Client S	D Samp D Samp	%Rec 103 106 103 le ID: N %Rec 93 101 le ID: N	06/15/18 : Lab Cor Prep Typ %Rec. Limits 90 - 110 90 - 110 90 - 110 90 - 110 %Rec. Limits 80 - 120 80 - 120 80 - 120 %Rec. MBLPS-18 Prep Typ %Rec.	21:13 21:13 atrol Sa be: Tot -05-MW be: Tot	1 al/NA /-1 (I) al/NA /-1 (I) al/NA RPD

QC Sample Results

Spike

Lab Sample ID: 240-96519-7 MS

Analysis Batch: 331714

Matrix: Water

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

Sample Sample

Prep Type: Total/NA

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

%Rec.

				•••••••									/01.0001			
Analyte	Result	Qua	lifier	Added		Result	Qua	lifier	Unit	D)	%Rec	Limits			
Fluoride	0.042	J		2.50		2.74			mg/L			108	80 - 120			
Lab Sample ID: 240-96519-7	MSD								Clien	t Sam	pl	e ID: N	IBLPS-18-	05-MV	V-1 (I)	
Matrix: Water													Prep Typ			
Analysis Batch: 331714																
-	Sample	Sam	ıple	Spike		MSD	MSD)					%Rec.		RPD	-
Analyte	Result	Qua	lifier	Added		Result	Qua	lifier	Unit	D)	%Rec	Limits	RPD	Limit	9
Fluoride	0.042	J		2.50		2.75			mg/L			108	80 - 120	0	15	
lethod: SM 2540C - Sol	ids. Tota		issolve	d (TDS	S)											
					-/											
Lab Sample ID: MB 240-330	503/1									Cli	ie	nt Sam	ple ID: Me	thod	Blank	
Matrix: Water													Prep Typ			
Analysis Batch: 330503																
		MB	MB													
Analyte	Re	sult	Qualifier		RL		MDL	Unit		DI	Pre	epared	Analyz	ed	Dil Fac	
Total Dissolved Solids		7.8	U		10		7.8	mg/L					06/07/18	10:44	1	
Lab Sample ID: LCS 240-330	0503/2								Cli	ent Sa	am	iple ID	: Lab Con			
Matrix: Water													Prep Typ	e: Tot	al/NA	
Analysis Batch: 330503				.												
				Spike		-	LCS			_		~-	%Rec.			
Analyte				Added		Result	Qua	litier	Unit	D) 	%Rec	Limits			
Total Dissolved Solids				626		627			mg/L			100	80 - 120			
Lab Sample ID: 240-96519-6									Clion	t Sam	nl		IBLPS-18-	05 MV	N_1 (I)	
Lan Sample ID. 240-30513-0	00								Clien	Jaill	μı	с ID. W	IDLF 3-10.	03-1414	v- i (i)	

MS MS

Lab Sample ID: 240-96519-6 DU **Matrix: Water** Analysis Batch: 330503

Analysis Datch: 550505									
-	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
Total Dissolved Solids	770		 760		mg/L		 	1	20

Prep Type: Total/NA

QC Association Summary

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

7470A

7470A

Metals

Prep Batch: 330141

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
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	

Analysis Batch: 330440

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

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

240-96519-7 MS

240-96519-7 MSD

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

Total/NA

Total/NA

Water

Water

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

QC Association Summary

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

General Chemistry Analysis Batch: 330127

Lab Sample ID

240-96519-1

240-96519-2

240-96519-3

240-96519-4

240-96519-5

240-96519-6

LCS 240-330127/2

Analysis Batch: 330503

240-96519-6 DU

Lab Sample ID

240-96519-1

240-96519-2

240-96519-3

240-96519-4

240-96519-5

240-96519-6

MB 240-330503/1

LCS 240-330503/2

10

Client Sample ID Matrix Method Prep Batch Prep Type MBLPS-18-05-MW-4 (I) Total/NA Water 9040B MBLPS-18-05-MW-5 (I) Total/NA Water 9040B Total/NA Water 9040B MBLPS-18-05-MW-3 (I) Total/NA Water 9040B MBLPS-18-05-MW-2 (I) MBLPS-18-05-MW-2 (D) Total/NA Water 9040B MBLPS-18-05-MW-1 (I) Total/NA 9040B Water Total/NA Water 9040B Lab Control Sample MBLPS-18-05-MW-1 (I) Total/NA 9040B Water **Client Sample ID** Matrix Method Prep Batch Prep Type MBLPS-18-05-MW-4 (I) Total/NA Water SM 2540C MBLPS-18-05-MW-5 (I) Total/NA Water SM 2540C MBLPS-18-05-MW-3 (I) Total/NA Water SM 2540C Total/NA MBLPS-18-05-MW-2 (I) Water SM 2540C MBLPS-18-05-MW-2 (D) Total/NA Water SM 2540C MBLPS-18-05-MW-1 (I) Total/NA Water SM 2540C

Water

Water

Water

SM 2540C

SM 2540C

SM 2540C

240-96519-6 DU

Method Blank

Lab Control Sample

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

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	

Total/NA

Total/NA

Total/NA

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	

Dilution

Factor

1

1

1

10

1

Run

Batch

Prepared

330141 06/05/18 15:00 MBB

330488 06/06/18 22:15 KLC

330127 06/05/18 14:37 BLW

331676 06/18/18 10:15 LKG

331676 06/18/18 10:35 LKG

330503 06/07/18 10:44 MMM

Analyst

Lab

TAL CAN

TAL CAN

TAL CAN

TAL CAN

TAL CAN

TAL CAN

Lab Sample ID: 240-96519-2

Number or Analyzed

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

Batch

Туре

Prep

Analysis

Analysis

Analysis

Analysis

Analysis

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

Prep Type

Total/NA

Total/NA

Total/NA

Total/NA

Total Recoverable

Total Recoverable

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

Batch

Method

3005A

6010C

9040B

9056A

9056A

SM 2540C

Lab Sample ID: 240-96519-1

Matrix: Water

Matrix: Water

2 3 4 5 6 7 8 9 10

11

Client Sample ID: MBLPS-18-05-MW-5 (I) Date Collected: 05/31/18 11:20 Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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 22:20	KLC	TAL CAN
Total/NA	Analysis	9040B		1	330127	06/05/18 14:43	BLW	TAL CAN
Total/NA	Analysis	9056A		1	331676	06/18/18 10:56	LKG	TAL CAN
Total/NA	Analysis	9056A		5	331676	06/18/18 11:17	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-3 (I) Date Collected: 05/31/18 13:41 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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) Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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

Lab Sample ID: 240-96519-3 Matrix: Water

Lab Sample ID: 240-96519-4 Matrix: Water

Dilution

Factor

1

1

1

1

Run

Batch

Number

Prepared

330141 06/05/18 15:00

330488 06/06/18 22:36 KLC

330127 06/05/18 15:00 BLW

331714 06/15/18 22:36 JWW

330503 06/07/18 10:44 MMM

or Analyzed

Analyst

MBB

Lab

TAL CAN

TAL CAN

TAL CAN

TAL CAN

TAL CAN

Lab Sample ID: 240-96519-6

Batch

Туре

Prep

Analysis

Analysis

Analysis

Analysis

Date Collected: 05/31/18 15:07

Date Received: 06/05/18 09:30

Prep Type

Total/NA

Total/NA

Total/NA

Total Recoverable

Total Recoverable

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

Batch

3005A

6010C

9040B

9056A

SM 2540C

Method

Lab Sample ID: 240-96519-5

Matrix: Water

Matrix: Water

2 3 4 5 6 7 8 9 10

Client Sample ID: MBLPS-18-05-MW-1 (I) Date Collected: 05/31/18 16:29 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Туре	Туре	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 21:41	KLC	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) Date Collected: 05/31/18 16:29 Date Received: 06/05/18 09:30

Lab Sample ID: 240-96519-7

Matrix: Water

Γ	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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

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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	

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

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Invoice to And And And And Email 2 Charles and Charles 2401997	FAGE 1 OF L	STD TAT X	REMARKS						METHOD OF SHIPMENTIBUL OF LADING FOLEVED FOR LAP RECEIVED FOR LAP CLOUND 6/S/1K 33	2 3 4 5 6 7 8
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CHAIN OF FISHbeck, Thompson, Carr & Hub CHAIN OF FISHbeck, Thompson, Carr & Hub Address <u>3515 Arborchu</u> Address <u>3515 Arborchu</u> Phone <u>616</u> 575 382		T LOCATION SAMPLER(S) NAME LACTTE, MAIL T MANAGER A COMODEL EMAILTCCOMODELIES THOSE MAL INFORMATION	SAMPLE SAMPLE IDENTIFICATION DATE TIME	1/05 MENS-REWENNER (E)	N JUN	्या			RELINQUISHED BY DATE TIME RELINQUISHED BY DATE TIME RELINQUISHED BY DATE TIME RELINQUISHED BY DECENVED BY DATE NO. 3 ONLY TO STATUS A RECEIVED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED BY DATE NO. 3 ONLY TO STATUS A RELINQUISHED FOR NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS A RELINDUISHED A RELINDUISHED BY DATE NO. 3 ONLY TO STATUS	042036

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4775 Campus Drive 39500 MacKenzie Drive, Suite 100 Kalamazoo, MI 49008 Novi, MI 48377 (269) 375-3824 (248) 324-2090	REQUIRED ANALYSES		PRESERVATIVE		NUMBER OF CONTAINERS SUBMITTED										DATE TIME		8 9 10 11 12 13
1, Carr & Huber, Inc. E 5913 Executive Dr., Ste. 100 Lansing, MI 48911 (517) 882-0383	MATRIX TYPE	(951AW) 8 (951AW) 8 (9102-100 910 910 910 910 910 910 910 910 910	anc V Janc V		T C	33									ELINOUGHED BY PATE TIME RELINOUISHED BY		
CHAIN OF CUSTODYFishbeck, Thompson, 1515 Arboretum Drive, SE Grand Rapids, MI 49546 (616) 575-3824	PROJECT NO	N SAMPLER(S) NAME CC. M. 1 7195 AND AD R PHONE2LG 544 - 6946 MATION EMALYCOMPOLICITICO		SAMPLE IDENTIFICATION		MARS-10-05-MW-101ms/ms/X								11	DATE THATE RA	i with date package.	g.v.m
fifesh R	PROJECT NAME	PROJECT LOCATION MARCOLLE-TCL (M) PROJECT MANAGER		SAMPLE	DATE TIME	5/18/1023									lffiv ↓ là ★ ♪		G 041501

TestAmerica Canton S	ample Receipt Form/Narra	ative	Login # :(514
Canton Facility				
Client FTCLH		Name	eru	npacked by:
Cooler Received on		ened on 6512		
	UPS FAS Clipper Clien			
Receipt After-hours. Dr			Location	
TestAmerica Cooler #		Client Cooler Box Plastic Bag None	Other	
Packing material us		lce Water None	Other	
1 Cooler temperature i	inon receipt	1. See Multin	ble Cooler Form	
IR GUN# IR-8 (CF	+0.1 °C) Observed Cooler	Temp. 4/2 °C Correcte	d Cooler Temp. 4.3	°C
IR GUN #36 (CF	+0.3°C) Observed Cooler 1	emp°C Corrected	Cooler Temp°	C
	-1.3°C) Observed Cooler T	emp°C Corrected	Cooler Temp	e
2. Were tamper/custod	y seals on the outside of the co	oler(s)? If Yes Quantity	Yer No	
-Were the seals on	the outside of the cooler(s) sig	gned & dated?	Yes No NA	
	ody seals on the bottle(s) or bo		Yes	
	ody seals intact and uncompro	mised?	Yes No NA	
	p attached to the cooler(s)?		No	
	accompany the sample(s)?	the appropriate place?	Ves No	Tests that are not
	pers relinquished & signed in (s) who collected the samples		DC? (Yes No	checked for pH by
	in good condition (Unbroken	-	Yes No	Receiving:
	Is be reconciled with the COC	•	Yes No	VOAs
	s) used for the test(s) indicated		Xe No	Oil and Grease
	eceived to perform indicated a		Ves No	TOC
11. Are these work share	e samples?	-	Yes No.	· · · · · · · · · · · · · · · · · · ·
	16 have been checked at the c		ad	×
	ample(s) at the correct pH upo	on receipt?	(Yes No VA	pH Strip Lot# <u>HC740840</u>
13. Were VOAs on the (e to see at the set of the	Yes No	
	mm in any VOA vials? ak present in the cooler(s)? The	Larger than this.	Yes No(NA) Yes (Na)	
	Hg trip blank present?			
	Date			N9
Contacted PM	Date	by vi	a verbal voice Mail C	Jiner
Concerning				
		· · ·		ا ا
17. CHAIN OF CUSTO	DDY & SAMPLE DISCREP	ANCIES	Samp	les processed by:
			L	JR
		wmr		
·				
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·				·
18. SAMPLE CONDIT	TION		······	······································
I TO OTHER DECOMPTING		a reactive f often the recomm	ended holding time had	expired.
Sample(s)	wer	e seceived aner the recontai		
Sample(s) Sample(s)		W	ere received in a broker	a container.
Sample(s) Sample(s)	wei	W	ere received in a broker ble >6 mm in diameter.	a container. (Notify PM)
Sample(s) Sample(s)	······································	W	ere received in a broker ble >6 mm in diameter.	a container. (Notify PM)
Sample(s) Sample(s) Sample(s) 19. SAMPLE PRESER	RVATION ,	were received with bub	ble >6 mm in diameter.	(Notify PM)
Sample(s) Sample(s) Sample(s) 19. SAMPLE PRESER	······································	were received with bub	ble >6 mm in diameter.	(Notify PM)

Login Container Summary Report

240-96519

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Temperature readings.

Client Sample ID	Lab ID	Container Type	<u>Container</u> <u>pH</u>	Preservative Added (mls)	Lot #
MBLPS-18-05-MW-4 (1)	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	<2		
MBLPS-18-05-MW-3 (1)	240-96519-B-3	Plastic 500ml - with Nitric Acid	<2		
MBLPS-18-05-MW-2 (I)	240-96519-B-4	Plastic 500ml - with Nitric Acid	<2	Name	
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	Plastic 500ml - with Nitric Acid	<2	<u> </u>	
MBLPS-18-05-MW-1 (1)	240-96519-E-6	Plastic 500ml - with Nitric Acid	<2		
MBLPS-18-05-MW-1 (J)	240-96519-F-6	Plastic 500ml - with Nitric Acid	<2		
MBLPS-18-05-MW-1 (I)	240-96519-D-7	Plastic 500ml - with Nitric Acid	<2		·····
MBLPS-18-05-MW-1 (1)	240-96519-E-7	Plastic 500ml - with Nitric Acid	<2		
MBLPS-18-05-MW-1 (1)	240-96519-F-7	Plastic 500ml - with 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: 240-96523-2

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

atrick O' Mearo

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

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

3

Qualifiers

Rad

Rad		
Qualifier	Qualifier Description	
*	LCS or LCSD is outside acceptance limits.	5
U	Result is less than the sample detection limit.	Ð

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	8
CFL	Contains Free Liquid	
CNF	Contains No Free Liquid	9
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	
DL	Detection Limit (DoD/DOE)	
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DLC	Decision Level Concentration (Radiochemistry)	
EDL	Estimated Detection Limit (Dioxin)	
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	
MDA	Minimum Detectable Activity (Radiochemistry)	
MDC	Minimum Detectable Concentration (Radiochemistry)	
MDL	Method Detection Limit	
ML	Minimum Level (Dioxin)	
NC	Not Calculated	
ND	Not Detected at the reporting limit (or MDL or EDL if shown)	
PQL	Practical Quantitation Limit	
QC	Quality Control	
RER	Relative Error Ratio (Radiochemistry)	
RL	Reporting Limit or Requested Limit (Radiochemistry)	
RPD	Relative Percent Difference, a measure of the relative difference between two points	
TEF	Toxicity Equivalent Factor (Dioxin)	

TEQ Toxicity Equivalent Pactor (Dioxin)

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

1 2 3 4 5 6 7 8 9 10 11 12

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.

Method Summary

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

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

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 Receive
240-96523-1	MBLPS-18-05-MW-4 (I)	Water	05/31/18 11:08 06/05/18 09
240-96523-2	MBLPS-18-05-MW-5 (I)	Water	05/31/18 11:20 06/05/18 09
240-96523-3	MBLPS-18-05-MW-3 (I)	Water	05/31/18 13:41 06/05/18 09

Detection Summary

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

No Detections.

No Detections.

No Detections.

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

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

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

Lab Sample ID: 240-96523-1	
Lab Sample ID: 240-96523-2	5
Lab Sample ID: 240-96523-3	7
	8
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This Detection Summary does not include radiochemical test results.

Client Sample Results

Vient Comple IF		40 05 N						Lob Comple	240.06	E02 4
lient Sample ID			100-4 (1)					Lab Sample		
ate Collected: 05/3									Matrix:	Water
ate Received: 06/0	15/18 09:30									
Method: 9315 - Ra	dium-226 (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC		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	% Viold	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.8	Quainei	40 - 110					<u></u>	-	
-			- TU - T . U					00,1,1,10,.0.02	01/00/10 00:00	
Method: 9320 - Ra	dium-228 (GFPC)								
	-		Count	Total						
			Uncert.	Uncert.						
			Uncert.	Uncert.						
Analyte		Qualifier	(2σ+/-)	(2 σ+/-)	RL	MDC		Prepared	Analyzed	Dil Fac
Analyte Radium-228	Result 0.240				RL 1.00	MDC 0.400		Prepared 06/11/18 13:56	Analyzed 07/02/18 14:36	Dil Fac
•	0.240	<u>U</u> *	(2σ+/-) 0.246	(2 σ+/-)				06/11/18 13:56	07/02/18 14:36	1
Radium-228	0.240		(2 σ+/-)	(2 σ+/-)				•	07/02/18 14:36 Analyzed	Dil Fac 1 Dil Fac 1
Radium-228	0.240 %Yield	<u>U</u> *	(2σ+/-) 0.246 Limits	(2 σ+/-)				06/11/18 13:56 Prepared 06/11/18 13:56	07/02/18 14:36 Analyzed	1
Radium-228 Carrier Ba Carrier	0.240 %Yield 88.8	<u>U</u> *	(2σ+/-) 0.246 Limits 40 - 110	(2 σ+/-)				06/11/18 13:56 Prepared 06/11/18 13:56	07/02/18 14:36 Analyzed 07/02/18 14:36	1 Dil Fac 1
Radium-228 Carrier Ba Carrier	0.240 % Yield 88.8 91.2	U * Qualifier	(20+/-) 0.246 <u>Limits</u> 40 - 110 40 - 110	(2σ+/-) 0.247	1.00			06/11/18 13:56 Prepared 06/11/18 13:56	07/02/18 14:36 Analyzed 07/02/18 14:36	1 Dil Fac 1
Radium-228 Carrier Ba Carrier Y Carrier	0.240 % Yield 88.8 91.2	U * Qualifier	(20+/-) 0.246 <u>Limits</u> 40 - 110 40 - 110	(2σ+/-) 0.247	1.00			06/11/18 13:56 Prepared 06/11/18 13:56	07/02/18 14:36 Analyzed 07/02/18 14:36	1 Dil Fac 1
Radium-228 Carrier Ba Carrier Y Carrier Method: Ra226_Ra	0.240 %Yield 88.8 91.2 a228 - Com	Qualifier	(20+/-) 0.246 <u>Limits</u> 40 - 110 40 - 110 dium-226 an Count Uncert.	(2σ+/-) 0.247 nd Radium Total Uncert.	1.00	0.400	pCi/L	06/11/18 13:56 Prepared 06/11/18 13:56 06/11/18 13:56	07/02/18 14:36 Analyzed 07/02/18 14:36 07/02/18 14:36	1 Dil Fac 1 1
Radium-228 Carrier Ba Carrier Y Carrier	0.240 %Yield 88.8 91.2 a228 - Com	U * Qualifier	$\frac{(2\sigma + l -)}{0.246} - \frac{Limits}{40 - 110}$ dium-226 and Count	(2σ+/-) 0.247	1.00		pCi/L Unit	06/11/18 13:56 Prepared 06/11/18 13:56	07/02/18 14:36 Analyzed 07/02/18 14:36	1 Dil Fac 1

226 + 228

Client Sample Results

Date Received: 06/05/18 09:30 Method: 9315 - Radium-226 (GFPC) Count Total Uncert. Analyte Result Qualifier (2\sigma+) RL MDC Unit Prepared Analyze Radium-226 0.272 Qualifier (2\sigma+) (2\sigma+) RL MDC Unit Prepared Analyze Carrier % Yield Qualifier Limits 40 - 110 0.176 1.00 0.223 Prepared Analyze Method: 9320 - Radium-228 (GFPC) Count Total Total	Dil Fac Dil Fac Dil Fac Dil Fac	Vater Dil Fac
ate Received: 06/05/18 09:30 Method: 9315 - Radium-226 (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier (2σ+/-) RL MDC Unit Prepared Analyze Radium-226 0.272 Qualifier (2σ+/-) (2σ+/-) RL MDC Unit Prepared Analyze Carrier % Yield Qualifier Limits 40 - 110 0.176 1.00 0.223 PCi/L 06/11/18 13:02 07/03/18 0 Method: 9320 - Radium-228 (GFPC) Count Total Total	Dil Fac 000 1	Dil Fac
Method: 9315 - Radium-226 (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier (2σ+/-) RL MDC Unit Prepared Analyze Radium-226 0.272 Qualifier Limits 0.176 1.00 0.223 Drit Prepared Analyze Carrier % Yield Qualifier Limits 0.176 0.176 0.000 0.223 Of/11/18 13:02 Of/10/18 13:02 Analyze Ba Carrier % Sield Qualifier Limits 0.176 0.176 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0	:00 1 I Dil Fac	1
Count Total Uncert. Analyte Result Qualifier (2σ+/-) RL MDC Unit Prepared Analyze Radium-226 0.272 0.174 (2σ+/-) 0.176 1.00 0.223 Dit Prepared Analyze Carrier % Yield Qualifier Limits 40 - 110 0.176 0.000 0.223 Dit Prepared Analyze Method: 9320 - Radium-228 (GFPC) Count Total Total Total Operation Operation <th>:00 1 I Dil Fac</th> <th>1</th>	:00 1 I Dil Fac	1
Count Total Uncert. Analyte Result Qualifier (2σ+/-) RL MDC Unit Prepared Analyze Radium-226 0.272 0.174 (2σ+/-) 0.176 1.00 0.223 Dit Prepared Analyze Carrier % Yield Qualifier Limits 40 - 110 0.176 0.000 0.223 Dit Prepared Analyze Method: 9320 - Radium-228 (GFPC) Count Total Total Total Operation Operation <th>:00 1 I Dil Fac</th> <th>1</th>	:00 1 I Dil Fac	1
Analyte Result Qualifier (2σ+/-) RL MDC Unit Prepared Analyze Radium-226 0.272 0.174 0.176 1.00 0.223 pCi/L 06/11/18 13:02 07/03/18 0 Carrier %Yield Qualifier Limits 40 - 110 06/11/18 13:02 07/03/18 0 Method: 9320 - Radium-228 (GFPC) Count Total Total 06/11/18 13:02 07/03/18 0	:00 1 I Dil Fac	1
Radium-226 0.272 0.174 0.176 1.00 0.223 pCi/L 06/11/18 13:02 07/03/18 0 Carrier %Yield Qualifier Limits Prepared Analyze Ba Carrier 86.4 40 - 110 06/11/18 13:02 07/03/18 0 Method: 9320 - Radium-228 (GFPC) Count Total	:00 1 I Dil Fac	1
Carrier Ba Carrier%Yield 86.4Qualifier 40 - 110Limits 40 - 110Prepared 06/11/18 13:02Analyze 07/03/18 0Method: 9320 - Radium-228 (GFPC) CountCountTotal	I Dil Fac	1 Dil Fac 1
Ba Carrier 86.4 40 - 110 06/11/18 13:02 07/03/18 0 Method: 9320 - Radium-228 (GFPC) Count Total		Dil Fac
Ba Carrier 86.4 40 - 110 06/11/18 13:02 07/03/18 0 Method: 9320 - Radium-228 (GFPC) Count Total		JII Fac 1
Method: 9320 - Radium-228 (GFPC) Count Total	:00 1	1
Count Total		
Count Total		
Harvest Harvest		
Uncert. Uncert.		
Analyte Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit Prepared Analyze	l Dil Fac	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 1	:36 1	1
Carrier %Yield Qualifier Limits Prepared Analyze	I Dil Fac	Dil Eac
Ba Carrier 86.4 40 - 110 06/11/18 13:56 07/02/18 1		1
Y Carrier 90.5 40 - 110 06/11/18 13:56 07/02/18 1		1
-		,
- Method: Ra226_Ra228 - Combined Radium-226 and Radium-228		
Count Total		
Uncert. Uncert.		
Analyte Result Qualifier $(2\sigma+/-)$ $(2\sigma+/-)$ RL MDC Unit Prepared Analyze	l Dil Fac	Dil Fac
Combined Radium 0.470 0.292 0.293 5.00 0.385 pCi/L 07/08/18 1	:47 1	1

226 + 228

Client Sample Results

: MBLPS	3-18-05-N	/W-3 (I)					Lab Sample	D: 240-96	523-3
31/18 13:41								Matrix:	
05/18 09:30	-								
dium-226 ((GFPC)								
 ,	•••••	Count	Total						
		Uncert.	Uncert.						
		(2 σ+/-)	(2 σ+/-)	RL			Prepared	Analyzed	Dil Fac
0.199	U	0.160	0.161	1.00	0.234	pCi/L	06/11/18 13:02	07/03/18 06:01	1
%Yield	Qualifier	l imits					Prenared	Analyzed	Dil Fac
	Quaimer						•	•	1
dium-228 (GFPC)	Count	Total						
		Uncert.	Uncert.						
Result	Qualifier	(2 σ+/-)	(2 σ +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
-0.0711	U *	0.196	0.196	1.00	0.367	pCi/L	06/11/18 13:56	07/02/18 14:37	1
%/ Viold	Onelifian	l insite					Draparad	Amelynad	
	Quaimer						•	•	Dil Fac
34.3		40 - 110					00/11/10 13.50	01/02/10 14.31	'
		10 110					06/11/18 13.56	07/00/10 11.37	1
91.2		40 - 110					06/11/18 13:56	07/02/18 14:37	1
91.2	hined Rac		nd Radium	-228			06/11/18 13:56	07/02/18 14:37	1
	ibined Rac		nd Radium _{Total}	-228			06/11/18 13:56	07/02/18 14:37	1
91.2	ibined Rac	dium-226 ai		-228			06/11/18 13:56	07/02/18 14:37	1
91.2 a228 - Com	nbined Rac	dium-226 au Count	Total	1-228 RL	MDC	Unit	06/11/18 13:56 Prepared	07/02/18 14:37 Analyzed	1 Dil Fac
	BLP Shiras D: MBLPS 31/18 13:41 05/18 09:30 adium-226 (Result 0.199 %Yield 92.9 adium-228 (Result -0.0711	D: MBLPS-18-05-N 31/18 13:41 05/18 09:30 adium-226 (GFPC) Result Qualifier 0.199 U %Yield Qualifier -0.0711 U* %Yield Qualifier	D: MBLPS-18-05-MW-3 (I) 31/18 13:41 05/18 09:30 adium-226 (GFPC) Count Uncert. Result Qualifier $(2\sigma+/-)$ 0.199 U $(2\sigma+/-)$ 0.160 $\frac{\% Yield}{92.9}$ Qualifier 40-110 adium-228 (GFPC) Count Uncert. $(2\sigma+/-)$ 0.100 $(2\sigma+/-)$ 0.190 $(2\sigma+/-)$ 0.190 U U U U U U U U	D: MBLPS-18-05-MW-3 (I) 31/18 13:41 05/18 09:30 adium-226 (GFPC) $\begin{array}{c} Count & Total \\ Uncert. & Uncert. \\ Count & Uncert. \\ (2\sigma+/-) & (2\sigma+/-) \\ 0.199 & U & 0.160 & 0.161 \\ \hline \\ \hline & \frac{\% Yield}{92.9} & \frac{Qualifier}{40 - 110} & \frac{Limits}{40 - 110} \\ \hline \\ adium-228 (GFPC) & Count & Total \\ Uncert. & Uncert. \\ \hline \\ \hline & \frac{Result}{0.0711} & \frac{Qualifier}{U^*} & \frac{(2\sigma+/-)}{0.196} & \frac{(2\sigma+/-)}{0.196} \\ \hline \\ & \% Yield & Qualifier & Limits \\ \hline \end{array}$	D: MBLPS-18-05-MW-3 (I) 31/18 13:41 05/18 09:30 adium-226 (GFPC) $\begin{array}{c} Count & Total \\ Uncert. & Uncert. \\ Count & 0.100 \\ \hline 0.199 & U \\ \hline 0.199 & U \\ \hline 0.199 & U \\ \hline 0.160 & 0.161 \\ \hline 1.00 \\ \hline \end{array}$ $\begin{array}{c} \frac{Result}{92.9} & \frac{Qualifier}{40.110} \\ \hline \\ Minueque & \frac{Vield}{40.110} \\ \hline \\ Minueque & \frac{Count}{40.110} \\ \hline \\ $	D: MBLPS-18-05-MW-3 (I) 31/18 13:41 05/18 09:30 adium-226 (GFPC) $\begin{array}{c} Count & Total \\ Uncert. & Uncert. \\ \hline \\ Result & Qualifier \\ \hline 0.199 & U \\ \hline \end{array} \begin{array}{c} (2\sigma+/-) & (2\sigma+/-) \\ 0.160 & 0.161 \\ \hline 1.00 \\ \hline \end{array} \begin{array}{c} MDC \\ \hline \end{array} \begin{array}{c} 0.234 \\ \hline \end{array} \begin{array}{c} 0.234 \\ \hline \end{array} \begin{array}{c} \frac{\% Yield}{92.9} & Qualifier \\ \hline 100 \\ \hline \end{array} \begin{array}{c} Limits \\ 40-110 \\ \hline \end{array} \end{array}$	D: MBLPS-18-05-MW-3 (I) 31/18 13:41 05/18 09:30 adium-226 (GFPC) $\begin{array}{c} Count & Total \\ Uncert. & Uncert. \\ \hline \\ Result & Qualifier \\ \hline 0.199 & U \\ \hline 0.199 & U \\ \hline \end{array} \begin{array}{c} (2\sigma+/-) & RL \\ (2\sigma+/-) & RL \\ \hline \end{array} \begin{array}{c} MDC & Unit \\ \hline \\ 0.234 & pCi/L \\ \hline \end{array}$ $\begin{array}{c} WDC & Unit \\ \hline \\ pCi/L \\ \hline \end{array}$ $\begin{array}{c} Wield & Qualifier \\ \hline \\ 92.9 & 40-110 \\ \hline \end{array}$ adium-228 (GFPC) $\begin{array}{c} Count & Total \\ Uncert. & Uncert. \\ Uncert. & Uncert. \\ \hline \\ -0.0711 & U^{*} & 0.196 \\ \hline \end{array} \begin{array}{c} Count & Total \\ \hline \\ 0.367 & pCi/L \\ \hline \end{array}$	BLP Shiras Steam Plant Lab Sample 31/18 13:41 31/18 13:41 05/18 09:30 Differ redium-226 (GFPC) Count Total Morettian Uncert. 0.199 U Count 0.199 U 0.160 0.199 U 0.160 %Yield Qualifier Limits 40 - 110 Vincert. Prepared 06/11/18 13:02 Oc/11/18 13:02 MDC Unit Prepared 06/11/18 13:02 Oc/11/18 13:02 Morettian Uncert. Uncert. 000 0.161 1.00 0.234 92.9 Qualifier Limits Prepared 06/11/18 13:02 Oc/11/18 13:02 Oc/11/18 13:02 Indium-228 (GFPC) Count Total Uncert. Uncert. Uncert. Uncert. Oc/11/18 13:02 Indium-228 (GFPC) Count Total Uncert. Oc/11/18 13:56 %Yield Qualifier Limits Prepared Oc/11/18 13:56 %Yield Qualifier	D: MBLPS-18-05-MW-3 (I) Lab Sample ID: 240-96 31/18 13:41 Matrix: 05/18 09:30 Matrix: Indium-226 (GFPC) Count Total $Matrix: Uncert. 0.199 U 0.199 0 0.100 0.160 92.9 Qualifier 40-110 1.00 00/11/18 13:02 07/03/18 06:01 Mitting Prepared 06/11/18 13:02 07/03/18 06:01 Mitting 06/11/18 13:02 07/03/18 06:01 06/11/18 13:02 06/11/18 13:02 07/03/18 06:01 Mitting 06/11/18 13:02 07/03/18 06:01 06/11/18 13:02 07/03/18 06:01 06/11/18 13:02 07/03/18 06:01 06/11/18 13:02 07/03/18 06:01 06/11/18 13:02 06/11/18 13:02 07/02/18 14:37 %Yield Qualifier (20+/-) 0.196 0.196 0.196 0.196 0.0367 Pici/L 06/11/18 13:56 07/02/18 14:37 %Yield Qualifier Limits $

+ 228

Tracer/Carrier Summary

Prep Type: Total/NA

Method: 9315 - Radium-226 (GFPC)

Matrix: Water

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 Legend

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Water

_				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)	88.8	91.2		
240-96523-2	MBLPS-18-05-MW-5 (I)	86.4	90.5		13
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 Carrie	r				

Y Carrier = Y Carrier

Total

MDC Unit

0.207 pCi/L

RL

1.00

Uncert.

(2**σ**+/-)

0.0929

Count

Uncert.

(2**σ**+/-)

0.0929

Limits

40 - 110

Method: 9315 - Radium-226 (GFPC)

MB MB

MB MB

%Yield Qualifier

-0.006681 U

92.6

Result Qualifier

Lab Sample ID: MB 160-369900/23-A

Matrix: Water

Analyte

Carrier

Ba Carrier

Radium-226

Analysis Batch: 373831

Client Sample ID: Method Blank

06/11/18 13:02 07/03/18 09:43

06/11/18 13:02 07/03/18 09:43

Analyzed

Analyzed

Prepared

Prepared

Prep Type: Total/NA

Prep Batch: 369900

Dil Fac

Dil Fac

1

1

12 13 14

15

	D: LCS 1	60-369	900/1-A					Clie	ent Sam	ple ID:	Lab Control S	Sample
Matrix: Water	-										Prep Type: To	
Analysis Bate	ch: 37383	30									Prep Batch: 3	36990(
			Cuilco	1.00	LCS	Total Uncert.					%Rec.	
Analyta			Spike Added	Result			RL	MDC	Unit	%Rec	%Rec. Limits	
Analyte Radium-226				12.31		(2σ+/-) 1.46	1.00	0.231		104	68 - 137	
Raululli-220			11.0	12.31		1.40	1.00	0.231	poi/L	104	00 - 137	
	LCS I	LCS										
Carrier	%Yield (Qualifier	· Limits									
Ba Carrier	88.8		40 - 110	-								
lethod: 932	20 - Rad	ium-2	28 (GFPC)								
Lab Sample I	D: MB 16	0-3699	05/23-A						Clie	nt Samp	ole ID: Method	Blan
Matrix: Water											Prep Type: To	
Analysis Bate	ch: 37366	52									Prep Batch: 3	
				Count	Total							
		MB	МВ	Uncert.	Uncert.							
Analyte		Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC		Pre	epared	Analyzed	Dil Fa
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	
		MB	MB									
									Dr	d	A	D:/ C-
Carrier		%Yield	Qualifier	Limits					FI	epared	Analyzed	DIIFa
		% Yield 92.6	Qualifier	Limits 40 - 110							Analyzed 07/02/18 14:40	
Carrier Ba Carrier Y Carrier			Qualifier						06/11	//18 13:56	•	Dil Fac
Ba Carrier Y Carrier	 D: LCS 10	92.6 92.0		40 - 110				Clie	06/11 06/11	7/18 13:56 1/18 13:56	07/02/18 14:40 07/02/18 14:40	
Ba Carrier Y Carrier Lab Sample I		92.6 92.0		40 - 110				Clie	06/11 06/11	//18 13:56 //18 13:56 nple ID:	07/02/18 14:40 07/02/18 14:40 Lab Control S	Sample
Ba Carrier Y Carrier Lab Sample I Matrix: Water	r	92.6 92.0 60-369		40 - 110				Clie	06/11 06/11	//18 13:56 //18 13:56 nple ID:	07/02/18 14:40 07/02/18 14:40 Lab Control S Prep Type: To	Sample otal/N/
Ba Carrier Y Carrier Lab Sample I Matrix: Water	r	92.6 92.0 60-369		40 - 110		Total		Clie	06/11 06/11	//18 13:56 //18 13:56 nple ID:	07/02/18 14:40 07/02/18 14:40 Lab Control S	Sample otal/NA
Ba Carrier Y Carrier Lab Sample I Matrix: Water	r	92.6 92.0 60-369		40 - 110 40 - 110	LCS	Total Uncert.		Clic	06/11 06/11	//18 13:56 //18 13:56 nple ID:	07/02/18 14:40 07/02/18 14:40 Lab Control S Prep Type: To	Sample otal/NA
Ba Carrier	r	92.6 92.0 60-369	905/1-A	40 - 110 40 - 110			RL	Clie	06/11 06/11	//18 13:56 //18 13:56 nple ID:	07/02/18 14:40 07/02/18 14:40 Lab Control S Prep Type: To Prep Batch: 3	Sample otal/NA
Ba Carrier Y Carrier Lab Sample I Matrix: Water Analysis Bato Analyte	r	92.6 92.0 60-369	905/1-A Spike	40 - 110 40 - 110 LCS	Qual	Uncert.	RL 1.00		06/11 06/11 ent Sam	/18 13:56 /18 13:56 n ple ID:	07/02/18 14:40 07/02/18 14:40 Lab Control S Prep Type: To Prep Batch: 3 %Rec.	Sample otal/NA
Ba Carrier Y Carrier Lab Sample I Matrix: Water Analysis Bate	r	92.6 92.0 60-369	905/1-A Spike Added	40 - 110 40 - 110 LCS Result	Qual	Uncert. (2σ+/-)		MDC	06/11 06/11 ent Sam	%Rec	07/02/18 14:40 07/02/18 14:40 Lab Control S Prep Type: To Prep Batch: 3 %Rec. Limits	Sample otal/NA

 Ba Carrier
 88.8
 40 - 110

 Y Carrier
 92.7
 40 - 110

QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant TestAmerica Job ID: 240-96523-2

Par	•
ιλαι	

Prep Batch: 369900

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-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	
rep Batch: 369905					
	Client Sample ID	Ргер Туре	Matrix	Method	Prep Batch
Prep Batch: 369905 Lab Sample ID 240-96523-1	Client Sample ID MBLPS-18-05-MW-4 (I)	Prep Type Total/NA	Matrix Water	Method PrecSep_0	Prep Batch
Lab Sample ID	·				Prep Batch
Lab Sample ID 240-96523-1 240-96523-2	MBLPS-18-05-MW-4 (I)	Total/NA	Water	PrecSep_0	Prep Batch
Lab Sample ID 240-96523-1	MBLPS-18-05-MW-4 (I) MBLPS-18-05-MW-5 (I)	Total/NA Total/NA	Water Water	PrecSep_0 PrecSep_0	Prep Batch

Dilution

Factor

1

1

1

Run

Batch

Number

Prepared

or Analyzed

369900 06/11/18 13:02 JLC

373831 07/03/18 06:00 RTM

369905 06/11/18 13:56 JLC

373488 07/02/18 14:36 CDR

374405 07/08/18 16:47 RTM

Analyst

Lab

TAL SL

TAL SL

TAL SL

TAL SL

TAL SL

Batch

Туре

Prep

Prep

Analysis

Analysis

Analysis

Date Collected: 05/31/18 11:08

Date Received: 06/05/18 09:30

Prep Type

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

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

Batch

9315

9320

Method

PrecSep-21

PrecSep 0

Ra226 Ra228

Lab Sample ID: 240-96523-1

Lab Sample ID: 240-96523-2

Matrix: Water

Matrix: Water

5

12

Client Sample ID: MBLPS-18-05-MW-5 (I) Date Collected: 05/31/18 11:20 Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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

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: 240-96523-3 Matrix: Water

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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	
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
Iowa	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.

Accreditation/Certification Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant TestAmerica Job ID: 240-96523-2

13 14

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.

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	CHAIN OF	Fishbeck Thompson, Carr & Huber, Inc. Address / Try 778204ET.or 22-52	Carr & H	Joer Tor	> 	Report to		PERNI MALEX	KH KON	Nut	Invoice to ALCENSIG PARABLE Email RCPAY & FTEH COM	
	KECORD C	Phone CIL-5X-3824	411 O. L.	1	3	Copy to				Ref	Lab Oucte Reference Z4013587	
PROJECT NAME	PROJECT NO	lect No. (6 de 20)	MATR	MATRIX TYPE			REQUIR	REQURED ANALYSES	S.		PAGE	
FROJECT LOCATION	AMPLE SAMPLE SAMPLE PHONE	SAMPLER(S) NAME 705 5 AD PHONEZ/A 544 - (A48) EMAILICOMPDE 10 2000	(%ATER) (%ATER)		L J	1972 WARDE 1977 WERDE 1974-43W.					stid Tar Rush Tar	
ALLER RUNNAL REV UNG	<u>,</u> 20.	s ample adentification	ias/anos snoanov	ξγ.				PRESERVATIVE				
CATE TIME STATE	4-1-20-31-212W				((×44.))		NUMBER OF CONTAINERS SUBMITTED	NTAINERS SI	UBNITTED		* METHIN SO NO 20 20	
	WR. PS-19~	ars-m-unarar	R								Ph. H4, 120	
	H1125-18-05 MW	OS MW 3/T)			·	n A		240-965				
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	V DATE TIME	RELIVOUSATO	DATE	10:30		RELINOUISHED EV	DATE			D OF SHIPM	METHOD OF SHIPMENTIBIL OF LADING	···· ·
Prok. Brouge	11:22 10:15	100	DATE		KEO KEO	RECEIVED BY	DATE	TIME		DFORLAB		· · · · · · · · · · · · · · · · · · ·
WATTE CONJUNE	40 6345 F	YELLOW Copy field File / Project Documentation.	ilje / Project	Document	ation.				5	>		1
042400	۲ ۶ .					15	13 14	12		<u>ග</u>		

	18-11 cm - the
TestAmerica Canton Sample Receipt Form/Narrative	Login # :
Canton Facility	· · · · · · · · · · · · · · · · · · ·
Nieni FTCAH Site Name	Cooler unpacked by:
Cooler Received on 4518 Opened on 4518	
	erica Courier Other
	rage Location
TestAmerica Cooler # TA Foam Box Client Cooler Box	Other
Packing material used: Bubble Wrap Foam Plastic Bag None	Other
n en	e Multiple Cooler Form
IR GUN# IR-8 (CF +0.1 °C) Observed Cooler Temp. 5 v4 °C Cor	
IR GUN #36 (CF +0.3°C) Observed Cooler Temp*C Corre	cted Cooler Temp°C
IR GUN # 627 (CF -1.3°C) Observed Cooler Temp°C-Corre	cted Cooler Temp*C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quanti	
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	
-Were tamper/custody seals intact and uncompromised?	Yes No NA
3. Shippers' packing slip attached to the cooler(s)?	Tes No
 Bid custody papers accompany the sample(s)? 	(Versnig
 Were the custody papers relinquished & signed in the appropriate place? 	i rests that are not
6. Was/were the person(s) who collected the samples clearly identified on the	
7. Did all bottles arrive in good condition (Unbroken)?	
8. Could all bottle labels be reconciled with the COC?	Yes No Yes No Oil and Gross
Were correct bottle(s) used for the test(s) indicated?	C Yes No
10. Sufficient quantity received to perform indicated analyses?	TOC
11. Are these work share samples?	Yes No
If yes, Questions 12-16 have been checked at the originating laboratory.	
12. Were all preserved sample(s) at the correct pH upon receipt?	Yes No NA pH Strip Lot# HC740840
13. Were VOAs on the COC?	Yes(No)
 Were air bubbles >6 mm in any VOA vials? I arger than this. 	Yes No. 212
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #	Yes No
16. Was a LL Hg or Me Hg trip blank present?	Yes No
Contacted PM Date by	via Verbal Voice Mail Other
Contacted PM Date by	_ yia veroai voice Maii Other
Concerning	
17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES	Samples processed by:
17. CHAIN OF COSTOD I & SAMELE DISCULTANCIES	TR
малин ница дин ^с , , , , , , , , , , , , , , , , , , ,	······································
18. SAMPLE CONDITION	
Sample(s) were received after the rece	ommended holding time had expired.
Sample(s)	were received in a broken container.
Sample(s)were received with	bubble >6 mm in diameter. (Notify PM)
·	
19. SAMPLE PRESERVATION	
Sample(s)	were further preserved in the laboratory.
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()))))))))))))))))))	

Login Container Summary Report

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Temperature readings:

Client Sample ID	Lab 1D	Container Type	Container pH	Preservative Added (mls)	<u>1.01 #</u>
<u>Concus Sumpto tes</u>	240-96523-B-1	Plastic 500ml - with Nitrie Acid	<2		
	240-96523-C-1	Plastic I liter - Nitric Acid	<2	·	· · · · · · · · · · · · · · · · · · ·
	240-96523-D-1	Plastic 1 liter - Nitric Acid	×2		· · · · · · · · · · · · · · · · · · ·
and a start of the second start The second start of the second s	240-96523-E-1	Plastic 1 liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
	240-96523-B-2	Plastic 500ml - with Nitric Acid	<2	·	· · · · · · · · · · · · · · · · · · ·
	240-96523-C-2	Plastic 1 liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	
	240-96523-D-2	Plastic 1 liter - Nitric Acid	<2	· · ·	
n en fragen en en frage. An en	240-96523-E-2	Plastic I liter - Nitric Acid	<2	· · ·	· · <u>· · · · · · · · · · · · · · · · · </u>
	240-96523-B-3	Plastic 500ml - with Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	
	240-96523-C-3	Plastic 1 liter - Nitric Acid	<2	·	
an ann an a	240-96523-D-3	Plastic 1 liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	
(1) A start of the second sec second second sec	240-96523-Е-3	Plastic 1 liter - Nitric Acid	<2	 	
					e travel a sector teneral de la composition de la composition de la composition de la composition de la composi

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Page 1 of 1

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Canton	NW	
TestAmerica	4101 Shuffel Street	

North Canton, OH 44720 Phone (330) 497-9396 Pax

Chain of Custody Record



Phone (330) 497-8396 Fax (330) 497-0772					
Client Information (Sub Contract Lab)	Sanpler	tab PW: Books: Krie M	Carlier Tracking Nots)		COC Np.
creen Contact Shipping/Receiving	Phene.	E-Mail: E-Mail: Kris. Drobks @Nestamerinainn com	State of Origin Michael	240-8 Page	240-87735.1 Page:
Company TestAmerica Laboratories, Inc.		Accreditions, Required (See note)		is dat.	Page 1 of 1
Address: 13715 Rider Trail North,	Due Dale Requested: 6/7/2018			240 Pre-	240-96523.1 Preservation Codes;
Giy; Earbi City	TAT Requested (days):		rulaiyais Kequested		ICL M. Hexbro Arthu M. M. M.
State, Zp: MO, 63045					C - Zn Acetate V - AsNaO2 C - Zn Acetate V - AsNaO2 D - Nith: Acid P - Na2O45
Phone: 314.298-8566(Tel) 314-298-8757(Fax)		4 (C 1			kaHSO4 O - Na2SO3 feOH R - Na2S2O3 metilar S - Inneora
11 (12,84).	WO #:	یں۔ 22-سام (0		₩ -H	Acid
Project Name CCR-MBL P Shires Steam Ptant	⁸⁷ roject #. 24020283	N 10 SI			4 - DI Water V - MCAA K - EDTA W - pit 4-5 1 - EDA Z - Albert inconsista
5408-	S\$OW#:) dəş: : dəş: (X) Qş			
Sample Identification - Client ID (Lab ID)	Sample Type Sample Date Trans Control		······	10 YodmuN Ik)	
	X	ation Code: N		ioT.	Special Instructions/Note:
MBLPS-18-05-MW-4 (I) (240-96523-1)		Water X x x			
MBL PS-18-05-MW-5 (I) (240-96523-2)	5/31/18 11.20	; >		2	
MBLPS-16-05-MW-3 (I) (240-96523-3)	5/31/18 13:41				
	1	V X X X		<u>.</u>	
Note: Since Jahoratory accreditations are subject to change. TestAnerica: Laboratories. In: Places the connecting of mechads ansiye & accreditation compliance upper) out althoration and the standard of the laboratory accreditation or althoration and the standard of the laboratory access to change. This sample stapment is towarded under chain-of-custody 11 the laboratory access to change stapment is towarded under chain-of-custody 11 the laboratory active international accreditation or althoration with the standard of the	ratories, tric places the contecting of methods and catories, tric places the contecting of methods and catorinatus bear and a scalyzed, the samples must be cont to date, return the signed Chain of Custody alt	4. A state of the state of t	urant leitonis. This sample stamme Ner instructions with the provided Anj (catories. bo:	and is forwarded under c tranges to accreditation	Trife sample strayment is torwarded under chain-of-custody if the lathcratory does not be provided. Any drainges to accreditation status should be briologith to festivariates
Possible Hazard Identification					· · · · · · · · · · · · · · · · · · ·
Unconfirmed		Sample Disposal (A	ee may be	les are retained to	iger than 1 month)
Deliverable Requested: I. II. IV. Other (specify)	Primary Deliverable Rank: 2	Special Instructions/OC Requirements	C Requirements:	Archive For	Acontras
Emply Kit Reinquished by:	Date:	Time.			
Retriguished by PL A. LD. L.		1 1		06M.	
Nemquished by	6 - 5 - 7 5 15 12 25	Company Received by	on HUN 6	6-6-15/091	C Company C
Reimgushed by	Dated inte:			Uale/time.	Compleny
Custody Seals Intact: Custody Seal No :				Date/Tane:	Constany
_		Contes Temperature(s)	Conter Temperature(s) *C and Other Remarks:		

er: 09/2/0/2/0

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Login Sample Receipt Checklist

Client: Fishbeck Thompson Carr & Huber Inc			Job Number: 240-96523-2	
Login Number 06502			List Courses TootAmories Ct. Louis	
Login Number: 96523 List Number: 2			List Source: TestAmerica St. Louis List Creation: 06/06/18 02:01 PM	
Creator: Press, Nicholas B				5
Question	Answer	Comment		
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td></td> <td></td> <td></td> <td></td>				
The cooler's custody seal, if present, is intact.				
Sample custody seals, if present, are intact.				8
The cooler or samples do not appear to have been compromised or tampered with.				9
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?				13
There are no discrepancies between the containers received and the COC.				
Samples are received within Holding Time (excluding tests with immediate HTs)				14
Sample containers have legible labels.				15
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: 240-96523-1

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

Hes Brooks

Authorized for release by: 6/19/2018 4:42:40 PM

Kris Brooks, Project Manager II (330)966-9790 kris.brooks@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.

..... LINKS **Review your project** results through Total Access Have a Question? Ask-The Expert Visit us at: www.testamericainc.com

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

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Qualifiers

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Metals		
Qualifier	Qualifier Description	
U	Indicates the analyte was analyzed for but not detected.	5
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	3
General C	hemistry	
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.	7
U	Indicates the analyte was analyzed for but not detected.	
		8

Glossary

Image: Second Stress	9
CFLContains Free LiquidCNFContains No Free LiquidDERDuplicate Error Ratio (normalized absolute difference)Dil FacDilution FactorDLDetection Limit (DoD/DOE)DL, RA, RE, INIndicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
CNFContains No Free LiquidDERDuplicate Error Ratio (normalized absolute difference)Dil FacDilution FactorDLDetection Limit (DoD/DOE)DL, RA, RE, INIndicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DERDuplicate Error Ratio (normalized absolute difference)Dil FacDilution FactorDLDetection Limit (DoD/DOE)DL, RA, RE, INIndicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
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	
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	
DL, RA, RE, IN Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DI C Decision Lovel Concentration (Radiochemistry)	
EDL Estimated Detection Limit (Dioxin)	
LOD Limit of Detection (DoD/DOE)	
LOQ Limit of Quantitation (DoD/DOE)	
MDA Minimum Detectable Activity (Radiochemistry)	
MDC Minimum Detectable Concentration (Radiochemistry)	
MDL Method Detection Limit	
ML Minimum Level (Dioxin)	
NC Not Calculated	
ND Not Detected at the reporting limit (or MDL or EDL if shown)	
PQL Practical Quantitation Limit	
QC Quality Control	
RER Relative Error Ratio (Radiochemistry)	
RL Reporting Limit or Requested Limit (Radiochemistry)	
RPD Relative Percent Difference, a measure of the relative difference between two points	
TEF Toxicity Equivalent Factor (Dioxin)	
TEQ Toxicity Equivalent Quotient (Dioxin)	

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.

(240-96523-3)

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.

Method Summary

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

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TestAmerica Canton

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

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: 240-96523-1

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

Lab Sample ID: 240-96523-1

13

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

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
									Recoverable
Antimony	1.0	J	2.0	0.57	ug/L	1	(6020A	Total
									Recoverable
Lithium	9.8		8.0	1.7	ug/L	1	(6020A	Total
									Recoverable
Fluoride	0.23		0.050	0.024	mg/L	1	9	9056A	Total/NA

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

Lab Sample ID: 240-96523-2

Lab Sample ID: 240-96523-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
Barium	95		5.0	2.2	ug/L	1	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)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	d Prep Type
Arsenic	1.5	J	5.0	0.75	ug/L	1	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.

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: 240-96523-1

Lab Sample ID: 240-96523-1

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

Matrix: Water

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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	1

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-5 (I) Date Collected: 05/31/18 11:20

Date Received: 06/05/18 09:30

Lab Sample ID: 240-96523-2 Matrix: Water

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	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	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 (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 15:15	1	Ì
General Chemistry										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
Fluoride	0.046	J	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

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: 240-96523-3 Matrix: Water

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 (
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 15:17	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

RL

5.0

5.0

1.0

1.0

1.0

2.0

5.0

1.0

2.0

5.0

8.0

1.0

MB MB

0.75 U

2.2 U

0.31 U

0.21 U

0.19 U

0.98 U

1.1 U

0.45 U

0.57 U

0.89 U

1.7 U

0.20 U

Result Qualifier

Method: 6020A - Metals (ICP/MS)

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

Matrix: Water

Analyte

Arsenic

Barium

Beryllium

Cadmium

Chromium

Antimony

Selenium

Lithium

Thallium

Molybdenum

Cobalt

Lead

Analysis Batch: 330498

MDL Unit

0.75 ug/L

2.2 ug/L

0.31 ug/L

0.21 ug/L

0.19 ug/L

0.98 ug/L

1.1 ug/L

0.45 ug/L

0.57 ug/L

0.89 ug/L

1.7 ug/L

0.20 ug/L

D

Prepared

Client Sample ID: Method Blank

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

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06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

Client Sample ID: Lab Control Sample

Prep Type: Total Recoverable

Prep Type: Total Recoverable

Analyzed

Prep Batch: 330141

Dil Fac

1

1

1

1

1

1

1

1

1

1

1

1

6 7 8 9 10

Lab Sample ID: LCS 240-330141/3-A Matrix: Water Analysis Batch: 330498

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: MB 240-33015 Matrix: Water Analysis Batch: 330440	50/1-A								Clie		ple ID: Method Prep Type: To Prep Batch:	otal/NA
-	MB	MB										
Analyte	Result	Qualifier		RL		MDL	Unit	D	Р	repared	Analyzed	Dil Fac
Mercury	0.13	U		0.20		0.13	ug/L		06/0	5/18 15:00	06/06/18 15:23	1
Lab Sample ID: LCS 240-3301 Matrix: Water Analysis Batch: 330440	50/2-A		Spike		1.05	LCS		Clien	t Sa		Lab Control S Prep Type: To Prep Batch: %Rec.	otal/NA
Annahata			•		-			11.9	_	0/		
Analyte			Added		Result	Qua	litier	Unit	D	%Rec	Limits	
Mercury			5.00		4.35			ug/L		87	80 - 120	

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-331714/3 Matrix: Water Analysis Batch: 331714	MB	МВ							Clie	ent Sam	ple ID: Metho Prep Type: T	
Analyte	Result	Qualifier		RL			-	D	Р	repared	Analyzed	Dil Fac
Fluoride	0.024	U	0	0.050	0.	024 n	ng/L				06/15/18 21:13	1
Lab Sample ID: LCS 240-331714/4 Matrix: Water Analysis Batch: 331714								Client	Sa	mple ID:	: Lab Control : Prep Type: T	
			Spike		LCS	LCS					%Rec.	
Analyte			Added	F	Result	Qualif	fier	Unit	D	%Rec	Limits	
Fluoride			2.50		2.64			mg/L		106	90 - 110	

QC Association Summary

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

TestAmerica Job ID: 240-96523-1

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12

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	
rep 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	
nalysis Batch: 330	440				
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
nalysis Batch: 330	498				
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
		Total Recoverable	Water	6020A	330141
240-96523-3	MBLPS-18-05-MW-3 (I)	TOTAL RECOVERADIE	india.		
	MBLPS-18-05-MW-3 (I) Method Blank	Total Recoverable	Water	6020A	330142
240-96523-3 MB 240-330141/1-A LCS 240-330141/3-A				6020A 6020A	330141 330141

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	
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	

Dilution

Factor

1

1

1

Run

Batch

Prepared

330141 06/05/18 15:00 MBB

330498 06/06/18 16:02 DSH

330150 06/05/18 15:00 MBB

330440 06/06/18 15:13 AJC

331714 06/16/18 01:42 JWW

Analyst

Lab

TAL CAN

TAL CAN

TAL CAN

TAL CAN

TAL CAN

Number or Analyzed

Batch

Туре

Prep

Prep

Analysis

Analysis

Analysis

Date Collected: 05/31/18 11:08

Date Received: 06/05/18 09:30

Prep Type

Total/NA

Total/NA

Total/NA

Total Recoverable

Total Recoverable

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

Batch

Method

3005A

6020A

7470A

7470A

9056A

Lab Sample ID: 240-96523-1

Lab Sample ID: 240-96523-2 Matrix: Water

Matrix: Water

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8
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11
13

Client Sample ID: MBLPS-18-05-MW-5 (I) Date Collected: 05/31/18 11:20 Date Received: 06/05/18 09:30

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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)
Date Collected: 05/31/18 13:41
Date Received: 06/05/18 09:30
```

Lab Sample ID: 240-96523-3 Matrix: Water

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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

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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

	CHAIN OF	Fishbeck Thompson, Carr & Huber, Inc.	Cart & H	S H 3	200	Report to		Row Marzy			invoice to Alcavary Pression	Paratic	
LICER OL	CUSTODY RECORD	Phone CIC - 5X - 3824	10 mg	11 4564		Copy to Email					Lab Duote Z4013587		
PROJECT NAME	AD (DU COLECT NO	Ject NO.	MATR	MATRIX TYPE				REQUIRED ANALYSES	33		rvácie		Witerstein
FROJECT LOCATION	Annora Annora Annora Annora Annora	र सम्बद्धाः	(Mater) M-soud		lef Iginonish	1922 UNICAL 1927 W21049 975-4344					STD TAT RUSH TAT DATE DUE		
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	PAR. PS-18-	And me see	X								1.1	120	
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NO 14	2 10:35	\sim	DATE	71ME	KEO	RECEIVED BY	DATE	Elimeter (VED FOR A	VIN 6/5/	K 930	
MATTE CERY - RELEVA	5 697 E	YELLOW Coly — field File / Project Documentation.	Pite / Project	Document	ation.).+ 			\sum	>			1
	3.					:	13	12		0 0			

	01 878
TestAmerica Canton Sample Receipt Form/Narrative	Login # :
Tient FTC & A Site Name Cooler Received on 4,15/18 Opened on 4	Cooler unpacked by:
FedEx: 1" Grd Exp> UPS FAS Clipper Client Drop Off	ff TestAmerica Courier Other
Receipt After-hours: Drop-off Date/Time	Storage Location
 TestAmerica Cooler # Foam Box Client Coole Packing material used: Bubble Wrap Foam Plastic E COOLANT: Wer Ice Blue Ice Dry Ice Wi Cooler temperature uporreceipt IR GUN# 1R-8 (CF +0.1 °C) Observed Cooler Temp IR GUN#36 (CF +0.3 °C) Observed Cooler Temp IR GUN # 627 (CF -1.3 °C) Observed Cooler Temp Were tamper/custody seals on the outside of the cooler(s)? If -Were the seals on the outside of the cooler(s) signed & date -Were the seals on the outside of the cooler(s) signed & date -Were tamper/custody seals intact and uncompromised? Shippers' packing slip attached to the cooler(s)? Did custody papers accompany the sample(s)? Were the custody papers relinquished & signed in the appropri Was/were the person(s) who collected the samples clearly ide Did all bottle labels be reconciled with the COC? Were correct bottle(s) used for the test(s) indicated? Sufficient quantity received to perform indicated analyses? Are these work share samples? If yes, Questions 12-16 have been checked at the originating 1 Were VOAs on the COC? Were air bubbles >6 mm in any VOA vials? <i>(Large</i>) Was a VOA trip blank present in the cooler(s)? Trip Blank Let Was a LL Hg or Me Hg trip blank present? 	Bag None Other Vater None Image: See Multiple Cooler Form %C %C Corrected Cooler Temp. %C %C No Yes No Yes No Yes No
Contacted PM Date by	via Verbal Voice Mail Other
Concerning	
17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES	Samples processed by:
18. SAMPLE CONDITION	after the recommended holding time had expired. were received in a broken container.
Sample(s)	eceived with bubble ≥6 mm in diameter. (Notify PM)
Sample(s)	eceived with bubble ≫6 mm in diameter. (Notify PM)

Login Container Summary Report

Temperature readings:

nperature readings:	Lab ID	Container Type	Container Preservative pH Added (mls)	<u>1.01 #</u>
	240-96523-B-1	Plastic 500ml - with Nitric Acid	- 	
	240-96523-C-1	Plastic I liter - Nitric Acid	~ <u>2</u>	· · · · · · · · · · · · · · · · · · ·
	240-96523-D-1	Plastic 1 liter - Nitric Acid	s:2	
	240-96523-E-1	Plastic 1 liter - Nitric Acid	< 2 · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
	240-96523-B-2	Plastic 500ml - with Nitric Acid	<2	· · ·
	240-96523-C-2	Plastic 1 liter - Nitric Acid	~2	
	240-96523-D-2	Plastic I liter - Nitric Acid	<u></u>	
	240-96523-E-2	Plastic I liter - Nitric Acid		· · · · · · · · · · · · · · · · · · ·
	240-96523-B-3	Plastic 500ml - with Nitric Acid	< .	· · ·
	240-96523-C-3	Plastic 1 liter - Nitric Acid	<2	···
	240-96523-D-3	Plastic 1 liter - Nitric Acid	······································	
anna a' stàitean ann. Tartainn ann ann ann ann ann ann ann ann ann	240-96523-E-3	Plastic 1 liter - Nitric Acid	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	· · · ·

ดหลงออกและการอธิรั*รษณ์รั*นได้รั



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

atrick O' Mearo

Authorized for release by: 7/9/2018 3:39:00 PM Patrick O'Meara, Manager of Project Management (330)966-5725 patrick.omeara@testamericainc.com

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

3

Qualifiers

Dad

Rad		Δ
Qualifier	Qualifier Description	1
*	LCS or LCSD is outside acceptance limits.	5
U	Result is less than the sample detection limit.	5

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	8
CFL	Contains Free Liquid	
CNF	Contains No Free Liquid	9
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	
DL	Detection Limit (DoD/DOE)	
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DLC	Decision Level Concentration (Radiochemistry)	
EDL	Estimated Detection Limit (Dioxin)	
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	
MDA	Minimum Detectable Activity (Radiochemistry)	
MDC	Minimum Detectable Concentration (Radiochemistry)	
MDL	Method Detection Limit	
ML	Minimum Level (Dioxin)	
NC	Not Calculated	
ND	Not Detected at the reporting limit (or MDL or EDL if shown)	
PQL	Practical Quantitation Limit	
QC	Quality Control	
RER	Relative Error Ratio (Radiochemistry)	
RL	Reporting Limit or Requested Limit (Radiochemistry)	
RPD	Relative Percent Difference, a measure of the relative difference between two points	
TEF	Toxicity Equivalent Factor (Dioxin)	

٩ TEQ Toxicity Equivalent Quotient (Dioxin)

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.

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.

Method Summary

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

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

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 Receive	d
240-96524-1	MBLPS-18-05-MW-2 (I)	Water	05/31/18 15:07 06/05/18 09	9:30
240-96524-2	MBLPS-18-05-MW-2 (D)	Water	05/31/18 15:07 06/05/18 09	
240-96524-3	MBLPS-18-05-MW-1 (I)	Water	05/31/18 16:29 06/05/18 09	9:30

Detection Summary

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

No Detections.

No Detections.

No Detections.

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

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

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

Lab Sample ID: 240-96524-1	
Lab Sample ID: 240-96524-2	5
Lab Sample ID: 240-96524-3	7
	8
	9

This Detection Summary does not include radiochemical test results.

Client Sample ID Date Collected: 05/3			IW-2 (I)	_	_			Lab Sample	D: 240-96 ID: 240-96	
ate Received: 06/0										
Method: 9315 - Rac	1ium-226 (GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	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		Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.6		40 - 110					06/11/18 13:02	07/03/18 06:02	1
Method: 9320 - Rac	dium-228 ((GFPC)								
	,	 ,	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.315	U *	0.219	0.221	1.00	0.337	pCi/L	06/11/18 13:56	07/02/18 14:37	1
	A/1/2 1 1	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Carrier		quanner								
Carrier Ba Carrier	92.6		40 - 110					06/11/18 13:56	07/02/18 14:37	1
									07/02/18 14:37 07/02/18 14:37	1 1
Ba Carrier Y Carrier	92.6 92.3	<u> </u>	40 - 110 40 - 110	nd Radium	-228					7 1
Ba Carrier	92.6 92.3	<u> </u>	40 - 110 40 - 110	nd Radium _{Total}	-228					1
Ba Carrier Y Carrier	92.6 92.3	<u> </u>	40 - 110 40 - 110 dium-226 a		-228					1
Ba Carrier Y Carrier	92.6 92.3 1 228 - Com	<u> </u>	40 - 110 40 - 110 dium-226 a Count	Total	-228 RL 5.00	MDC 0.337				1 1 Dil Fac

226 + 228

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

TestAmerica Job ID: 240-96524-2

Client Sample ID: Date Collected: 05/31			/W-2 (D)					Lab Sample		524-2 : Water	
ate Received: 06/05		-								Water	
Method: 9315 - Radi	ium-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	1	
Analyte Radium-228	Result 0.106	Qualifier U *	Uncert. (2σ+/-) 0.209	Uncert. (2σ+/-) 0.209	RL 1.00	MDC 0.357		Prepared 06/11/18 13:56	Analyzed 07/02/18 14:37	Dil Fac	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac	
Ba Carrier	91.2		40 - 110					06/11/18 13:56	•	1	
Y Carrier	96.1		40 - 110					06/11/18 13:56	07/02/18 14:37	1	
Method: Ra226_Ra2	228 - Con	nbined Ra	dium-226 a	nd Radium	n-228						
_			Count	Total							
			Uncert.	Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL			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

lient Sample ID			/IW-1 (I)					Lab Sample		
ate Collected: 05/3		-							Matrix:	Water
ate Received: 06/0	5/18 09:30									
Method: 9315 - Rac	lium-226 (GFPC)								
		,	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC		Prepared	Analyzed	Dil Fac
Radium-226	0.409		0.224	0.227	1.00	0.264	pCi/L	06/11/18 13:02	07/03/18 09:40	1
Carrier	%Vield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	91.7	Quainei	40 - 110					06/11/18 13:02	07/03/18 09:40	
- -										
Method: 9320 - Rac	lium-228 (GFPC)	-							
			Count	Total						
▲ al- 4a	Beault	Qualifier	Uncert.	Uncert.		MDC	1114	Dremared	Arreburned	
Analyte			(2σ+/-) 0.265	(2σ+/-)	RL	MDC		Prepared	Analyzed	Dil Fac
		11 ^		0.265	1.00	0.458	pCI/L	06/11/18 13:56	07/02/18 14:37	1
Radium-228	0.107	0	0.200							
		Qualifier	Limits					Prepared	Analyzed	Dil Fac
Radium-228 Carrier Ba Carrier								Prepared 06/11/18 13:56	Analyzed 07/02/18 14:37	Dil Fac
Carrier	%Yield		Limits					•	07/02/18 14:37	Dil Fac 1 1
Carrier Ba Carrier Y Carrier	<mark>%Yield</mark> 91.7 94.6	Qualifier	<i>Limits</i> 40 - 110 40 - 110					06/11/18 13:56	07/02/18 14:37	1
Carrier Ba Carrier	<mark>%Yield</mark> 91.7 94.6	Qualifier	Limits 40 - 110 40 - 110 dium-226 au		-228			06/11/18 13:56	07/02/18 14:37	1
<i>Carrier</i> Ba Carrier Y Carrier	<mark>%Yield</mark> 91.7 94.6	Qualifier	Limits 40 - 110 40 - 110 dium-226 au Count	Total	-228			06/11/18 13:56	07/02/18 14:37	1
Carrier Ba Carrier Y Carrier Method: Ra226_Ra	%Yield 91.7 94.6 228 - Com	Qualifier	Limits 40 - 110 40 - 110 dium-226 au Count Uncert.	Total Uncert.				06/11/18 13:56 06/11/18 13:56	07/02/18 14:37 07/02/18 14:37	1
<i>Carrier</i> Ba Carrier Y Carrier	%Yield 91.7 94.6 228 - Com	Qualifier	Limits 40 - 110 40 - 110 dium-226 au Count	Total	-228 	MDC 0.458		06/11/18 13:56	07/02/18 14:37	1

226 + 228

Tracer/Carrier Summary

Prep Type: Total/NA

Prep Type: Total/NA

Method: 9315 - Radium-226 (GFPC)

Matrix: Water

			Percent Yield (Acceptance Limits)
		Ba Carrier	
Lab Sample ID	Client Sample ID	(40-110)	
240-96524-1	MBLPS-18-05-MW-2 (I)	92.6	
240-96524-2	MBLPS-18-05-MW-2 (D)	91.2	
240-96524-3	MBLPS-18-05-MW-1 (I)	91.7	
240-96524-3 MS	MBLPS-18-05-MW-1 (I)	89.4	
240-96524-3 MSD	MBLPS-18-05-MW-1 (I)	88.2	
LCS 160-369900/1-A	Lab Control Sample	88.8	
MB 160-369900/23-A	Method Blank	92.6	

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Water

				Percent Yield (Acceptance Limits)
		Ba Carrier	Y Carrier	
b Sample ID	Client Sample ID	(40-110)	(40-110)	
0-96524-1	MBLPS-18-05-MW-2 (I)	92.6	92.3	
40-96524-2	MBLPS-18-05-MW-2 (D)	91.2	96.1	
10-96524-3	MBLPS-18-05-MW-1 (I)	91.7	94.6	
10-96524-3 MS	MBLPS-18-05-MW-1 (I)	89.4	90.8	
0-96524-3 MSD	MBLPS-18-05-MW-1 (I)	88.2	91.2	
CS 160-369905/1-A	Lab Control Sample	88.8	92.7	
/IB 160-369905/23-A	Method Blank	92.6	92.0	

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

Method:	9315 -	Radium-226	(GFPC)

	ID: MB 160-3	86990)0/23-A						Clie		ole ID: Met		
Matrix: Wate											Prep Type		
Analysis Bat	tch: 373831										Prep Bate	ch: 36	9900
				Count	Total								
		MB		Uncert.	Uncert.								
Analyte			Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC			repared	Analyze		il Fac
Radium-226	-0.006	681	U	0.0929	0.0929	1.00	0.207	pCi/L	06/1	1/18 13:02	07/03/18 09	9:43	1
		MB	MB										
Carrier			Qualifier	Limits						repared	Analyze		il Fac
Ba Carrier		92.6		40 - 110					06/1	1/18 13:02	07/03/18 09	9:43	1
Lab Sample	ID: LCS 160-	3699	00/1-4					Cli	ent Sar	nnle ID [.]	Lab Conti	rol Sa	mnle
Matrix: Wate		0000						011	ont our		Prep Type		_
Analysis Bat											Prep Bate		
, analysis ba						Total					. Top But		
			Spike	LCS	LCS	Uncert.					%Rec.		
Analyte			Added	Result		(2σ+/-)	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 Qua		Limits										
Ba Carrier	88.8		40 - 110	-									
	ID: 240-9652	4-3 N	15					Clien	Samp		BLPS-18-0		
Matrix: Wate Analysis Bat	er	4-3 N	10			Total		Client	. Samp		Prep Type Prep Bate	: Tota	I/NĂ
Matrix: Wate	er		NS Spike	MS	MS	Total Uncert.		Client	Janp		Prep Type	: Tota	I/NĂ
Matrix: Wate	er tch: 373831	Imple		MS Result	-		RL	MDC			Prep Type Prep Bate	: Tota	I/NĂ
Matrix: Wate Analysis Bat	er tch: 373831 Sample Sa	Imple	Spike	-	-	Uncert.	RL 1.00		Unit		Prep Type Prep Bate %Rec.	: Tota	I/NÁ
Matrix: Wate Analysis Bat Analyte	er tch: 373831 Sample Sa Result Qu	Imple	Spike Added	Result	-	Uncert. (2σ+/-)		MDC	Unit	%Rec	Prep Type Prep Bate %Rec. Limits	: Tota	I/NÁ
Matrix: Wate Analysis Bat Analyte	er tch: 373831 Sample Sa <u>Result Qu</u> 0.409	imple Jal	Spike Added	Result	-	Uncert. (2σ+/-)		MDC	Unit	%Rec	Prep Type Prep Bate %Rec. Limits	: Tota	I/NĂ
Matrix: Wate Analysis Bat Analyte Radium-226	er tch: 373831 Sample Sa Result Qu 0.409 MS MS	imple Jal	Spike Added 15.7	Result 14.46	-	Uncert. (2σ+/-)		MDC	Unit	%Rec	Prep Type Prep Bate %Rec. Limits	: Tota	I/NÁ
Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Lab Sample Matrix: Wate	er tch: 373831 Sample Sa Result Qu 0.409 MS MS %Yield Qua 89.4 ID: 240-9652	imple ual Ilifier	Spike Added 15.7 Limits 40 - 110	Result 14.46	-	Uncert. (2σ+/-)		MDC 0.248	Unit pCi/L	- <u>%Rec</u> 89	Prep Type Prep Bate %Rec. Limits 75 - 138 BLPS-18-0 Prep Type	e: Tota ch: 36	-1 (I)
Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Lab Sample	er tch: 373831 Sample Sa Result Qu 0.409 MS MS %Yield Qua 89.4 ID: 240-9652	imple ual Ilifier	Spike Added 15.7 Limits 40 - 110	Result 14.46	-	Uncert. (2σ+/-)		MDC 0.248	Unit pCi/L	- <u>%Rec</u> 89	Prep Type Prep Bate %Rec. Limits 75 - 138	e: Tota ch: 36	-1 (I)
Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Lab Sample Matrix: Wate	er tch: 373831 Sample Sa Result Qu 0.409 MS MS %Yield Qua 89.4 ID: 240-9652	umple Jal Lifier 4-3 N	Spike Added 15.7 Limits 40 - 110	Result 14.46	-	Uncert. (2σ+/-) 1.74		MDC 0.248	Unit pCi/L	- <u>%Rec</u> 89	Prep Type Prep Bate %Rec. Limits 75 - 138 BLPS-18-0 Prep Type	e: Tota ch: 36	-1 (I) 9900 -1 (I) 1/NA 9900
Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Lab Sample Matrix: Wate	er tch: 373831 Sample Sa Result Qu 0.409 MS MS %Yield Qua 89.4 ID: 240-9652 er tch: 373831	umple Jal 1///ifier 4-3 M	Spike Added 15.7 <u>Limits</u> 40 - 110	Result 14.46	Qual MSD	Uncert. (2σ+/-) 1.74		MDC 0.248	Unit pCi/L	- <u>%Rec</u> 89	Prep Type Prep Bate %Rec. Limits 75-138 BLPS-18-0 Prep Type Prep Bate	e: Tota ch: 36	-1 (I) 9900 -1 (I) 1/NA 9900 RER
Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Lab Sample Matrix: Wate Analysis Bat	er tch: 373831 Sample Sa Result Qu 0.409 MS MS %Yield Qua 89.4 ID: 240-9652 er tch: 373831 Sample Sa	umple Jal 1///ifier 4-3 M	Spike Added 15.7 - Limits 40 - 110 ASD Spike	Result 14.46	Qual MSD	Uncert. (2σ+/-) 1.74 Total Uncert.	1.00	MDC 0.248 Client	Unit pCi/L t Samp Unit	- <mark>%Rec</mark> 89 le ID: Mi	Prep Type Prep Bate %Rec. Limits 75 - 138 BLPS-18-0 Prep Type Prep Bate %Rec.	e: Tota ch: 36 	-1 (I) -1 (I) I/NA 9900 RER Limit
Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Lab Sample Matrix: Wate Analysis Bat	er tch: 373831 Sample Sa Result Qu 0.409 MS MS %Yield Qua 89.4 ID: 240-9652 er tch: 373831 Sample Sa Result Qu 0.409	umple Jal 4-3 M umple Jal	Spike Added 15.7 - Limits 40 - 110 NSD Spike Added	Result 14.46 MSD Result	Qual MSD	Uncert. (2σ+/-) 1.74 Total Uncert. (2σ+/-)	1.00 -	MDC 0.248 Client	Unit pCi/L t Samp Unit	- <u>%Rec</u> 89	Prep Type Prep Bate %Rec. Limits 75 - 138 BLPS-18-0 Prep Type Prep Bate %Rec. Limits	e: Tota ch: 36 	-1 (I) -1 (I) -1 (I) -1/NA 9900 RER Limit
Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Lab Sample Matrix: Wate Analysis Bat	er tch: 373831 Sample Sa Result Qu 0.409 MS MS %Yield Qua 89.4 ID: 240-9652 er tch: 373831 Sample Sa Result Qu	umple Jal 4-3 M umple Jal	Spike Added 15.7 - Limits 40 - 110 NSD Spike Added	Result 14.46 MSD Result	Qual MSD	Uncert. (2σ+/-) 1.74 Total Uncert. (2σ+/-)	1.00 -	MDC 0.248 Client	Unit pCi/L t Samp Unit	- <u>%Rec</u> 89	Prep Type Prep Bate %Rec. Limits 75 - 138 BLPS-18-0 Prep Type Prep Bate %Rec. Limits	e: Tota ch: 36 	-1 (I)

Total

MDC Unit

0.372 pCi/L

RL

1.00

MDC Unit

0.418 pCi/L

RL

1.00

Total

Uncert.

(2**σ**+/-)

1.44

Uncert.

(2**σ**+/-)

0.198

Count

Uncert.

(2**σ**+/-)

Limits

40 - 110

40 - 110

LCS LCS

Result Qual

13.10 *

Spike

Added

Limits

40 - 110

40 - 110

8.18

0.198

Method: 9320 - Radium-228 (GFPC)

MB MB

MB MB

%Yield Qualifier

-0.07828 U

92.6

92.0

Result Qualifier

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

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

LCS LCS

88.8

92.7

Lab Sample ID: 240-96524-3 MS

Analysis Batch: 373488

%Yield Qualifier

Matrix: Water

Analyte

Carrier

Ba Carrier

Y Carrier

Analyte

Carrier

Ba Carrier

Y Carrier

Matrix: Water

Radium-228

Matrix: Water

Analysis Batch: 373489

Radium-228

Analysis Batch: 373662

Client Sample ID: Method Blank

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

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

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

Client Sample ID: Lab Control Sample

%Rec.

Limits

56 - 140

Analyzed

Analyzed

Prep Type: Total/NA Prep Batch: 369905

Prepared

Prepared

%Rec

160

Prep Type: Total/NA

Prep Batch: 369905

Dil Fac

Dil Fac

1

1

1

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

Prep Batch: 369905

						Total					•	
	Sample	Sample	Spike	MS	MS	Uncert.					%Rec.	
Analyte	Result	Qual	Added	Result	Qual	(2 σ+/-)	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	
	MO	Me										

11/13	11/13	
%Yield	Qualifier	Limits
89.4		40 - 110
90.8		40 - 110
	% Yield 89.4	

Lab Sample ID: 240-96524-3 MSD Matrix: Water Analysis Batch: 373488

Client Sample ID: MBLPS-18-05-MW-1 (I) Prep Type: Total/NA Prep Batch: 369905

Analysis But	011. 01 0400								TTOP Du		
					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									

QC Association Summary

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

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	
rep Batch: 369905					
	Client Sample ID	Ргер Туре	Matrix	Method	Prep Batc
Lab Sample ID	Client Sample ID MBLPS-18-05-MW-2 (I)	Prep Type Total/NA	Matrix Water	Method PrecSep_0	Prep Batc
- Lab Sample ID 240-96524-1	·				Prep Batc
rep Batch: 369905 Lab Sample ID 240-96524-1 240-96524-2 240-96524-3	MBLPS-18-05-MW-2 (I)	Total/NA	Water	PrecSep_0	Prep Batc
Lab Sample ID 240-96524-1 240-96524-2 240-96524-3	MBLPS-18-05-MW-2 (I) MBLPS-18-05-MW-2 (D)	Total/NA Total/NA	Water Water	PrecSep_0 PrecSep_0	Prep Batc
Lab Sample ID 240-96524-1 240-96524-2 240-96524-3 MB 160-369905/23-A	MBLPS-18-05-MW-2 (I) MBLPS-18-05-MW-2 (D) MBLPS-18-05-MW-1 (I)	Total/NA Total/NA Total/NA	Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0	Prep Batc
Lab Sample ID 240-96524-1 240-96524-2	MBLPS-18-05-MW-2 (I) MBLPS-18-05-MW-2 (D) MBLPS-18-05-MW-1 (I) Method Blank	Total/NA Total/NA Total/NA Total/NA	Water Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0	Prep Batc

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

Client Sample ID: MBLPS-18-05-MW-2 (I) Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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) Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

Batch Batch Dilution Batch Prepared Method Prep Type Туре Run Factor Number or Analyzed Lab Analyst TAL SL Total/NA PrecSep-21 369900 06/11/18 13:02 JLC Prep Total/NA Analysis 9315 373831 07/03/18 06:02 RTM TAL SL 1 TAL SL Total/NA PrecSep 0 Prep 369905 06/11/18 13:56 JLC Total/NA 9320 373488 07/02/18 14:37 CDR TAL SL Analysis 1 Total/NA Analysis Ra226_Ra228 1 374405 07/08/18 16:47 RTM TAL SL

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: 240-96524-3 Matrix: Water

Lab Sample ID: 240-96524-2

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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

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7/9/2018

Accreditation/Certification Summary

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.

Accreditation/Certification Summary

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

13 14

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 Accords Privable Email VIC-Pay D. F. Leh. Cam Lab Ducte Reference	PAGE 1	STD TAT STD TAT RUSH INT DUE DUE		F Wetals - 56, 45, 80, 80	Ph Hx								METHOD OF SHIPMENTISHIL OF LADING	The Automatic		2 3 3 5 6 7 4
Penni Mahler DEtrucom	ite cunter analyses					524 Ch					 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		Datter June	DATE TIME RECEIVED FOR LAB		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	WATRIX TYPE												PY DOPE (1195 RELINOUISHED BY	DATE TIME TO ACCENCE OF A	field F4E / Project Documentation.	
JAIN OF JSTODY ECORD	10 - 64	PROJECT LOCATION SAMPLER(S) NAME PROJECT MANAGER PHONE 21 A D T C C EMAIL TO COMPENSE ADDITIONAL INFORMATION	SAMPLE SAMPLE Date The	- 13	W HELPS 14-05-HW X	V 1629 HURS- 18-05- HN 164							RELINOUSINED EV DATE TIME RELINOVSHED	10 DATE I WAY RECEIVED	WHITE COPY Reight with data reckage. YELLOW Cony	042060

<u> Andreas and A</u>

TestAmerica Canto	n Sample Receipt Form/N	<i>arrative</i>	Login	n#:	24
Canton Facility	· · · · ·	·			
Client FRA		Site Name # 4		Cooter unj	backed by:
Cooler Received on f	TELIX	Opened on 651	X	X	
EadEx: 1ª Grat Exe	UPS FAS Clipper			Other	······································
Receipt After-hours		Chair prop On 1	Storage Location	()tht	<u> </u>
TestAmerica Cooler #		Client Cooler	Box Other	NII)	
Packing material	used: Bubble Wrap Fo	Dry Ice Water	None Other None See Multiple Cooler For		
IR GUN# IR-8 (IR GUN #36 (Cl ⁺ +0.1 °C) Observed Co CF +0.3°C) Observed Cool CF -1.3°C) Observed Cool	oler Temp <u>. ≥i ′</u> ′°C ler Temp°C	Corrected Cooler T Corrected Cooler Ter Corrected Cooler Ter	emp. <u>S</u> np°C	C
	ody seals on the outside of th		huanting 1	No	
	on the outside of the cooler(Ng NA	
	ustody seals on the bottle(s)			NO	· . . ·
	ustody seals intact and uncor			SNo NA	
	slip attached to the cooler(s)		778	No.	
	rs accompany the sample(s)?		<u>Ve</u>	No	l a
	papers relinquished & signe		lace? (Yes	BNO	Tests that are not checked for pH by
6. Was/were the per	son(s) who collected the sam	ples clearly identified		> No	Receiving:
	ive in good condition (Unbro			No	
8. Could all bottle h	bels be reconciled with the (20C?	Tes	5No	VOAs
	le(s) used for the test(s) indic			2No	Oil and Grease TOC
10. Sufficient quantit	y received to perform indicat	ed analyses?		<u>PNo</u>	100
11. Are these work sl				NO	
	12-16 have been checked at i			~	
	d sample(s) at the correct pH	l upon receipt?	<u>(Yes</u>	No NA p	H Strip Lot# <u>HC74084(</u>
13. Were VOAs on the				Nos	
	>6 mm in any VOA vials?			S NO NA	
	alank present in the cooler(s)	? Inp Blank Lot #	res Yes		
10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	Me Hg trip blank present?	·····		Sur 1992	
Contacted PM	Date	by	via Verbal. V	oice Mail Off	ier
Concerning					······································
17. CHAIN OF CUS	TODY & SAMPLE DISCI	REPANCIES			processed by: TR
				· · · · · · · · · · · · · · · · · · ·	
{ · · · ·	···				
18. SAMPLE CONI		ىلىيىنىيە بىلىرى بىلىيىنىيە بىلىيىنىيە بىلىيىنىيە 1- بىرىيە ئىلىرى بىلىيە بىلىيىنى بىرىيە بىلىيە بىل		(1))) 6	unirad
Sample(s)		were received after th	e recommended hold	nig time had e	xpuea.
Sample(s)		······································	were received	I III A DIOKCH C	DIRALISCE,
1 Sample(s)		were received	with phopic >0 mm i	in diameter, tN	ony rm)
<u> </u>					
19. SAMPLE PRES	ERVATION				
19. SAMPLE PRES	Preservative(s) add		were fur	rther preserved	in the laboratory.

WI-NC-099

6/5/2018

Login Container Summary Report

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Temperature readings:

Client Sample ID	Lah ID	Container Type	<u>Container</u> <u>pH</u>	Preservative Added (mls)	<u>Lot #</u>
MBLPS-18-05-MW-2 (I)	240-96524-B-1	Plastic 500ml - with Nitric Acid	<2	4 - 201 M 1 - 201 - 201	· · ·
MBLPS-18-05-MW-2 (1)	240-96524-C-1	Plastic 1 liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	
MBLPS-18-05-MW-2 (1)	240-96524-D-1	Plastic 1 liter - Nitric Acid	<2		
MBLPS-18-05-MW-2 (I)	240-96524-E-1	Plastic 1 liter - Nitric Acid			· · · · · · · · · · · · · · · · · · ·
MBLPS-18-05-MW-2 (D)	240-96524-B-2	Plastic 500ml - with Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	. <u>-</u>
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 1 liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	entration and both free large in the most of
MBLPS-18-05-MW-2 (D)	240-96524-E-2	Plastic I liter - Nitric Acid	 <2 		
MBI.PS-18-05-MW-1 (1)	240-96524-A-3	Plastic I liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	<u></u>
MBLPS-18-05-MW-1 (I)	240-96524-B-3	Plastic I liter - Nitric Acid			·
MBLPS-18-05-MW-1 (1)	240-96524-C-3	Plastic I liter - Nitric Acid	<2		
MBLPS-18-05-MW-1 (1)	240-96524-D-3	Plastic 1 liter - Nítric Acid	- 2		
MBLPS-18-05-MW-1 (1)	240-96524-E-3	Plastic 1 liter - Nitric Acid	<2		
MBLPS-18-05-MW-1 (I)	240-96524-F-3	Plastic 1 liter - Nitric Acid	<2		
MBLPS-18-05-MW-1 (I)	240-96524-G-3	Plastic 1 liter - Nitric Acid	<2		· · · · · · · · · · · · · · · · · · ·
MBLPS-18-05-MW-1 (1)	240-96524-14-3	Plastic 1 liter - Nitric Acid	$<2^{\circ}$	- ,	. <u></u>
MBLPS-18-05-MW-1 (1)	240-96524-1-3	Plastic I liter - Nitric Acid	<2		

Canton	MM
TestAmerica	101 Shuffel Street

Chain of Custody Record



North Canton, DH 44720 Phone (330) 497-9596 Fax (330) 497-0772	2	5					· · · ·							AND A CHARLES		odi unuz, transformationationationations 1999 - Angeler Statemeter (1999)	80.
Lab)	Sampler:		Brook	Leb PM Brooks, Kris M					- <u>-</u>	Carrier Tracking Nots)	N Guya	ols).		COC No: 240-87735.1	5.1		
Client Contact Shipping/Rectativing	Phone:		E-Mai: Aris br	E-Mait: kris.brooks@testamericainc.com	amela	ricainc	COT		<u> 2 0</u>	State of Origin Michigan	ngin.			Page 1 of	۰. ۲۰۰		T
Company: TestAmerica Laboratories, Inc.				Accreditions Required (See role)	rs Rogi	èred (Se	e nale)			·				Job #, 240-96524-1	4-1		<u> </u>
Adæess 13715 Rider Trail North.	Due Date Requested: 6/7/2018						Anal	/sìs	Regu	Analysis Requested				Preservation Codes	ion Codes	(6)	1
City: Earth City	TAT Requested (days):			17										E-NaOH C - Zh Aset		W - Mezane N - Node D - AsNaO2	
51ak: Zp MO, 63045			 - -	<u>•{)</u>	(3,									D - Nitric Acid E - Na14504		P - Na2045 O - Na2503	
Рнэме. 314-298-8566(Теі) 314-298-8757(Fex)	PO#,				110) B									F • MeUrt 6 • Anchlot H - Ascistic And		.R - Na2S203 S - H2SO4 T - TSP Dodetahrdrais	a
second	WO#,			lon	хх-ти			·····								Li - Acetone V - IACAA	,
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MBLPS-18-05-MW-2 (1) (240-96524-1)	5/31/18 13	5:07	Water		××	×											
MBLPS-18-05-MW-2 (D) (240-96524-2)	5/31/18 15	15:07 Eastern	Water		×××	×	i 					 	ļ	5			
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uncommunea Deliverable Requested: I. II. III, IV. Other (specify)	Primary Deliverable I	Rank: 2		Speci	Metura el Instr	Special Instructions/OC Requirements:	NOC 1	(equir	ement	Disposal By Lab ements:	3y Lat		2	Archive For		Months	
Empty Kit Retinquished by:	Date:			Time:						1357	Method of Shyperativ	nenadiyi					T
Reinguished by: Resnerastics Chearles Conit	Date Tarre. Le - S - 7 8 Date Tarre:	15:19	Company Company	<u>e e</u>	Received by	SURO A	Ser	A	UN.			Date Time:		09101	-	Company Company	<u> </u>
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Ver. 09.20 2616

Data/Turner

Couler Temperature(s) "C end Other Remarks

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Received by:

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Dare/Time:

Chain of Custody Record



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² hone (330) 497-9396 Fax (330) 497-0772						· · ·				•	· · · ·	Vert of Abrilla South South	THE LEADER IN CONTROLNAGE AND THE TAGE
Client Information (Sub Contract Lab)	Sampler:			Lab PM Brook	Lab PM Brooks, Kris M	·.			Certer Tracking Nots)	ng No(s):		COC No: 240-87736.1	
bent Contact; Shipping/Receiving	Plique:			E-Mart Kris.b	E-Mail. kvis:brooks@lestamiericainc.com	stameric	ainc.com		State of Origen Michigan			Pege: Page 1 of 1	
iompary: restAnterica 1.aboratories, kic.					Accreditation	no Require	Acceditations Required (See note)					Job #: 240-96624-1	
doress 13715 Rider Trail North,	Due Dale Requested: 6/7/2018						Anal	vsis Re	Analvsis Requested			Preservation Codes	otes:
13% 5ath Cilv	TAT Requested (day	ys):										A - HCL B - NaOH	M Hexane N None
1016.270. 1016.270. MO. 630145	<u>.,,</u>				iz•(⊅₌	()						C - Zn Acetate D - Nitric Acid E - NaHSOA	O - AsNaO2 P - Na2045 O - Na2030
hane 314-296-8566(Tet) 314-296-8752(Fax)	# Oct					133D) (F - MeON G - Amériler	
	#0#				/ (o)	27-mu					S	ri - Merchtike Meid 1 - Ine J - Di Waler	
ropert Name CCR-MBL P Shiras Steam Plant	Project #, 24020283				i Jo sa	ibsA 0					184(16)	K - EDTA 1 - EDA	W - pH 4-5 Z - other (specify)
site: · · · · · · · · · · · · · · · · · · ·	SSOWE:				л) (s					•••••	uos ja	Other:	
Sample Iden(lification - Cilient ID {Lab ID}	Sample Date	Sample Time	Sample Type (C=comp. G=grab)	Matrix (mewater.512014) Unemateresi	Perior Fillered S Perior MS/M M/SM mioref	4452649228 GE 3320 Barss8/Pre day decay					o tedmuM leto	C. C	Social Instantion (Instant
		X	1 10	hon Code:								Cheria	
MBLPS-18-05-MW-1 (I) {240-96524-3MS}	5/31/18	16.29 Eastern	MS	Water		××							
VBLPS-18-05-MW-1 (I) (240-96524-3MSD)	5/31/18	16:29	MSD	Water		×							
		Edesition											
	- - -												
Vote: Since taboralory are subject to change. Test/merical taboratories. Inc. places the ownership of melicol analyte & accreditation compliance upon out subcontract and votances. This sample shipment is ferwarded under chain-ed-custody. If the lateratory fores no accreditation is the samples there are a compliance upon out subcontract shortanes. This sample shipment is ferwarded under chain-ed-custody. If the lateratory fores no accreditation is the samples there are a compliance to the TestAmestica laboratory or other instructions with the provided. Any changes to accreditation should be brought to TestAmestica laboratory or other instructions with the provided. Any changes to accreditation should be brought to TestAmestica laboratory or other instructions with the provided. Any changes through to TestAmestica laboratory or other instructions with the provided. Any changes through the brought to TestAmestica laboratory or other instructions with the provided. Any changes through the brought to TestAmestica laboratory or other instructions with the provided. Any changes through the brought to TestAmestica Laboratory or other instructions with the provided. Any changes to accreditations should be brought to TestAmestica taboratory for the accreditation status should be brought to TestAmestica taboratory and the brought to TestAmestica taboratory and the brought to TestAmestica taboratory and the brought to test and test an	ratories, Inc. places the estamatrix being anialys eat to dale, return the s	ownership of ed. The samp gned Chain o	melkod, anal as must be st of Custody all	yte & accreditat uisped back to R esting to said co	on compilar 18 TestAme Mplicance N	vće upon tv sice labora: o TestAme	it subconita ory or other ica Laboraji	d taborator Instructions Pries, Inc	es. This senation will be provided	s shipment is 1. Any chang	forwarded i és to accre	under chain-el-cus ditation status sho	This semble thistread is forwarded under chain-ch-custody. If the lateratory does not be provided. Any changes to accreditation status should be brought to TestAnners
Possible Hazard Identification					Samp	le Dispo	sal (A fee	may be	assessed if	samples a	re relain	Sample Disposal (A fee may be assessed if samples are retained longer (han 1 month)	1 7 month)
Unconfirmed]	Return To Chent	o Cilerit	-	Disposal By Lab	ab	Archive For	ive For	Months
Jeriverable Krequested: 1, 11, 11, 11, Other (specify)	Primary Deliverable Rank;	ole Rank: 2			Specie	al Instruct	Special Instructions/QC Requirements	Requirem					
Emply Kit Relinquished by:		Date:			Time:				Method	Method of Shipment:			
calinguestica by Charles Drowth	Dato/Ime:	15	63	Company 240	$Q_{\frac{1}{2}}$	OPPred by	lan.	Pro	July 1	Officiane	180	0/6	Company 57L
	Dale/Tmts:			Company	9X	Received by:			· · ·	Date Time			Company
Reknquskked by.	Date/Time:			Gampeny	Ű	Received by:				Date/Time.			Company

Custody Seals Intact: A Yes A No

Custody Seal No.

2452016

coller Temperature(s) "C. and Olher Renarks

14

15

Login Sample Receipt Checklist

Client: Fishbeck Thompson Carr & Huber Inc			Job Number: 240-96524-2	
Login Number 96524			List Source: TestAmerica St. Louis	
Login Number: 96524 List Number: 2 Creator: Press, Nicholas B			List Creation: 06/06/18 02:01 PM	5
Question	Answer	Comment		
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td></td> <td></td> <td></td> <td></td>				
The cooler's custody seal, if present, is intact.				
Sample custody seals, if present, are intact.				8
The cooler or samples do not appear to have been compromised or tampered with.				9
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.				13
Samples are received within Holding Time (excluding tests with immediate HTs)				
Sample containers have legible labels.				15
Containers are not broken or leaking.				15
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.

Login Sample Receipt Checklist

Client: Fishbeck Thompson Carr & Huber Inc			Job Number: 240-96524-2	
			305 Number: 240-30324-2	
Login Number: 96524			List Source: TestAmerica St. Louis	
List Number: 3 Creator: McKinney, Gerrod E			List Creation: 06/09/18 12:45 PM	5
Question	Answer	Comment		
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td></td> <td></td> <td></td> <td></td>				
The cooler's custody seal, if present, is intact.				
Sample custody seals, if present, are intact.				8
The cooler or samples do not appear to have been compromised or tampered with.				9
Samples were received on ice.				4.0
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?				13
There are no discrepancies between the containers received and the COC.				
Samples are received within Holding Time (excluding tests with immediate HTs)				14
Sample containers have legible labels.				15
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

Hes Brooks

Authorized for release by: 6/19/2018 4:46:03 PM

Kris Brooks, Project Manager II (330)966-9790 kris.brooks@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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Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant

3

Qualifiers

Metals		
Qualifier	Qualifier Description	
U	Indicates the analyte was analyzed for but not detected.	5
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	J
General Che	mistry	
Qualifier	Qualifier Description	
U	Indicates the analyte was analyzed for but not detected.	
Glossary		8
Abbreviation	These commonly used abbreviations may or may not be present in this report.	0
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	3
%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)	13
EDL	Estimated Detection Limit (Dioxin)	
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	
MDA	Minimum Detectable Activity (Radiochemistry)	

- MDC Minimum Detectable Concentration (Radiochemistry)
- MDL Method Detection Limit
- ML Minimum Level (Dioxin)
- NC Not Calculated ND Not Detected at the reporting limit (or MDL or EDL if shown)
- PQL Practical Quantitation Limit
- QC **Quality Control**
- RER Relative Error Ratio (Radiochemistry)
- RL Reporting Limit or Requested Limit (Radiochemistry)
- RPD Relative Percent Difference, a measure of the relative difference between two points
- TEF Toxicity Equivalent Factor (Dioxin)
- TEQ Toxicity Equivalent Quotient (Dioxin)

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.

ANIONS

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

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

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.

Method Summary

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

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

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

Method Description

Preparation, Mercury

Anions, Ion Chromatography

Preparation, Total Recoverable or Dissolved Metals

Metals (ICP/MS)

Mercury (CVAA)

Method

6020A

7470A 9056A

3005A

7470A

Protocol References:

Laboratory References:

Protocol

SW846

SW846

SW846

SW846

SW846

5	
8	
9	

) ID: 240-96524-1	
Laboratory	
TAL CAN	

TestAmerica Canton

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

TestAmerica Canton

Detection Summary

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

Lab Sample ID: 240-96524-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	DN	lethod	Prep Type
Arsenic	0.84	J	5.0	0.75	ug/L	1	6	020A	Total
									Recoverable
Barium	73		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	2.2		2.0	0.98	ug/L	1	6	6020A	Total
									Recoverable
Molybdenum	1.1	J	5.0	1.1	ug/L	1	6	6020A	Total
									Recoverable
Lithium	5.9	J	8.0	1.7	ug/L	1	6	6020A	Total
									Recoverable
Fluoride	0.055		0.050	0.024	mg/L	1	9	056A	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	Method	Prep Type
Arsenic	1.0	J	5.0	0.75	ug/L	1	6020A	Total
								Recoverable
Barium	72		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	1.7	J	2.0	0.98	ug/L	1	6020A	Total
								Recoverable
Lithium	6.0	J	8.0	1.7	ug/L	1	6020A	Total
								Recoverable
Fluoride	0.055		0.050	0.024	mg/L	1	9056A	Total/NA

This Detection Summary does not include radiochemical test results.

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)

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

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.84	J	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	J	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	U	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		ug/L		06/05/18 15:00	06/06/18 16:24	1
_ Method: 7470A - Mercury (C	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 15:19	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

Client Sample Results

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

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

TestAmerica Job ID: 240-96524-1

1 2 3 4 5 6 7 8

Lab Sample ID: 240-96524-2 Matrix: Water

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 (
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	mg/L			06/16/18 03:05	1

RL

5.0

5.0

1.0

1.0

1.0

2.0

5.0

1.0

2.0

5.0

8.0

1.0

MDL Unit

0.75 ug/L

2.2 ug/L

0.31 ug/L

0.21 ug/L

0.19 ug/L

0.98 ug/L

1.1 ug/L

0.45 ug/L

0.57 ug/L

0.89 ug/L

1.7 ug/L

0.20 ug/L

D

Prepared

Method: 6020A - Metals (ICP/MS)

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

Matrix: Water

Analyte

Arsenic

Barium

Beryllium

Cadmium

Chromium

Antimony

Selenium

Lithium

Thallium

Molybdenum

Cobalt

Lead

Analysis Batch: 330498

MB MB

0.75 U

2.2 U

0.31 U

0.21 U

0.19 U

0.98 U

1.1 U

0.45 U

0.57 U

0.89 U

1.7 U

0.20 U

Result Qualifier

Client Sample ID: Method Blank

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

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06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

06/05/18 15:00 06/06/18 15:31

Prep Type: Total Recoverable

Analyzed

Prep Batch: 330141

Dil Fac

1

1

1

1

1

1

1

1

1

1

1

1

6 7 8 9 10

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

	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	

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 240-330150/1-A Matrix: Water Analysis Batch: 330440								Clie		ole ID: Method Prep Type: To Prep Batch:	otal/NA
	MB										
Analyte F	Result	Qualifier		RL		IDL Unit	D	Р	repared	Analyzed	Dil Fac
Mercury	0.13	U		0.20		0.13 ug/L		06/0	5/18 15:00	06/06/18 15:23	1
Lab Sample ID: LCS 240-330150/2-A Matrix: Water Analysis Batch: 330440		:	Spike		LCS	LCS	Client	Sai	-	Lab Control S Prep Type: To Prep Batch: %Rec.	otal/NA
Analyte		А	dded		Result	Qualifier	Unit	D	%Rec	Limits	
Mercury			5.00		4.35		ug/L		87	80 - 120	

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-331714/3 Matrix: Water Analysis Batch: 331714									Clie	ent Sam	ple ID: Method Prep Type: Te	
	MB	MB										
Analyte	Result	Qualifier		RL	N	IDL U	Jnit	D	Р	repared	Analyzed	Dil Fac
Fluoride	0.024	U	0.	.050	0.	024 r	ng/L		-		06/15/18 21:13	1
Lab Sample ID: LCS 240-331714/4 Matrix: Water Analysis Batch: 331714								Client	t Sai	mple ID:	: Lab Control S Prep Type: Te	
			Spike		LCS	LCS					%Rec.	
Analyte			Added	F	Result	Quali	fier	Unit	D	%Rec	Limits	
Fluoride			2.50		2.64			mg/L		106	90 - 110	

QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant TestAmerica Job ID: 240-96524-1

6020A

6020A

Metals

Prep Batch: 330141

Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MBLPS-18-05-MW-2 (I)	Total Recoverable	Water	3005A	
MBLPS-18-05-MW-2 (D)	Total Recoverable	Water	3005A	
Method Blank	Total Recoverable	Water	3005A	
Lab Control Sample	Total Recoverable	Water	3005A	
Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MBLPS-18-05-MW-2 (I)	Total/NA	Water	7470A	
MBLPS-18-05-MW-2 (D)	Total/NA	Water	7470A	
Method Blank	Total/NA	Water	7470A	
Lab Control Sample	Total/NA	Water	7470A	
440				l l
Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MBLPS-18-05-MW-2 (I)	Total/NA	Water	7470A	330150
MBLPS-18-05-MW-2 (D)	Total/NA	Water	7470A	330150
Method Blank	Total/NA	Water	7470A	330150
Lab Control Sample	Total/NA	Water	7470A	330150
498				
Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MBLPS-18-05-MW-2 (I)	Total Recoverable	Water	6020A	330141
MBLPS-18-05-MW-2 (D)	Total Recoverable	Water	6020A	330141
	MBLPS-18-05-MW-2 (I) MBLPS-18-05-MW-2 (D) Method Blank Lab Control Sample Client Sample ID MBLPS-18-05-MW-2 (I) MBLPS-18-05-MW-2 (D) Method Blank Lab Control Sample Client Sample ID MBLPS-18-05-MW-2 (I) MBLPS-18-05-MW-2 (D) Method Blank Lab Control Sample S Client Sample ID MBLPS-18-05-MW-2 (I) MELPS-18-05-MW-2 (I)	MBLPS-18-05-MW-2 (I) Total Recoverable MBLPS-18-05-MW-2 (D) Total Recoverable Method Blank Total Recoverable Lab Control Sample Total Recoverable MBLPS-18-05-MW-2 (I) Prep Type MBLPS-18-05-MW-2 (I) Total/NA MBLPS-18-05-MW-2 (D) Total/NA Method Blank Total/NA Lab Control Sample Total/NA Method Blank Total/NA Lab Control Sample Total/NA MBLPS-18-05-MW-2 (D) Total/NA MBLPS-18-05-MW-2 (I) Total/NA MBLPS-18-05-MW-2 (D) Total/NA MBLPS-18-05-MW-2 (D) Total/NA MBLPS-18-05-MW-2 (D) Total/NA Method Blank Total/NA Lab Control Sample Total/NA Method Blank Total/NA Lab Control Sample Total/NA Method Blank Total/NA Lab Control Sample Total/NA MBLPS-18-05-MW-2 (I) Total/NA MBLPS Total/NA Total/NA MBLPS Total/NA Total/NA MBLPS Total/NA	MBLPS-18-05-MW-2 (I) Total Recoverable Water MBLPS-18-05-MW-2 (D) Total Recoverable Water Method Blank Total Recoverable Water Lab Control Sample Total Recoverable Water MBLPS-18-05-MW-2 (I) Total Recoverable Water MBLPS-18-05-MW-2 (I) Total/NA Water MBLPS-18-05-MW-2 (D) Total/NA Water Method Blank Total/NA Water Lab Control Sample Total/NA Water Method Blank Total/NA Water Lab Control Sample Total/NA Water MBLPS-18-05-MW-2 (D) Total/NA Water MBLPS-18-05-MW-2 (D) Total/NA Water MBLPS-18-05-MW-2 (D) Total/NA Water MBLPS-18-05-MW-2 (D) Total/NA Water Method Blank Total/NA Water Lab Control Sample Total/NA Water MBLPS-18-05-MW-2 (D) Total/NA Water Method Blank Total/NA Water Lab Control Sample Total/NA Water Method Blank	MBLPS-18-05-MW-2 (I) Total Recoverable Water 3005A MBLPS-18-05-MW-2 (D) Total Recoverable Water 3005A Method Blank Total Recoverable Water 3005A Lab Control Sample Total Recoverable Water 3005A MBLPS-18-05-MW-2 (I) Total Recoverable Water 3005A MBLPS-18-05-MW-2 (D) Total/NA Water 7470A MBLPS-18-05-MW-2 (D) Total/NA Water 7470A Method Blank Total/NA Water 7470A Lab Control Sample Total/NA Water 7470A Method Blank Total/NA Water 7470A Lab Control Sample Total/NA Water 7470A MBLPS-18-05-MW-2 (D) Total/NA Water 7470A MBLPS-18-05-MW-2 (D) Total/NA Water 7470A MBLPS-18-05-MW-2 (D) Total/NA Water 7470A Method Blank Total/NA Water 7470A Lab Control Sample Total/NA Water 7470A Method Blank Total/NA Water 7

General Chemistry

Method Blank

Lab Control Sample

MB 240-330141/1-A

LCS 240-330141/3-A

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	

Total Recoverable

Total Recoverable

Water

Water

330141

330141

Lab Sample ID: 240-96524-1

Lab Sample ID: 240-96524-2

Matrix: Water

Matrix: Water

1 2 3 4 5 6 7 8 9 10 11

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

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

	Batch	Batch		Dilution	Batch	Prepared		
Prep Туре	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
otal Recoverable	Prep	3005A			330141	06/05/18 15:00	MBB	TAL CAN
otal Recoverable	Analysis	6020A		1	330498	06/06/18 16:24	DSH	TAL CAN
「otal/NA	Prep	7470A			330150	06/05/18 15:00	MBB	TAL CAN
otal/NA	Analysis	7470A		1	330440	06/06/18 15:19	AJC	TAL CAN
otal/NA	Analysis	9056A		1	331714	06/16/18 02:44	JWW	TAL CAN

Client Sample ID: MBLPS-18-05-MW-2 (D) Date Collected: 05/31/18 15:07 Date Received: 06/05/18 09:30

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	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

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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	

Involce to Accudes Payable Email OC 20 D. B. H. C. M. Lab Quote Reference	STD TAT RUSH TAT RUSH TAT DATE DUE DATE DUE REMARKS	Mutals - Sh, As Ba, Be	Cal Cr (C) Phy May						METHOD OF SHEMEMINISTIC OF LADING	12 CATE	
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5. Carr & Huber, Inc. Pr. Carr & Huber, Inc. Report to Email 15. 25. 44. 44. Copy to Email MATHUX TYPE									DATE RELINQUISHED BY	DATE TIME RECEIVED BY	
3.4/3. CHAIN OF Fishbeck Thompson, Carl & Hubber Fishbeck Thompson, Carl & Hubbeck Thompson, Carl &	PROJECT LOCATION SAMPLER(S) NAME PROJECT MANAGER PHONE 21 A 24 2 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	MBL75-17-05-MW	X HBEPS 17.05-HW 2 (D) X X X X X X X X X X X X X X X X X X X							RECEIVED BY DATE TWAY RECEIVED BY	509 S

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	n Sample Receipt Form/	/Narratiye	Logi	n#:	124
Canton Facility					······
Client FTC4	······································	Site Name 1 4		Cooter un	backed by:
Cooler Received on f	15/18	Opened on 6[5]]	8	XSC	
FedEx: 1ª Grd/ Exp	S UPS FAS Clipper			Other	۱۰۰
Receipt After-hours		······································	Storage Location	······································	
TestAmerica Cooler #	TA Foam Bo	x Client Cooler	Box Other		
COOLANT	Wet Ice Blue Ice	Dry lee Water	None Other	·····	
1. Cooler temperatu	e upon receipt	<ີ ປ _	See Multiple Cooler Fe		
IR GUN# 1R-8 (CF +0.1 °C) Observed C	looler Temp	Corrected Cooler 7		c_{\cdot}
	CF +0.3°C) Observed Co CF -1.3°C) Observed Co		Corrected Cooler Te Corrected Cooler Te		and the second second
	and a shirt of the second second second		· · · · · · · · · · · · · · · · · · ·		an an an Araba an Araba. An Araba an Ar
	ody seals on the outside of			s No	an an an an Arrange. An an an Arrange
	on the outside of the cooler			D Ng NA	
	ustody seals on the bottle(s			S(NO)	•
	ustody seals intact and unco			SNO NA	
	slip attached to the cooler(rs accompany the sample(s		(Ye	S No. Z No	L
	rs accompany the sample(s papers relinquished & sign		lace?.	s No	Tests that are not
	son(s) who collected the sa		Low the COC^{9} Ve	S No	checked for pH by
	ive in good condition (Unb			No	Receiving:
	bels be reconciled with the			SNo.	VOAs
	le(s) used for the test(s) ind	•		5No	Oil and Grease
	y received to perform indic			No	TOC
11. Are these work sh				(No)	
	12-16 have been checked a	t the originating labora			
	d sample(s) at the correct p			s No NA p	H Strip Lot# HC740840
13. Were VOAs on th				No3	
	>6 mm in any VOA vials?		his. Ye	S NONA	
	alank present in the cooler(s	s)? Trip Blank Lot #			
16. Was a LL Hg or I	Ae Hg trip blank present? _		Υ¢	No.	
Contacted PM	Date	by	vía Verbal. N	Voice Mail Oil	ier
Concerning					
17. CHAIN OF CUS	TODY & SAMPLE DISC	CREPANCIES		Sample	processed by:
		•		1	JR
{					
18. SAMPLE CONI				*****	
Sample(s)		were received after th	e recommended hold	ling time had e	xpired.
Sample(s)			were receive	d in a broken c	ontainer,
Sample(s)		were received	with bubble >6 mm	in diameter. (N	otify PM)
i					······································
19. SAMPLE PRES	ERVATION				
	Preservative(s) a		ware fo	17133447 Detractationar	in the laboration

WI-NC-099

6/5/2018

Login Container Summary Report

Mary Construction and the second s

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Temperature readings:

Cilent Sample ID	<u>Lab 1D</u>	Container Type	<u>Container</u> <u>pH</u>	Preservative Added (mis)	<u>1.01 #</u>
MBLPS-18-05-MW-2 (I)	240-96524-B-1	Plastic 500ml - with Nitric Acid	<2		· · · ·
MBLPS-18-05-MW-2 (1)	240-96524-C-1	Plastic 1 liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	
MBLPS-18-05-MW-2 (1)	240-96524-D-1	Plastic 1 liter - Nitric Acid	<2		
MBLPS-18-05-MW-2 (I)	240-96524-E-1	Plastic 1 liter - Nitric Acid	<2		· · ·
MBLPS-18-05-MW-2 (D)	240-96524-B-2	Plastic 500ml - with Nitric Acid	<2		· · ·
MBLPS-18-05-MW-2 (D)	240-96524-C-2	Plastic 1 liter - Nitric Acid	~2		·
MBLPS-18-05-MW-2 (D)	240-96524-D-2	Plastic 1 liter - Nitric Acid	<2		
MBLPS-18-05-MW-2 (D)	240-96524-E-2	Plastic I liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	۵۵۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰
MBI.PS-18-05-MW-1 (1)	240-96524-A-3	Plastic 1 liter - Nitric Acid	<2	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
MBLPS-18-05-MW-1 (I)	240-96524-B-3	Plastic I liter - Nitric Acid		. ·	· · · · · · · · · · · · · · · · · · ·
MBLPS-18-05-MW-1 (1)	240-96524-C-3	Plastic I liter - Nitric Acid	<2		
MBLPS-18-05-MW-1 (1)	240-96524-D-3	Plastic 1 liter - Nitrie Acid	2		
MBLPS-18-05-MW-1 (I)	240-96524-E-3	Plastic 1 liter - Nitric Acid	<2	·	
MBLPS-18-05-MW-1 (1)	240-96524-F-3	Plastic 1 liter - Nitric Acid	<2		· · · · · · · · · · · · · · · · · · ·
MBLPS-18-05-MW-1 (1)	240-96524-G-3	Plastic 1 liter - Nitric Acid	<2		
MBLPS-18-05-MW-1 (1)	240-96524-14-3	Plastic I liter - Nitric Acid	$<2^{\circ}$		
MBLPS-18-05-MW-1 (I)	240-96524-1-3	Plastic 1 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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 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 L	ight and Power/Shiras
Sample collection dates:	09/20/18	
Sample matrix:	Groundwater	
Analytical parameters/methods:	Metals General Chemistry	6010C 9040B, 9056A, SM2540C
Laboratory:	TestAmerica	
Sample Delivery Group(s):	240-101698-1	

Sample Index:

Field ID	Lab ID	Field ID	Lab ID
MBLPS-18-09-MW-1(I)	240-101698-3	MBLPS-18-09-MW-4(I)	240-101698-5
MBLPS-18-09-MW-2(I)	240-101698-2	MBLPS-18-09-MW-4(D)	240-101698-6
MBLPS-18-09-MW-3(I)	240-101698-1	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.

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 $pH \le 2$.	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 🛛
The target analytes were detected in the method blanks at concentrations above the MDL but below the RL.	Yes 🗌 No 🛛

Exceptions:

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.

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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.



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 \square
Samples were analyzed within the analyte-specific holding times.	Yes 🛛	No 🗌	

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 (± 30%) for at least 75% of the	Yes 🖂	
analyses.		

			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

September 2 Lab Suite:	2018						CCR Appendix I	11											CCR Append								
Lub Suite.						Ì			Total										cen Appene					1			
Parameter:				Boron	Calcium	Chloride	Fluoride	Sulfate	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 MC	'L:			NE	NE	NE	4.0	NE	NE	NE	6.0	10	2.0	4.0	5.0	100	NE	4.0	15	NE NE	2.0	NE	5.0	NE	NE	50	2.0
Location	Wall	Collection	Dunlingto																								
Location	Well ID	Date	Duplicate																							ļ	
	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 08/29/17		300 U 300 U	120,000 130,000	260 270	0.10 U 0.10 U	21 20	800 960	7.54 6.56	2.0 U 2.0 U	5.0 U 5.0 U	0.14	1.0 U 1.0 U	1.0 U 1.0 U	10 U 18	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 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
		09/06/17		300 U	130,000	270	0.10 U	20	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
	MW-2	09/20/18 07/19/17		67 J 300 U	120,000 51,000	300 60	0.044 J 0.38 U	24 22	740 220	7.9 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	07/24/17		300 U	63,000	59	0.38 U	22	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	0.30 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
ient		05/31/18	v	74 J	68,000	86	0.056	31	330 330	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 5.0 U	1.0 U
radi		05/31/18 09/20/18	Х	75 J 55 J	70,000 64,000	86 85	0.057 0.058	31 29	330	8.0 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 0	1.0 U
Nng	MW-3	07/19/17		300 U	68,000	98	0.038 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
Do		07/24/17		300 U	69,000	89	0.38 U	36	440	7.86	2.0 U	5.0 U	0.23	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/23/17		300 U	75,000	95	0.10 U	44	300	7.81	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		08/29/17		300 U	62,000	86	0.10 U	28	390	6.32	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.00 U	1.00 U	1.00 U	5.0 U	2.0 U
		09/06/17		300 U	62,000	85	0.10 U	26	380	7.77	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.05	1.00 U	1.05	5.0 U	2.0 U
		09/14/17		300 U	57,000	83	0.10 U	25	380	7.85	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.0 U	10 U	0.20 U	50 U	1.17	1.00 U	1.17	5.0 U	2.0 U
		09/14/17	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 05/31/18		300 U 45 J	69,000 55,000	87 67	0.10 U 0.067	21 20	350 290	8.10 8.2	2.0 U 2.0 U	5.0 U 1.5 J	0.10 U 0.066	1.0 U 1.0 U	1.0 U 1.0 U	10 U 2.4	20 U 0.32 J	0.065	3.0 U 1.0 U	10 U 4.9 J	0.20 U 0.20 U	50 U 1.2 J	1.00 U 0.128 U	1.00 U 0.199 U	1.00 U -0.0711 U	5.0 U 5.0 U	2.0 U 1.0 U
		09/20/18		43 J 41 J	70,000	92	0.055	20	340	8.1	2.0 0	1.5 5	0.000				0.32 J	0.005	1.0 0	4.9 J	0.20 0	1.2 J	0.128 0	0.133 0	-0.0711 0		
	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 09/28/17		300 U 300 U	100,000 160,000	360 370	0.18	49 46	1,000 1,200	7.77	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 3.1 U	10 U 13	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
		10/05/17		300 U	120,000	380	0.12	40	1,200	7.70	2.0 U	5.0 U	0.10 U	1.0 U	1.0 U	10 U	20 U		3.1 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		120	130,000	450	0.23	42	1,000	7.8	1.0 J	1.4 J	0.10 0	1.0 U	0.24 J	10 0 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
ţ		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 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	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	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 1.00 U	5.0 U 5.0 U	2.0 U 2.0 U
pgré		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
Ē		09/14/17		300 U	96,000	200	0.10 U	18	730	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

Lab Suite:						(CCR Appendix				CCR Appendix IV																
Parameter	:			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	Duplicate																								
	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

His Brooks

Authorized for release by: 10/5/2018 8:13:25 PM

Kris Brooks, Project Manager II (330)966-9790 kris.brooks@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.

..... LINKS **Review your project** results through Total Access Have a Question? Ask-The Expert Visit us at: www.testamericainc.com

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

Minimum Level (Dioxin)

Practical Quantitation Limit

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not Calculated

Quality Control

3

М	ota	e

ML

NC

ND

PQL

QC

RER RL

RPD TEF

TEQ

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.	5
U	Indicates the analyte was analyzed for but not detected.	0
General Che	emistry	
Qualifier	Qualifier Description	
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.	7
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.	8
Glossary		9
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	10
%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	
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

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

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

Reporting Limit or Requested Limit (Radiochemistry)

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.

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.

Method Summary

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

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

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

Method Description

Anions, Ion Chromatography

Solids, Total Dissolved (TDS)

Preparation, Total Recoverable or Dissolved Metals

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

Metals (ICP)

pН

Protocol References:

Laboratory References:

Method

6010C

9040B

9056A

3005A

SM 2540C

Laboratory

TAL CAN

TAL CAN

TAL CAN

TAL CAN

TAL CAN

Protocol

SW846

SW846

SW846

SW846

SM

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8	
9	

10/5/2018

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

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

Client Sample ID: MBLPS-18-09-MW-3 (I)

Lab Sample ID: 240-101698-1

Lab Sample ID: 240-101698-2

5

7 8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	41	J	100	23	ug/L	1	_	6010C	Total
Calcium	70000		5000	310	ug/L	1		6010C	Recoverable Total
pH	8.1	HF	0.1	0.1	SU	1		9040B	Recoverable 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	Method	Prep Type
Boron	55	J	100	23	ug/L	1	_	6010C	Total
									Recoverable
Calcium	64000		5000	310	ug/L	1		6010C	Total
									Recoverable
рН	8.0	HF	0.1	0.1	SU	1		9040B	Total/NA
Chloride	85		1.0	0.28	mg/L	1		9056A	Total/NA
Fluoride	0.058		0.050	0.024	mg/L	1		9056A	Total/NA
Sulfate	29		1.0	0.35	mg/L	1		9056A	Total/NA
Total Dissolved Solids	310		10	7.8	mg/L	1		SM 2540C	Total/NA

Client Sample ID: MBLPS-18-09-MW-1 (I)

Lab Sample ID: 240-101698-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	67	J	100	23	ug/L	1	_	6010C	Total
Calcium	120000		5000	310	ug/L	1		6010C	Recoverable Total
рН	7.9	HF	0.1	0.1	SU	1		9040B	Recoverable Total/NA
Chloride	300		5.0	1.4	mg/L	5		9056A	Total/NA
Fluoride	0.044	J	0.050	0.024	mg/L	1		9056A	Total/NA
Sulfate	24		1.0	0.35	mg/L	1		9056A	Total/NA
Total Dissolved Solids	740		10	7.8	mg/L	1		SM 2540C	Total/NA

Client Sample ID: MBLPS-18-09-MW-5

Lab Sample ID: 240-101698-4

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
рН	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)

Lab Sample ID: 240-101698-5

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant TestAmerica Job ID: 240-101698-1

Client Sample ID: MBLPS-18-09-MW-4 (I) (Continued)

Lab Sample ID: 240-101698-5

Lab Sample ID: 240-101698-6

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
рН	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)

Analyte **Result Qualifier** RL MDL Unit Dil Fac D Method Prep Type Boron 100 23 ug/L 6010C 110 1 Total Recoverable Calcium 5000 130000 310 ug/L 6010C 1 Total Recoverable pН 7.7 HF 0.1 0.1 SU 1 9040B Total/NA 9056A Chloride 450 10 2.8 mg/L 10 Total/NA Fluoride 0.23 0.050 0.024 mg/L 1 9056A Total/NA Sulfate 0.35 mg/L 9056A Total/NA 42 1.0 1 **Total Dissolved Solids** 1000 1 SM 2540C 20 16 mg/L Total/NA

This Detection Summary does not include radiochemical test results.

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	41	J	100	23	ug/L		09/24/18 14:00	09/25/18 10:07	1
Calcium	70000		5000	310	ug/L		09/24/18 14:00	09/25/18 10:07	1
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
			1.0	0.35	mg/L			09/26/18 09:32	1
Sulfate	22		1.0	0.55	my/L			03/20/10 03.32	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

Lab Sample ID: 240-101698-2 Matrix: Water

Analyte	Result	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	,
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	mg/L			09/26/18 09:53	1
o. 16.4	29		1.0	0.35	mg/L			09/26/18 09:53	1
Sulfate	29		1.0	0.00	iiig/ L			00/20/10 00.00	

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

Analyte	Result	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									
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
Sulfate	24		1.0	0.35	mg/L			09/26/18 10:55	1

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

Sulfate

Total Dissolved Solids

TestAmerica Job ID: 240-101698-1

09/26/18 11:37

09/27/18 13:55

8

1

1

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 Method: 6010C - Metals (ICP) - Total Recoverable MDL Unit Analyte Result Qualifier RL D Dil Fac Prepared Analyzed Boron 39 J 100 23 ug/L 09/24/18 14:00 09/25/18 09:45 1 120000 5000 310 ug/L 09/24/18 14:00 09/25/18 09:45 Calcium 1 **General Chemistry** Analyte **Result Qualifier** RL MDL Unit D Prepared Analyzed Dil Fac pН 0.1 0.1 SU 09/22/18 14:54 7.6 HF 1 Chloride 5 220 5.0 1.4 mg/L 09/26/18 12:39 Fluoride 0.031 J 0.050 0.024 mg/L 09/26/18 11:37 1

1.0

10

22

630

0.35 mg/L

7.8 mg/L

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) Date Collected: 09/20/18 14:13 Date Received: 09/22/18 10:00

Lab Sample ID: 240-101698-5 Matrix: Water

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	,
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
рН	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
Sulfate	42		1.0	0.35	mg/L			09/26/18 13:41	1
Juliate									

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) Date Collected: 09/20/18 14:13 Date Received: 09/22/18 10:00

Lab Sample ID: 240-101698-6 Matrix: Water

5

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
	· · · · · · · · · · · · · · · · · · ·		1.0	0.25	mg/L			09/26/18 18:31	
Sulfate	42		1.0	0.55	mg/∟			09/20/10 10.31	1

Client Sample ID: Method Blank

Prep Type: Total Recoverable

9

13

Dil Fac 1 1 trol Sample ecoverable tch: 346908

Analysia Datah, 247092														
Analysis Batch: 347083												Prep Ba	tch: 3	4690
		MB	MB											
Analyte	Re		Qualifier		RL			Unit	I		repared	Analyz		Dil Fa
Boron		23	U		100		23	ug/L		09/2	4/18 14:00	09/25/18	09:09	
Calcium		310	U		5000		310	ug/L		09/2	4/18 14:00	09/25/18	09:09	
Lab Sample ID: LCS 240-3469	908/2-A								Clie	nt Sai	mple ID:	Lab Cor	trol S	ampl
Matrix: Water												e: Total I		
Analysis Batch: 347083												Prep Ba		
·····,···				Spike		LCS	LCS					%Rec.		
Analyte				Added		Result	Qua	lifier	Unit	D	%Rec	Limits		
Boron				1000		1110			ug/L		111	80 - 120		
Calcium				50000		51300			ug/L		103	80 - 120		
Lab Sample ID: 240-101698-4	MS								Clie	nt Sa	mple ID:	MBLPS	18-09-	.ww-
Matrix: Water									-			e: Total I		
Analysis Batch: 347083												Prep Ba		
·····,···	Sample	Sam	ple	Spike		MS	MS					%Rec.		
Analyte	Result	Quali	ifier	Added		Result	Qua	lifier	Unit	D	%Rec	Limits		
Boron	39	J		1000		1120			ug/L		108	75 - 125		
Calcium	120000			50000		169000			ug/L		105	75 - 125		
Lab Sample ID: 240-101698-4	MSD								Clie	nt Sa	mple ID:	MBLPS-	18-09-	-ww
Matrix: Water												e: Total I		
Analysis Batch: 347083												Prep Ba		
	Sample	Sam	ple	Spike		MSD	MSE)				%Rec.		RP
Analyte	Result	Quali	ifier	Added		Result	Qua	lifier	Unit	D	%Rec	Limits	RPD	Lim
Boron	39	J		1000		1080			ug/L		104	75 - 125	4	2
Calcium	120000			50000		158000			ug/L		82	75 - 125	7	2
/lethod: 9040B - pH														
Lab Sample ID: LCS 240-3467	711/2								Clie	nt Sai	mple ID:	Lab Cor	trol S	amnl
	11/46								Cilei	in Gai		Prep Ty		
													J. I.U.	
Matrix: Water														
Matrix: Water Analysis Batch: 346711				Spike		LCS								
Matrix: Water				Spike Added		LCS Result	LCS Qua		Unit	D	%Rec	%Rec. Limits		

Lab Sample ID: LCS 240-346711/29 Matrix: Water Analysis Batch: 346711				Clie	nt Sai	mple ID	: Lab Control Sample Prep Type: Total/NA
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
рН	6.29	6.3		SU		100	97 - 103

Lab Sample ID: 240-101698 Matrix: Water	8-4 DU				Clie	ent Sample	ID: MBLPS-18-09 Prep Type: To	
Analysis Batch: 346711	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

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 240-346908/1-A

Matrix: Water

RL

1.0

Method: 9056A - Anions, Ion Chromatography

MB MB

0.28 U

Result Qualifier

Client Sample ID: Method Blank

Prep Type: Total/NA

ľ	MDL	Unit		DF	Prepared	Analyzed	Dil Fac	6
	0.28	mg/L				09/25/18 22:30	1	U
0	.024	mg/L				09/25/18 22:30	1	
	0.35	mg/L				09/25/18 22:30	1	
			Clie	ent Sa	mple ID	: Lab Control S Prep Type: To		8
s	1.00							9
-	LCS			_	a/ -	%Rec.		
lt	Qua	lifier	Unit	D		Limits		10
0			mg/L		104	90 - 110		
4			mg/L		105	90 - 110		14
4			mg/L		105	90 ₋ 110		
			Clie	ent Sa	mple ID	: MBLPS-18-09	9-MW-5	12
						Prep Type: To	otal/NA	13
S	MS					%Rec.		
	-							

Client Sample ID: MBLPS-18-09-MW-5

Client Sample ID: MBLPS-18-09-MW-5

Client Sample ID: Method Blank

Matrix: Water Analysis Batch: 347183

Lab Sample ID: MB 240-347183/3

Analyte

Chloride

Fluoride	0	.024	U		0.050	0	.024 n	ng/L				09/25/18 22:30	1
Sulfate		0.35	U		1.0		0.35 n	ng/L				09/25/18 22:30	1
Lab Sample ID: LCS 240-3	47183/4								Clier	nt Sar	nple ID	: Lab Control Sa	mple
Matrix: Water												Prep Type: Tot	
Analysis Batch: 347183													
				Spike		LCS	LCS					%Rec.	
Analyte				Added		Result	Qualit	ier	Unit	D	%Rec	Limits	
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: 240-10169	8.4 MS								Clie	nt Sai	mnle ID	: MBLPS-18-09-	MW-5
Matrix: Water									oner			Prep Type: Tot	
Analysis Batch: 347183													
	Sample	Sam	ple	Spike		MS	MS					%Rec.	
Analyte	Result	Qual	ifier	Added		Result	Qualit	ier	Unit	D	%Rec	Limits	
Analyte													
Fluoride	0.031	J		2.50		2.75			mg/L		109	80 - 120	

Lab Sample ID: 240-101698-4 MS **Matrix: Water**

Analysis Batch: 347183										
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	220		250	452		mg/L		94	80 - 120	

Lab Sample ID: 240-101698-4 MSD Matrix: Water

Analysis Batch: 347183											
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
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	0	15

Lab Sample ID: 240-101698-4 MSD Matrix: Water Analysia Datahy 247492

Analysis Balch: 34/103												
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	220		250	450		mg/L		94	80 - 120	0	15	

Lab Sample ID: MB 240-347361/3 **Matrix: Water**

Analysis Batch: 347361									
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.28	U	1.0	0.28	mg/L			09/26/18 15:45	1

Lab Sample ID: MB 240-347361/3

Lab Sample ID: LCS 240-347361/4

Matrix: Water

Matrix: Water

Analyte

Fluoride

Sulfate

Analysis Batch: 347361

Client Sample ID: Method Blank

Analyzed

Prep Type: Total/NA

5

9

Dil Fac 09/26/18 15:45 1 09/26/18 15:45 1

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

Analysis Batch: 347361								
	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	50.0	52.0		mg/L		104	90 - 110	
Fluoride	2.50	2.65		mg/L		106	90 ₋ 110	
Sulfate	50.0	52.4		mg/L		105	90 ₋ 110	

RL

1.0

0.050

MDL Unit

0.024 mg/L

0.35 mg/L

D

Prepared

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

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

MB MB

0.024 U

0.35 U

Result Qualifier

Lab Sample ID: MB 240-347570/1 Matrix: Water Analysis Batch: 347570									Clie	ent Sam	ple ID: Metho Prep Type: T	
	ME							_	_			
Analyte		t Qualifier		RL			Unit		<u>Р</u>	repared	Analyzed	Dil Fac
Total Dissolved Solids	7.8	3 U		10		7.8	mg/L				09/27/18 13:55	1
								Clier	nt Sai	mple ID:	Lab Control	Sample
Matrix: Water										- C	Prep Type: T	
Analysis Batch: 347570												
			Spike		LCS	LCS	5				%Rec.	
Analyte			Added		Result	Qua	lifier	Unit	D	%Rec	Limits	
Total Dissolved Solids			494		484			mg/L		98	80 - 120	
								Clier	nt Sai	mple ID:	MBLPS-18-0	9-MW-5
Matrix: Water											Prep Type: T	
Analysis Batch: 347570												
San	nple Sa	mple			DU	DU						RPD
Analyte Re	sult Qu	alifier			Result	Qua	lifier	Unit	D		RP	D Limit
Total Dissolved Solids	630				628			mg/L			0.	.2 20

QC Association Summary

Client: Fishbeck Thompson Carr & Huber Inc Project/Site: CCR-MBLP Shiras Steam Plant TestAmerica Job ID: 240-101698-1

10

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	
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	

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 Batch
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	

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

40-101698-1 Matrix: Water 4 5

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:	240-10	1698-
		Matrix	· Wate

Batch Batch Dilution Batch Prepared Method Prep Type Run Number or Analyzed Туре Factor Analyst Lab TAL CAN **Total Recoverable** Prep 3005A 346908 09/24/18 14:00 MBB Total Recoverable 6010C 347083 09/25/18 10:07 WKD TAL CAN Analysis 1 Total/NA Analysis 9040B 1 346711 09/22/18 14:32 MMM TAL CAN Total/NA Analysis 9056A 347183 09/26/18 09:32 JWW TAL CAN 1 Total/NA Analysis SM 2540C 347570 09/27/18 13:55 ACR TAL CAN 1

Client Sample ID: MBLPS-18-09-MW-2 (I)
Date Collected: 09/20/18 10:54
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 10:12	WKD	TAL CAN
Total/NA	Analysis	9040B		1	346711	09/22/18 14:38	MMM	TAL CAN
Total/NA	Analysis	9056A		1	347183	09/26/18 09:53	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-1 (I) Date Collected: 09/20/18 11:51 Date Received: 09/22/18 10:00

-	Batch	Batch		Dilution	Batch	Prepared		
Prep Туре	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 10:17	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 Date Collected: 09/20/18 13:09 Date Received: 09/22/18 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared 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

Lab Sample ID: 240-101698-3

Lab Sample ID: 240-101698-2

Matrix: Water

Matrix: Water

11

Lab Sample ID: 240-101698-4

Matrix: Water

Client Sample ID: MBLPS-18-09-MW-4 (I)

Lab Sample ID: 240-101698-5

Date Collected: 09/20/18 14:13 Date Received: 09/22/

Prep Type

Total/NA

Total/NA

Total/NA

Total/NA

Total Recoverable

Total Recoverable

Matrix: Water

Matrix: Water

09/22/18 1	0:00								
Batch	Batch		Dilution	Batch	Prepared				5
Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab		
Prep	3005A			346908	09/24/18 14:00	MBB	TAL CAN		
Analysis	6010C		1	347083	09/25/18 10:21	WKD	TAL CAN		0
Analysis	9040B		1	346711	09/22/18 14:59	MMM	TAL CAN		
Analysis	9056A		1	347183	09/26/18 13:41	JWW	TAL CAN		- 4
Analysis	9056A		10	347183	09/26/18 14:01	JWW	TAL CAN		8
Analysis	SM 2540C		1	347570	09/27/18 13:55	ACR	TAL CAN		
									9
D: MBI	LPS-18-09-M	W-4 (D)				Lab Sa	mple ID: 2	40-101698-6	

Client Sample ID: MBLPS-18-09-MW-4 (D) Date Collected: 09/20/18 14:13 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 10:26	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

aboratory: TestAme accreditations/certifications he	erica Canton eld by this laboratory are listed. No	ot all accreditations/certific	cations are applicable to this	s 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 *	

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

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	linvoite to service ser	Lab Ouche 246,2,2 2 2 2	Reference C C V V V V	PAGE	STD TAT RUSH TAT DATE DUE:			* proved Dup to prive 4 *	* MARCO 1/MS/040 70 001-5 *									de sehipmentieul of lacing	FORLAB		
	1 - E	Copy to Construction Construction Construction		REQUIRED AMALYSES	Mos Sas 148115112	FRESERVATIVE	MUMBER OF CONTAINERS SUBMITTED							240-101698 Chain of Custod				2 EDEV DATE TIME	150 BY DATE TIME RECEIVED FOR LAR		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
d d	Fishheck, Thompson, Cair & Huber, Inc.			MATRIX TYPE	s (WATER): SMI SOLIC MIR SMI SOLIC SMI SOLIC	(- 19/01109 -	1994		X									P.M.K. 3.20	RECEIVED BY DATE THE RECEIVED B	- field File / Project Documentation.	
	CHAIN OF	III CALI CUSTODY		PROJECT NAME PROJECT NO.	AMPLE SAMPLE ACC PHONE TON	SAMPLE DENTFICATION	DATE THE THE ACTIVE RE-HR. MILL 3 CT)	1054 Mr4 PS-18-0-42-20		(I) - 102 MBLPS - 1809 MWS (I)	WRIPS-IT-09-MW-5(D)							ELINOUISHED BY DATE TIME	1 M	vith data packagu.	1947 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 - 1967 -
	2	6905499 1979	1	<u>z S</u>	e Ne Iq	· .	517			Page	24 0	 	 	<u> </u>	 	 			10/5/2		Ž.

10/5/2018

Canton Facility	t Form/Narrative		Login # : 1016	098
lient F7C+H	Site Name	~	Cooler un	packed by:
ooler Received on <u><i>P</i>-22-16</u>	Opened on <u>9-2</u>	2-18	- POP	
edEx: 1° Grd Exp UPS FAS (Clipper Client Drop Off	TestAmerica C	~. iV	······································
Receipt After-hours: Drop-off Date/Tin)¢	Storage Lo		·····
 FestAmerica Cooler # TA F Packing material used: Bubble Wit COOLANT: Wer Ice Bl Cooler temperature upon receipt IR GUN# IR-8 (CF ±0.9 °C) Obst IR GUN #36. (CF ±0.6 °C) Obset Were tamper/custody seals on the outside of the -Were the seals on the outside of the -Were tamper/custody seals intact. Shippers' packing slip attached to the Understandy papers accompany the s Were the custody papers relinquishe Were the person(s) who collected Did all bottles arrive in good conditiant. Sufficient quantity received to perform the tamper of the termination of the termination of the Were tamper of the termination of the termination. Were correct bottle(s) used for the termination of the termination of the termination of the termination of the termination. Sufficient quantity received to perform the termination of the termination of termination of termination of termination of termin	oam Box Client Cooler ap Foam <u>Plastic Bag</u> ue Ice Dry Ice Wate served Cooler Temp. <u>Z-0</u> tyed Cooler Temp. <u>Y</u> utside of the cooler(s)? If Ye is cooler(s) signed & dated bottle(s) or bottle kits (LL1 and uncompromised? cooler(s)? ample(s)? d & signed in the appropriate of the samples clearly idention (Unbroken)? with the COC? st(s) indicated? rm indicated analyses? eccked at the originating lab correct pH upon receipt?	Box Of None Of r None □ See Multiple ("C Corrected Co "C Corrected Co cs Quantity \ lg/MeHg)? e place? fied on the COC oratory.	her her Cooler Form coler Temp°C Yes No Yes No	Tests that are not checked for pH by Receiving: VOAs Oil and Grease TOC
5. Was a VOA trip blank present in the	cooler(s)? Trip Blank Lot esem?		Yes No	
 Was a VOA trip blank present in the Was a LL Hg or Me Hg trip blank pr 	cooler(s)? Trip Blank Lot esem?			her
 14. Were air bubbles >6 mm in any VO. 15. Was a VOA trip blank present in the 16. Was a LL Hg or Me Hg trip blank pr Contacted PM Date Concerning 	cooler(s)? Trip Blank Lot esent?by	via v	Yes No	і ңег
 Was a VOA trip blank present in the 16. Was a LL Hg or Me Hg trip blank pr Contacted PM Date 	cooler(s)? Trip Blank Lot esem?by	via v	Yes No /erbal Voice Mail Ou Sample	her s processed by:
15. Was a VOA trip blank present in the 16. Was a LL Hg or Me Hg trip blank present Contacted PM	cooler(s)? Trip Blank Lot esent? by by by	via V	Yes No 'erbal Voice Mail Otl Sample	s processed by:
5. Was a VOA trip blank present in the 6. Was a LL Hg or Me Hg trip blank pu Contacted PM Date Concerning 7. CHAIN OF CUSTODY & SAMPI 7. CHAIN OF CUSTODY & SAMPI 8. SAMPLE CONDITION Sample(s)	cooler(s)? Trip Blank Lot esent? by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by _by	via V	Yes No 'erbal Voice Mail Ou Sample	s processed by:
5. Was a VOA trip blank present in the 6. Was a LL Hg or Me Hg trip blank pu Contacted PM Date Concerning 7. CHAIN OF CUSTODY & SAMPI 7. CHAIN OF CUSTODY & SAMPI 8. SAMPLE CONDITION 8. Sample(s) Sample(s)	cooler(s)? Trip Blank Lot esent? by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by _by	via V	Yes No 'erbal Voice Mail Otl Sample C led holding time had e received in a broken c	s processed by: $\Sigma/2$ expired. container.
5. Was a VOA trip blank present in the 6. Was a LL Hg or Me Hg trip blank pr Contacted PM Date Concerning 7. CHAIN OF CUSTODY & SAMPI 7. CHAIN OF CUSTODY & SAMPI 8. SAMPLE CONDITION 8. Sample(s) Sample(s) Sample(s) Sample(s)	cooler(s)? Trip Blank Lot esent? by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by by _by	via V	Yes No 'erbal Voice Mail Ou Sample	s processed by: $\Sigma/2$ expired. container.
15. Was a VOA trip blank present in the 16. Was a LL Hg or Me Hg trip blank present in the Contacted PM Date Concerning 7. CHAIN OF CUSTODY & SAMPI 17. CHAIN OF CUSTODY & SAMPI 18. SAMPLE CONDITION Sample(s) Sample(s) 19. SAMPLE PRESERVATION	cooler(s)? Trip Blank Lot esent? by by by 	r the recommens were were wet with bubble	Yes No 'erbal Voice Mail Otl Sample Sample fed holding time had e received in a broken c >6 mm in diameter. (N	s processed by: 2612 expired. sontainer: Notify:PM).
15. Was a VOA trip blank present in the 16. Was a LL Hg or Me Hg trip blank pr Contacted PM Date Concerning	cooler(s)? Trip Blank Lot esent? by by by 	r the recommens were were wet with bubble	Yes No 'erbal Voice Mail Otl Sample Sample fed holding time had e received in a broken c >6 mm in diameter. (N	s processed by: 2612 expired. sontainer: Notify:PM).

WI-NC-099

. Attrivite

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9/22/2018

Login Container Summary Report

240-101698

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Lononoroturo	roodinger
Temperature	icauius.
 A statistical design of the statistical statis Statistical statistical statis	

Client Sample ID	Lab ID	Container Type	Container Preservative pH Added (mls)	<u>Lot #</u>
MBLPS-18-09-MW-3 (I)	240-101698-A-1	Plastic 250ml - with Nitric Acid	2	5
MBLPS-18-09-MW-2 (1)	240-101698-A-2	Plastic 250ml - with Nitric Acid	<2	3
MBLPS-18-09-MW-1 (I)	240-101698-A-3	Plastic 250ml - with Nitric Acid	<2	6
MBLPS-18-09-MW-5	240-101698-A-4	Plastic 250ml - with Nitric Acid	<2	7
MBLPS-18-09-MW-5	240-101698-B-4	Plastic 250ml - with Nitric Acid		
MBLPS-18-09-MW-5	240-101698-C-4	Plastic 250ml - with Nitric Acid	<2	8
MBLPS-18-09-MW-5 (I)	240-101698-A-5	Plastic 250ml - with Nitric Acid	· · · · · · · · · · · · · · · · · · ·	
MBLPS-18-09-MW-5 (P)	240-101698-A-6	Plastic 250ml - with Nitric Acid	<2	
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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 \geq 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.

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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-5 and 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. <u>https://www.epa.gov/sites/production/files/2016-</u>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

¹- Confidence level for passing initial test or one verification resample at all downgradient wells for a single parameter (nonparametric test only)

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.

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.

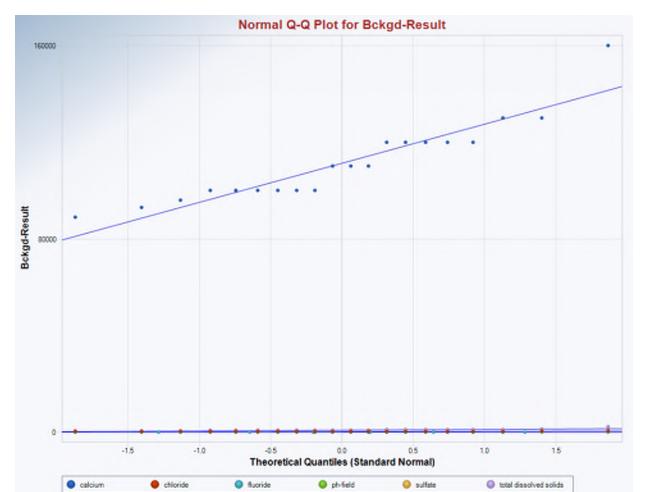
2. Observation Value 590 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.098

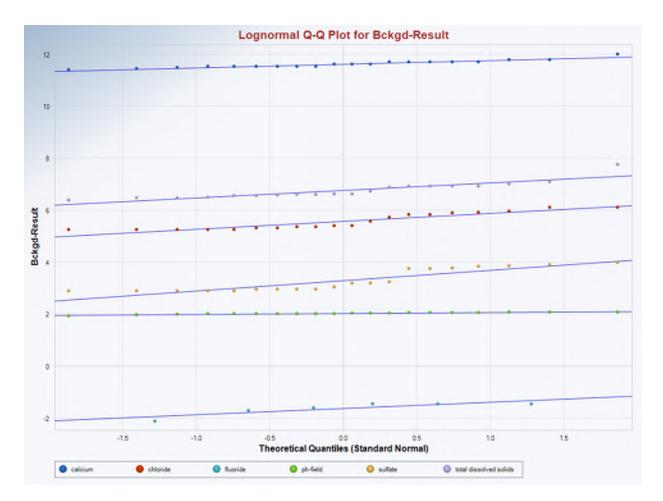
For 10% significance level, 590 is not an outlier.

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
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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

43.37	k star (bias corrected MLE)	50.98	k hat (MLE)
2569	Theta star (bias corrected MLE)	2185	Theta hat (MLE)
1735	nu star (bias corrected)	2039	nu hat (MLE)
16917	MLE Sd (bias corrected)	111400	MLE Mean (bias corrected)

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

99% UTL with	99% Coverage	189657
	99% UPL (t)	159381
	99% USL	165857

90% Percentile (z) 132228 95% Percentile (z) 139199 99% Percentile (z) 153283

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% Coverag	e 160000
Approx, f used to compute achieved CC	0.202	Approximate Actual Confidence Coefficient achieved by UT	L 0.182
		Approximate Sample Size needed to achieve specified Co	C 461
99% Percentile Bootstrap UTL with 99% Coverage	160000	99% BCA Bootstrap UTL with 99% Coverag	e 160000
99% UPL	160000	90% Percentil	e 130000
90% Chebyshev UPL	162679	95% Percentil	e 131500
95% Chebyshev UPL	185906	99% Percentil	e 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

Total Number of Observations	20	Number of Distinct Observations	11
Minimum	190	First Quartile	197.5
Second Largest	450	Median	220
Maximum	450	Third Quartile	345
Mean	273	SD	91.66
Coefficient of Variation	0.336	Skewness	0.765
Mean of logged Data	5.56	SD of logged Data	0.318

Critical Values fo	r Background	Threshold Values (BTVs)	
Tolerance Factor K (For UTL)	3.832	d2max (for USL)	2.884
	Normal G	DF Test	
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 St	atistics Assur	ning 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 G	OF Test	
A-D Test Statistic	1.366	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Leve	el
K-S Test Statistic	0.262	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value 0.194 Data Not Gamma Distributed at 5% Significance Level		el	
Data Not Gamm	a Distributed	at 5% Significance Level	
	Gamma S		
k hat (MLE)	10.21	k star (bias corrected MLE)	8.71
Theta hat (MLE)	26.74	Theta star (bias corrected MLE)	31.34
nu hat (MLE)	408.3	nu star (bias corrected)	348.4
MLE Mean (bias corrected)	273	MLE Sd (bias corrected)	92.5
Background Sta	atistics Assun	ning 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 Lo	ognormal at 5	% Significance Level	
Background Stat	tistics assumi	ng Lognormal Distribution	
99% LITL with 99% Coverage	877 4	90% Percentile (z)	390.3

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

d2max (for USL)

1.671

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL) 4.203

Normal GOF Test

Shapiro Wilk Test Statistic	0.876	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.202	Lilliefors GOF Test
5% Lilliefors Critical Value	0.343	Data appear Normal at 5% Significance Level
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

A-D Test Statistic	0.452	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.22	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level
Detected data anneas C		istributed at 50/ Cignificance Level

Detected data appear Gamma Distributed at 5% Significance Level

	Gamma	Statistics	
k het (MLE)	19.03		7.744
k hat (MLE)		k star (bias corrected MLE)	
Theta hat (MLE)	0.0101	Theta star (bias corrected MLE)	0.0248
nu hat (MLE)	190.3	nu star (bias corrected)	77.44
MLE Mean (bias corrected)	0.192	MLE Sd (bias corrected)	0.069
Background Sta	tistics Ass	uming 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
	Lognorma	I 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 Level	
Lilliefors Test Statistic	0.244	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.343	Data appear Lognormal at 5% Significance Level	
Data appear Approxi	mate Logn	ormal at 5% Significance Level	
Background Stati	stics assur	ning 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 D	istribution	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

Total Number of Observations	20	Number of Distinct Observations	19
Minimum	6.76	First Quartile	7.44
Second Largest	7.92	Median	7.525
Maximum	7.93	Third Quartile	7.743
Mean	7.543	SD	0.275
Coefficient of Variation	0.0365	Skewness	-1.066
Mean of logged Data	2.02	SD of logged Data	0.0372

Critical Values for Background Threshold Values (BTVs)

	2 022		0.004
Tolerance Factor K (For UTL)	3.832	d2max (for USL)	2.884
	Normal GC	DF Test	
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 appea	ar Normal at 5	% Significance Level	
Background St	atistics Assun	ning 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 G	DE 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	e 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	e Level
		buted at 5% Significance Level	
		-	
	Gamma S	atistics	
k hat (MLE)	771.5	k star (bias corrected MLE)	655.8
Theta hat (MLE)	0.00978	Theta star (bias corrected MLE)	0.0115
nu hat (MLE)	30861	nu star (bias corrected)	26233
MLE Mean (bias corrected)	7.543	MLE Sd (bias corrected)	0.295
Pockaround St	otiotico Acoum	ing 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		0.210
99% WH USL	8.372	99% HW USL	8.377
	Lognormal C	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:

$$X_n \pm T_a s_n \sqrt{1 + (1/n)}$$

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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 (BTVs)

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) 45.8	38
99% UPL (t)	63.17	95% Percentile (z) 50.6	54
99% USL	66.86	99% Percentile (z) 59.5	56
	Gamma (GOF Test	
A-D Test Statistic	1.985	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.241	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.194	Data Not Gamma Distributed at 5% Significance Level	
Data Mat Oamm	- Distribute		

Data Not Gamma Distributed at 5% Significance Level

	Gamma	Statistics	
k hat (MLE)	5.754	k star (bias corrected MLE)	4.924
Theta hat (MLE)	5.058	Theta star (bias corrected MLE)	5.91
nu hat (MLE)	230.1	nu star (bias corrected)	197
MLE Mean (bias corrected)	29.1	MLE Sd (bias corrected)	13.11
Background Sta	atistics Ass	uming 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
	Lognorma	I 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 Lo	gnormal at	5% Significance Level	
Background Stat	istics assur	ning 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% USL	90.4	99% Percentile (z)	71.37
Nonparametric E	Distribution	Free Background Statistics	
Data do not fo	llow a Disc	ernible Distribution (0.05)	
Nonparametric Uppe	er 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

Approx, f used to compute achieved CC	0.202	Approximate Actual Confidence Coefficient achieve	ed by UTL	0.182
		Approximate Sample Size needed to achieve spe	ecified 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

Total Number of Observations20Minimum590Second Largest1200Maximum2300Mean900Coefficient of Variation0.415Mean of logged Data6.748

Number of Distinct Observations14First Quartile700Median745Third Quartile1000SD373.3Skewness2.997SD of logged Data0.311

Critical Values fo	r Backgrour	d Threshold Values (BTVs)	
Tolerance Factor K (For UTL)	3.832	d2max (for USL)	2.884
	Normal C	GOF Test	
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	
Beckgmund St	atistics Ass	uming Normal Distribution	
99% UTL with 99% Coverage		90% Percentile (z)	1378
Ŭ	1871	95% Percentile (z)	1514
	1976	99% Percentile (z)	
55 / 60E	1370		1700
	Gamma	GOF Test	
A-D Test Statistic	1.272	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Leve	el
K-S Test Statistic	0.216	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.194	Data Not Gamma Distributed at 5% Significance Leve	el
Data Not Gamm	na Distribute	d 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 Sta	atistics Assu	iming 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% HW USL 2035

Lognormal GOF Test

99% WH USL 2022

Shapiro Wilk Test Statistic	0.832	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.209	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 2810 99% UPL (t) 1916 99% USL 2092
 90% Percentile (z)
 1270

 95% Percentile (z)
 1422

 99% Percentile (z)
 1758

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

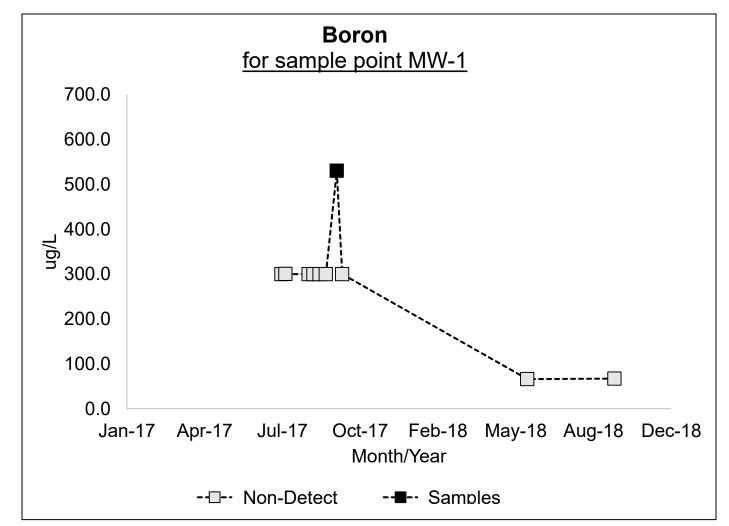
Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	20	99% UTL with 99% Cov	erage	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% Cov	erage	2300
99% UPL	2300	90% Per	entile	1110
90% Chebyshev UPL	2047	95% Per	entile	1255
95% Chebyshev UPL	2567	99% Per	entile	2091
99% USL	2300			

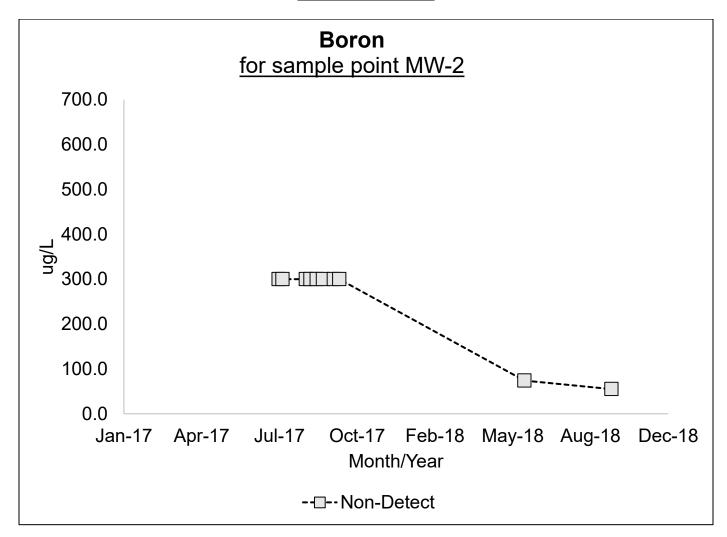
Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

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.

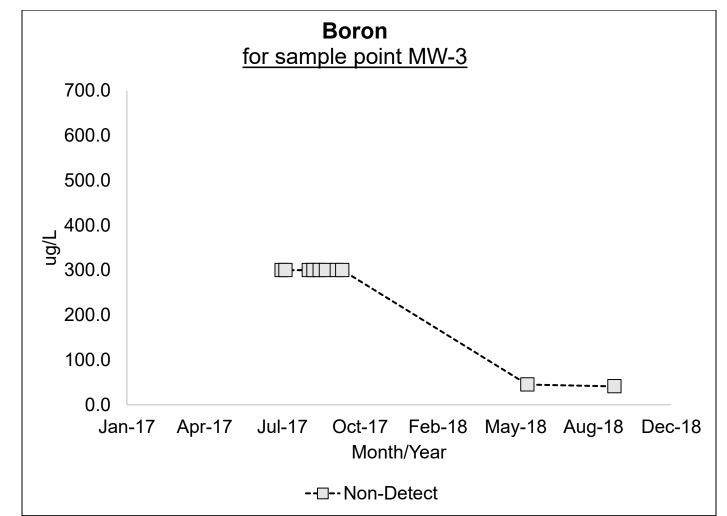
Attachment B



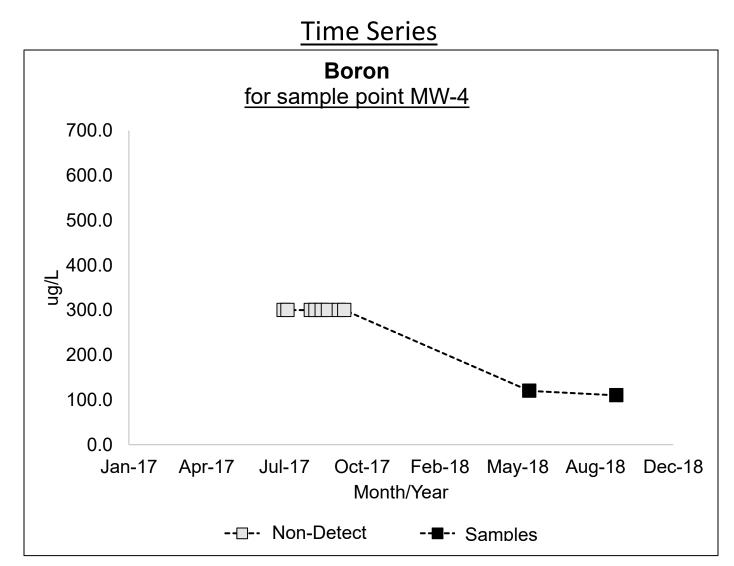
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



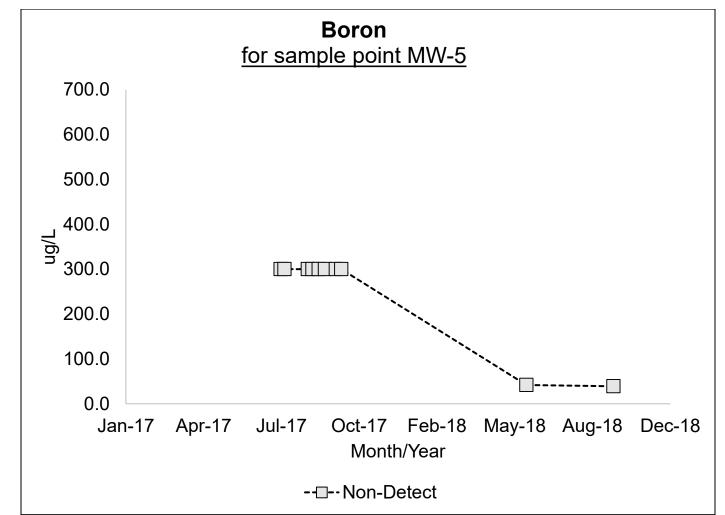
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



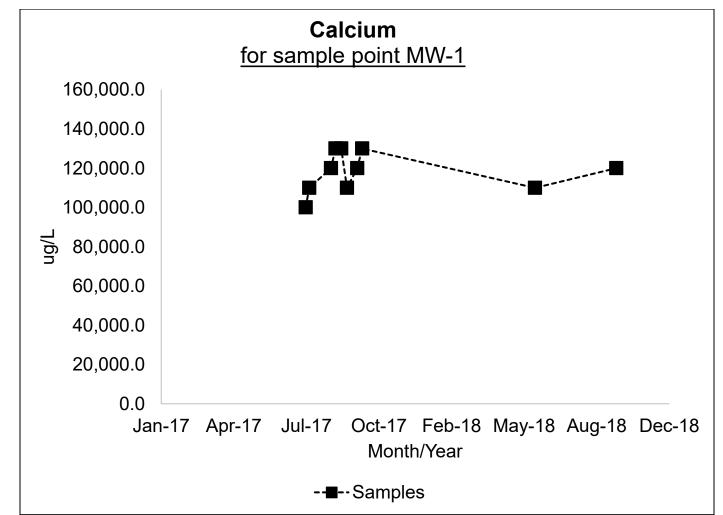
* Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



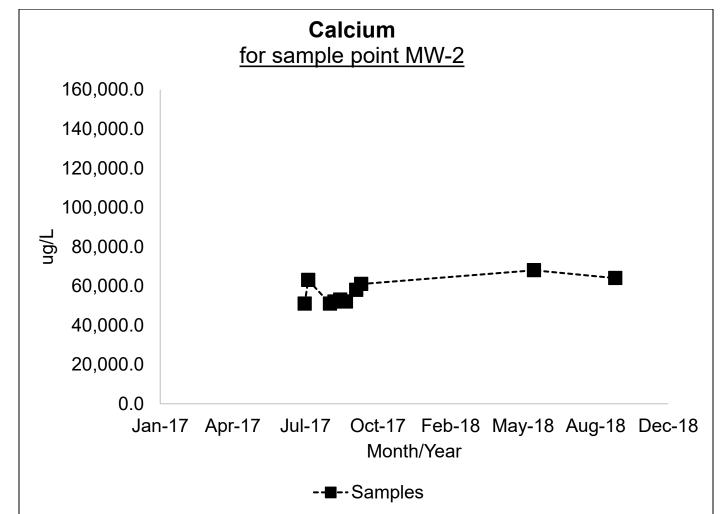
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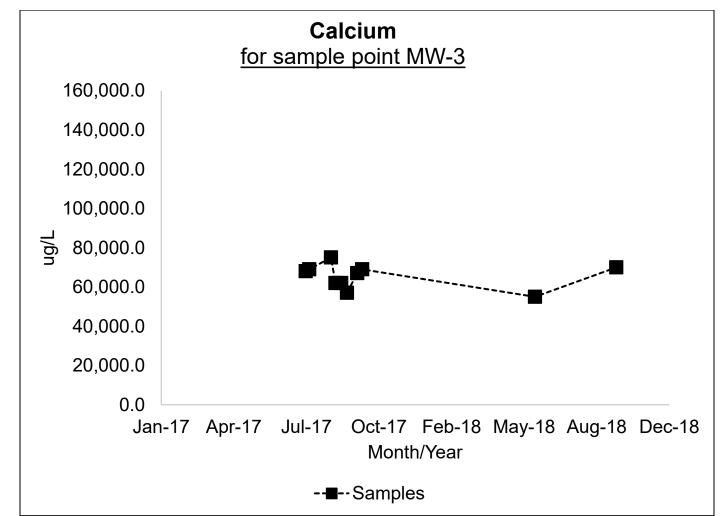
* Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



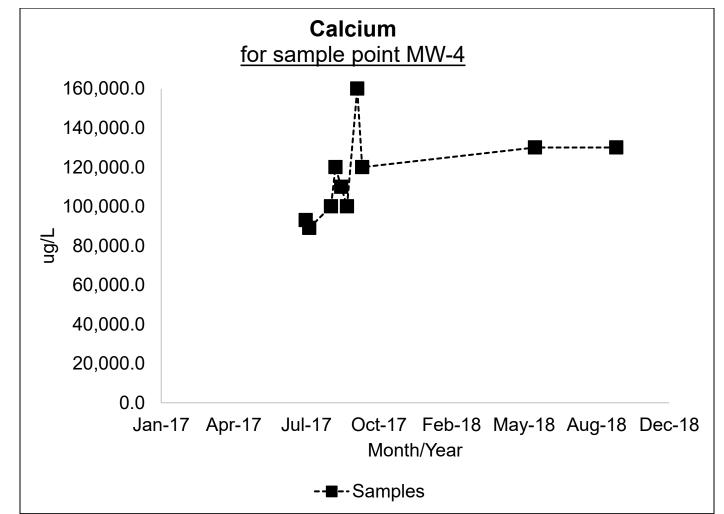
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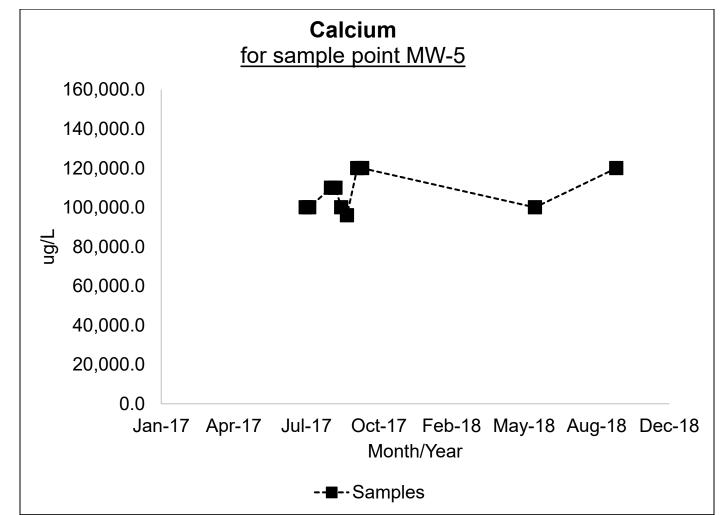
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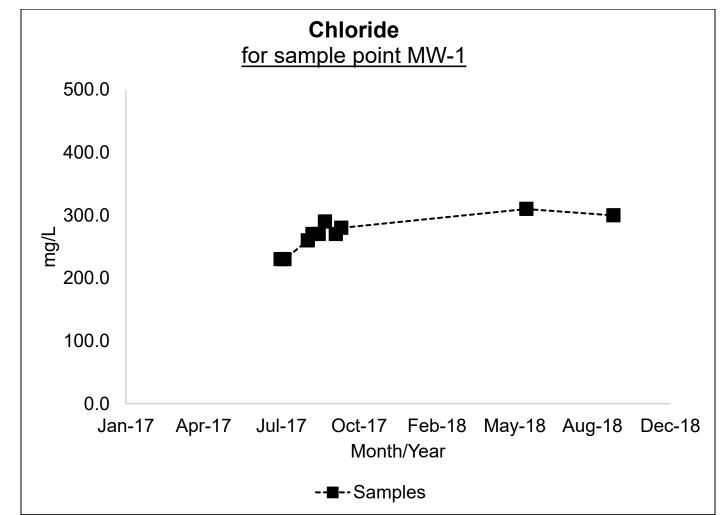
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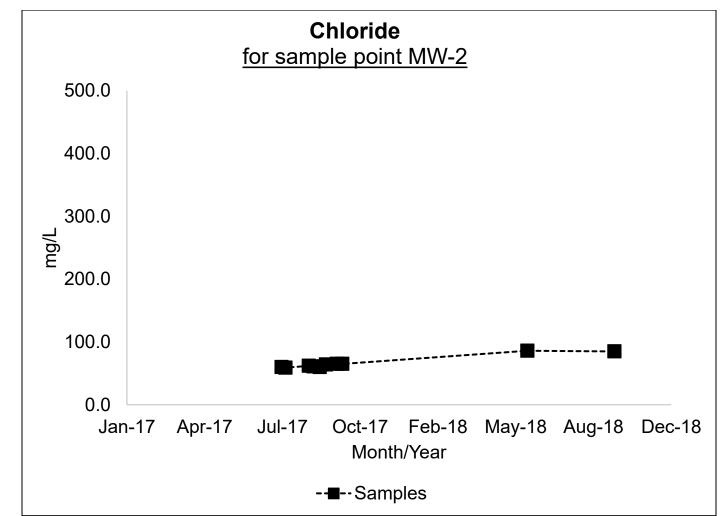
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



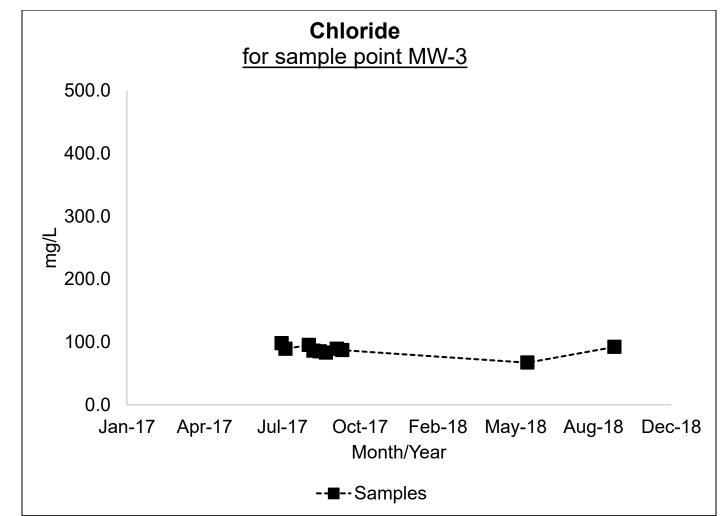
* Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



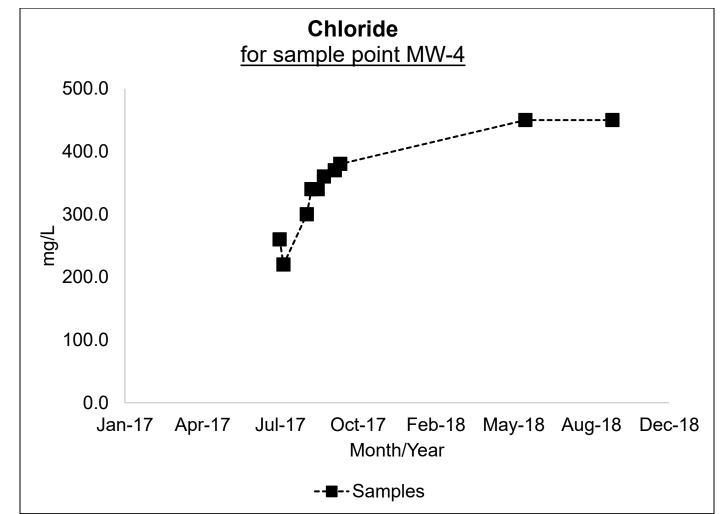
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



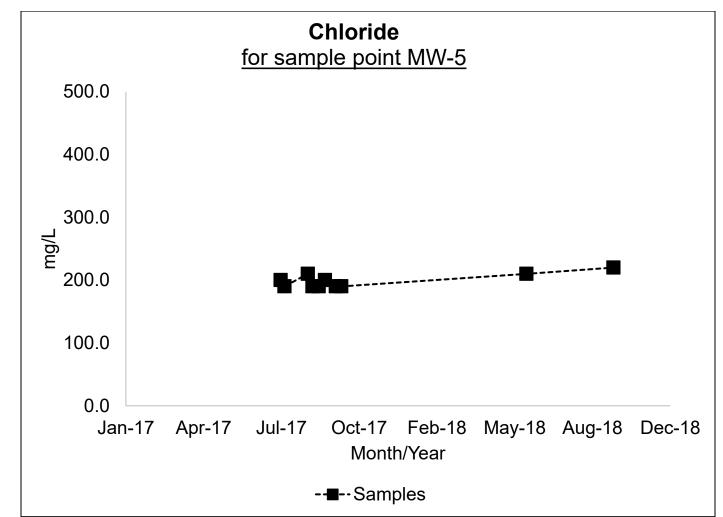
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



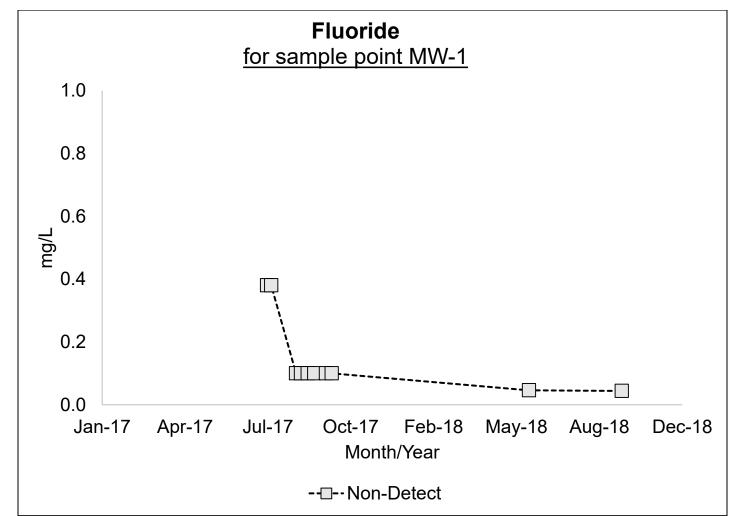
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



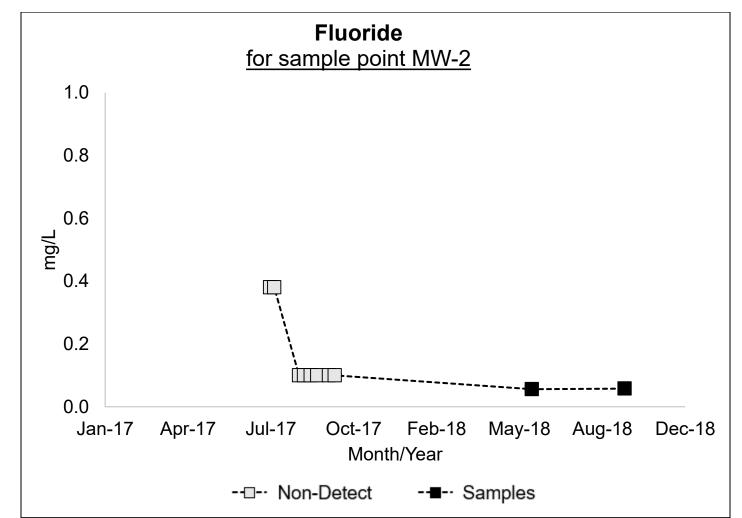
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



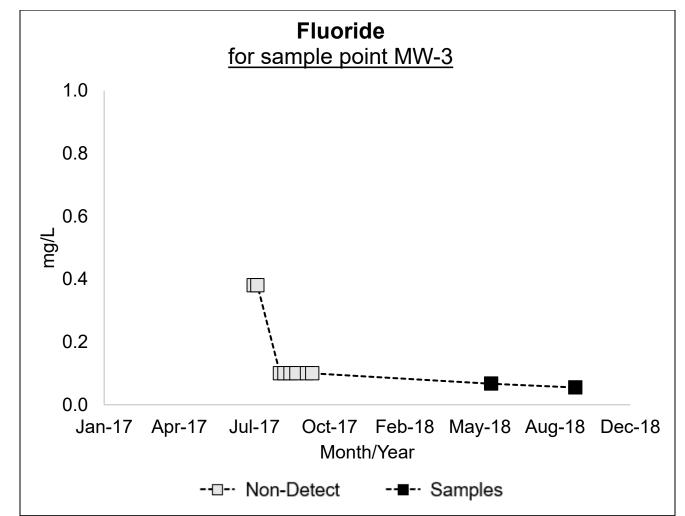
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



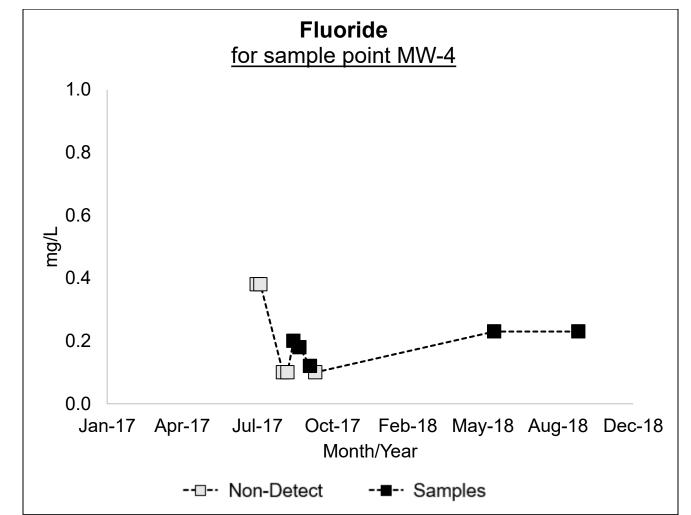
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



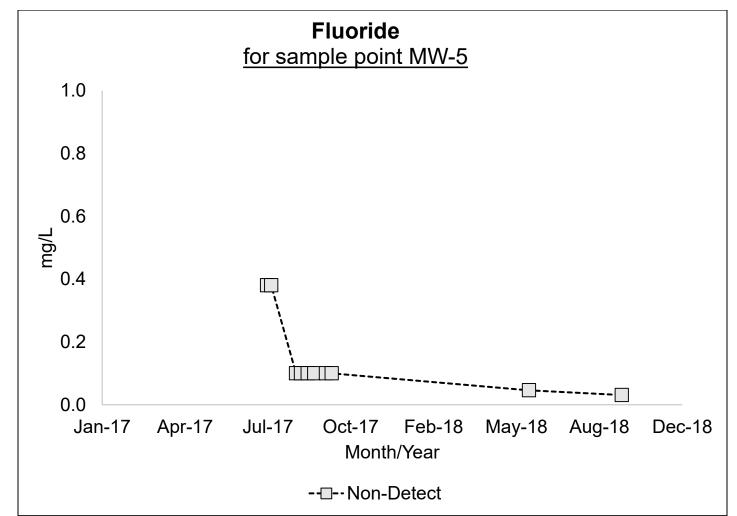
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



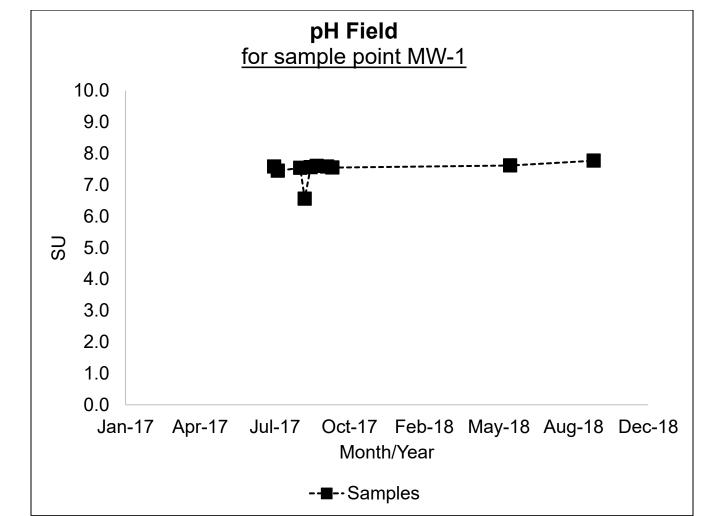
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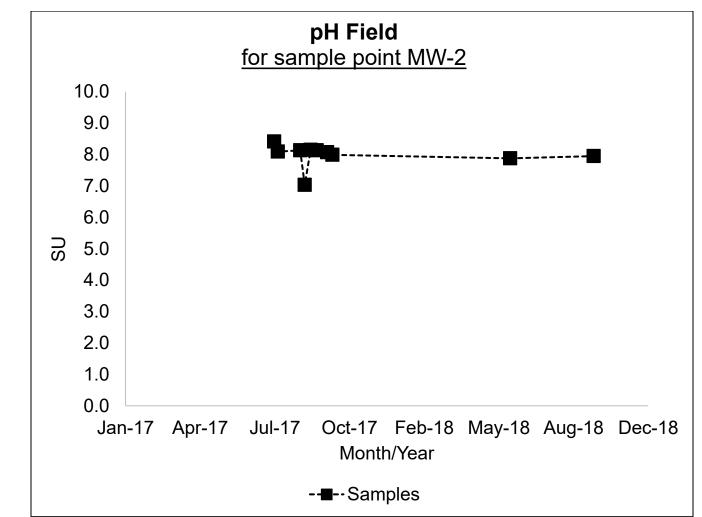
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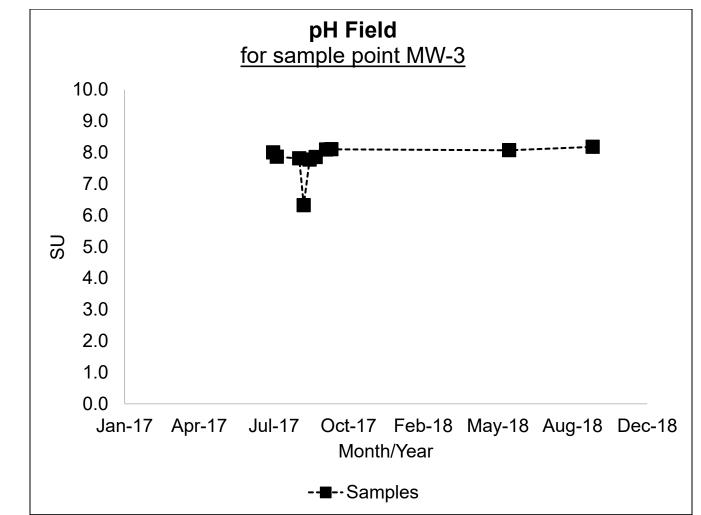
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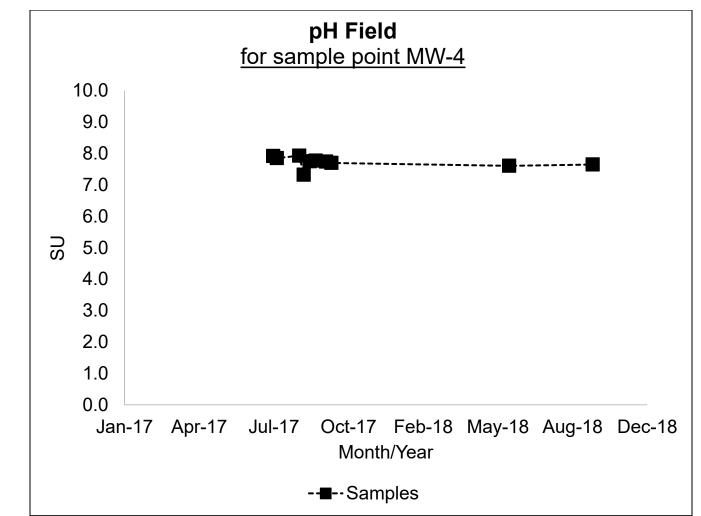
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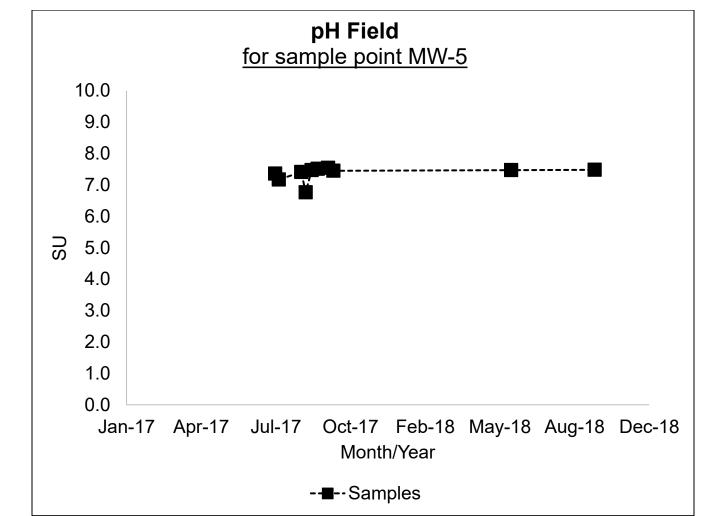
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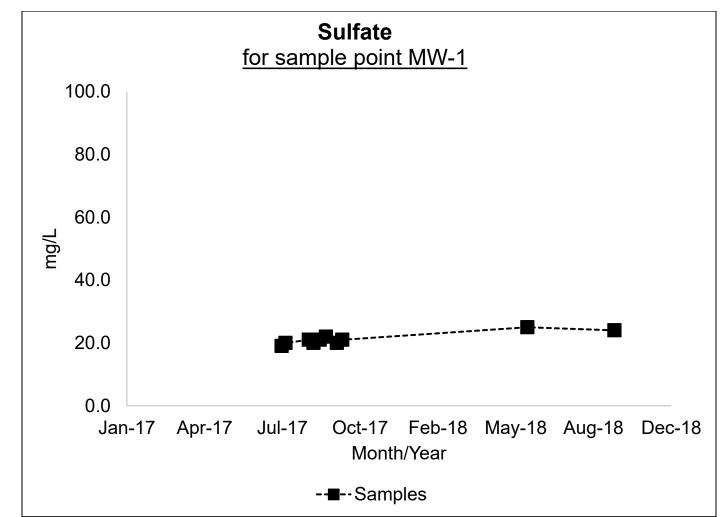
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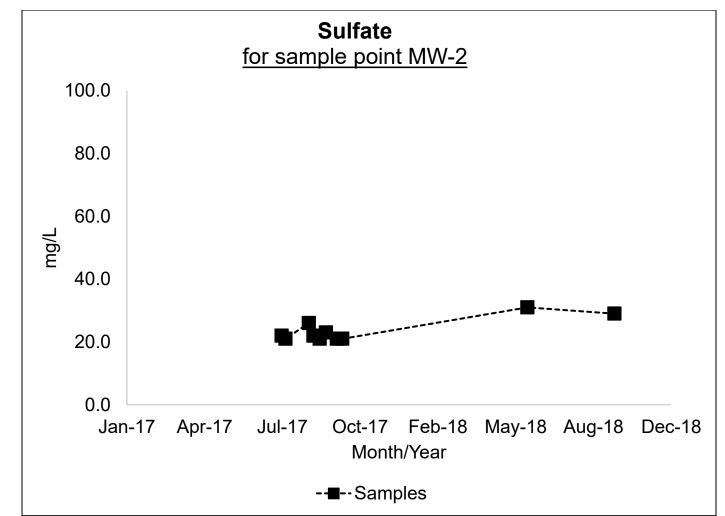
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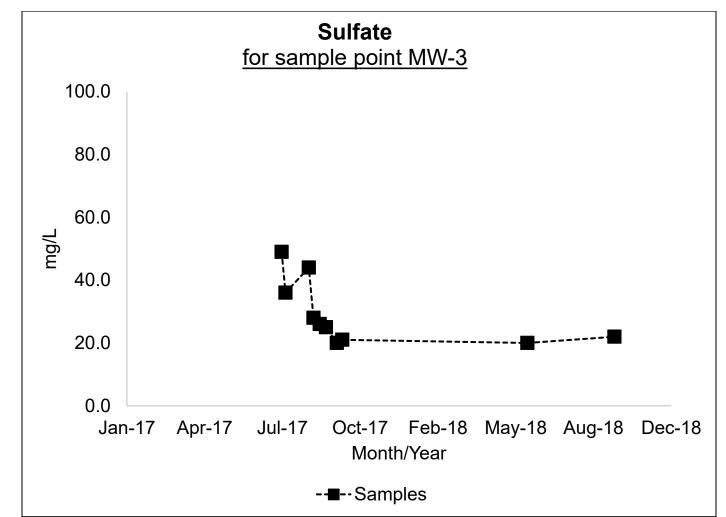
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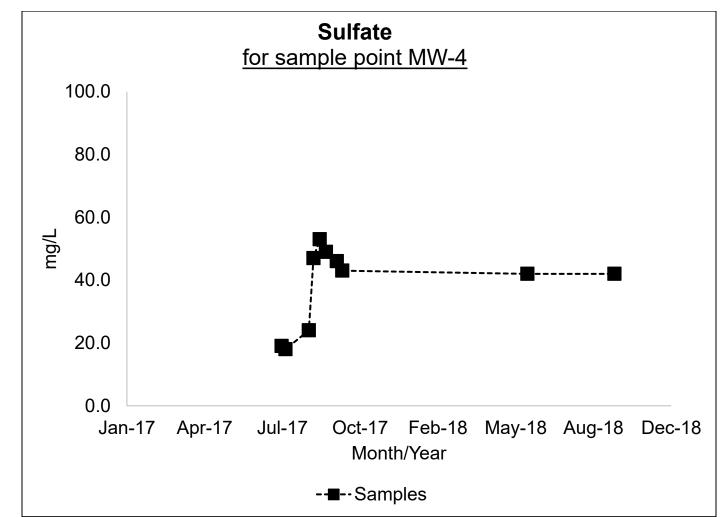
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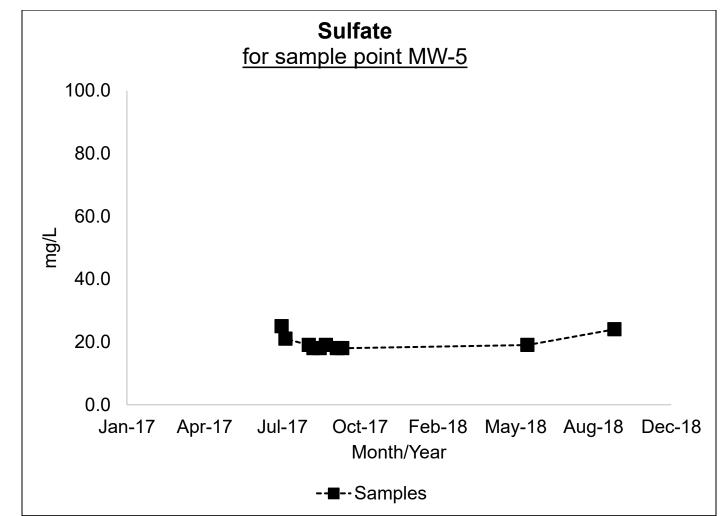
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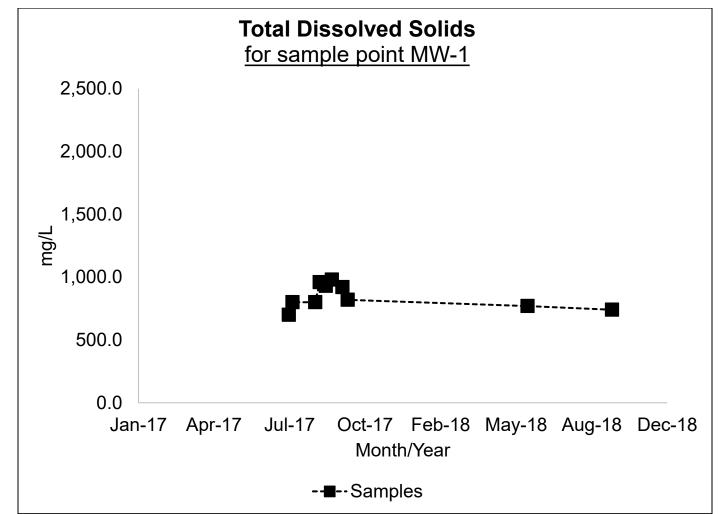
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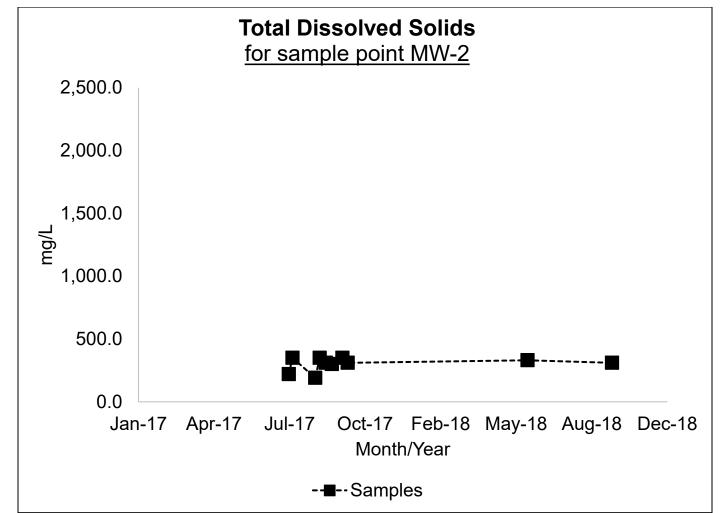
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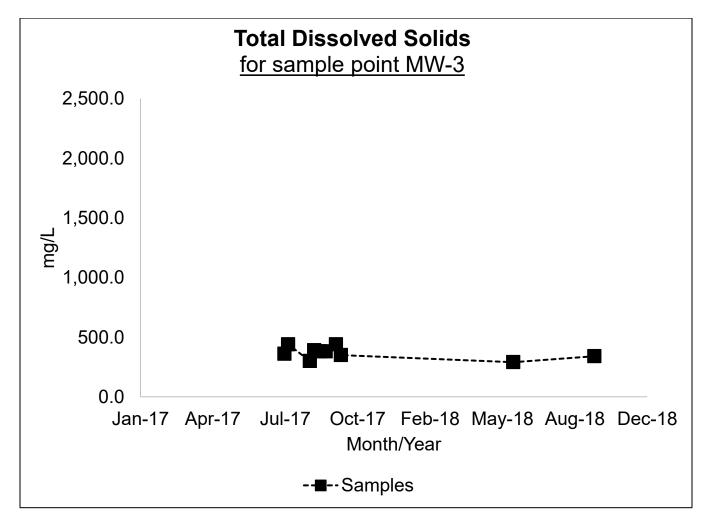
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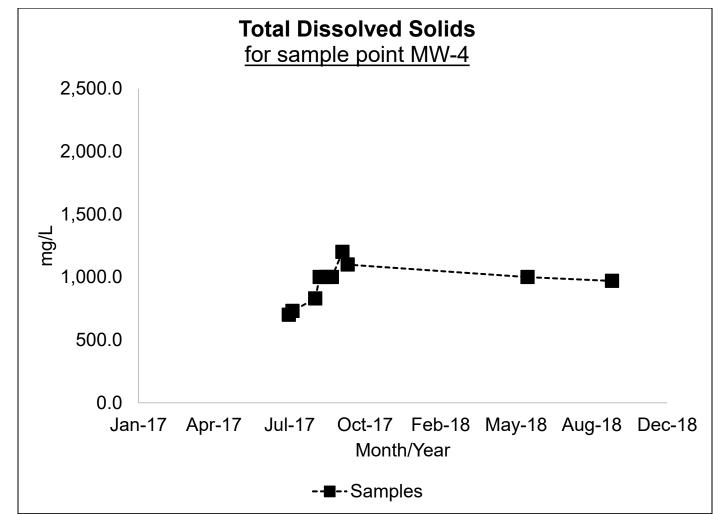
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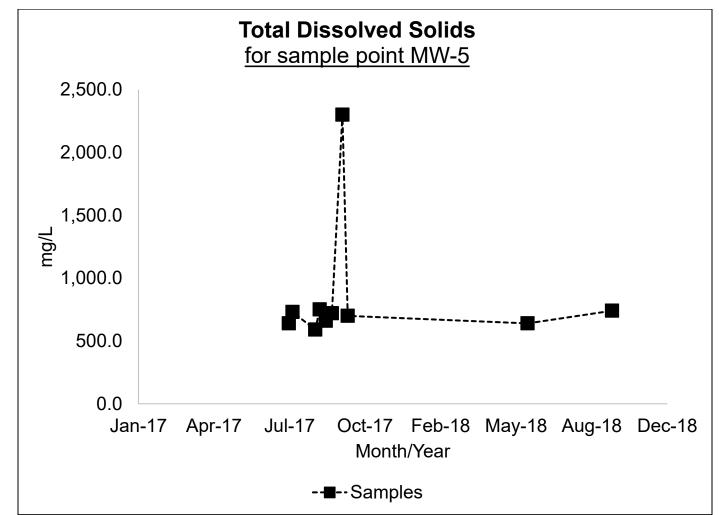
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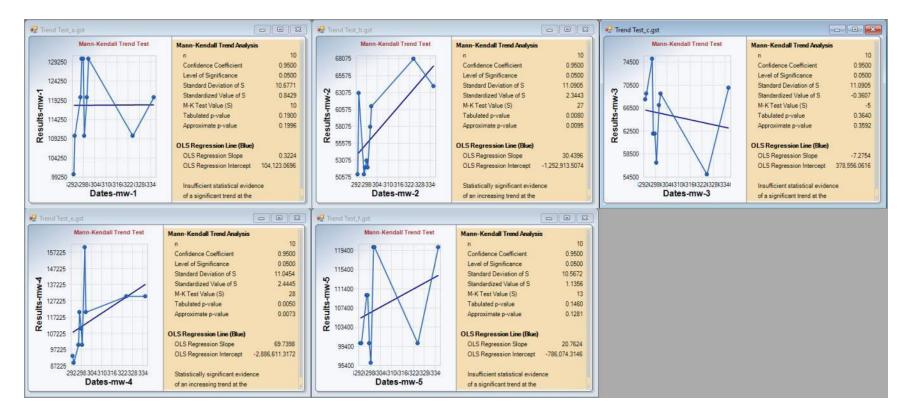


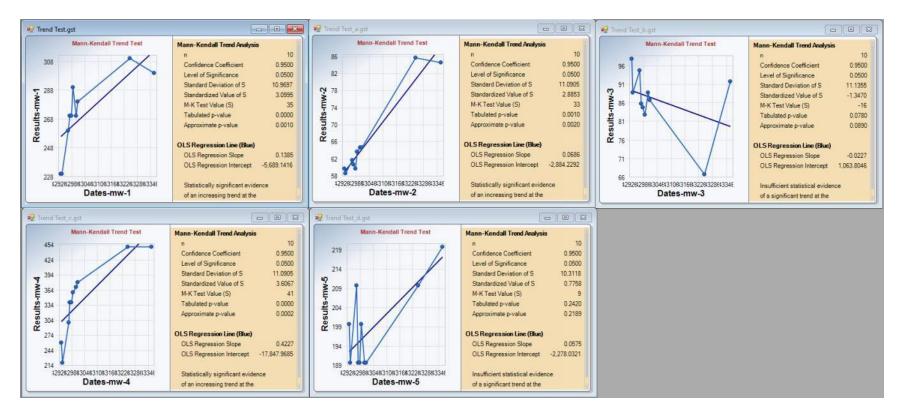
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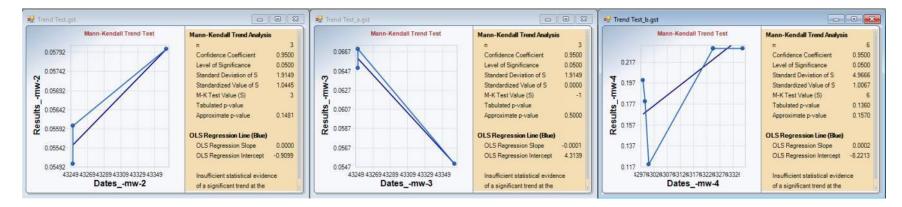




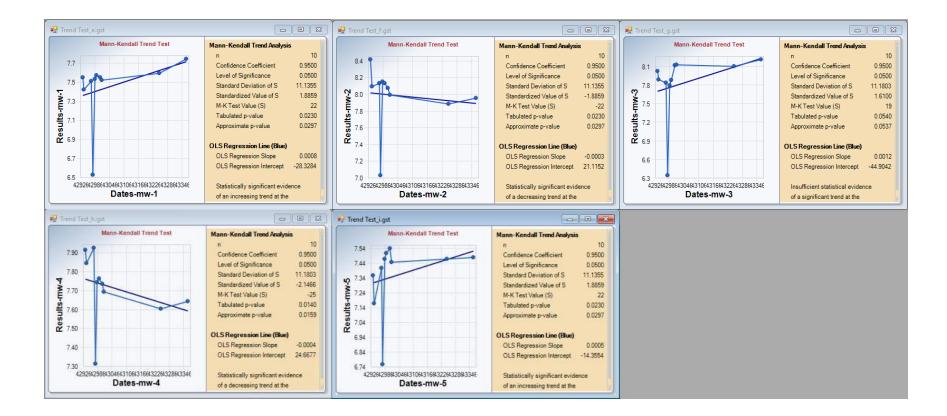


Chloride

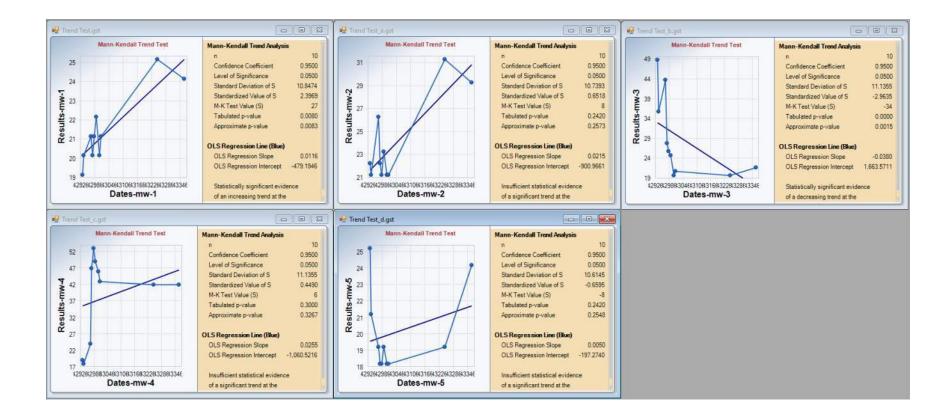


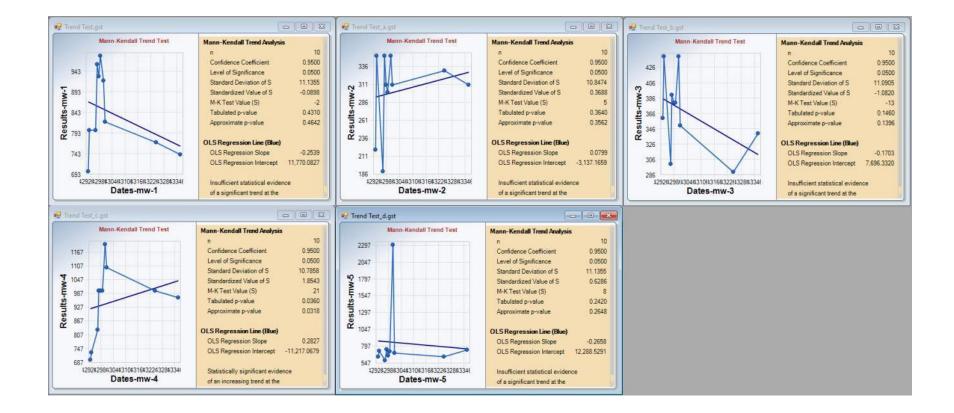






Sulfate





Total Dissolved Solids

Mann-Kendall Trend Test Analysis

User Selected Options ProUCL 5.110/29/2018 3:21:17 PM Date/Time of Computation 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)	10
Number of Missing Events	0
Number or Reported Events Used	10
Number Values Reported (n)	10
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

10
0
10
10
89000
160000
115200
113492
115000
21498
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	26.44
Coefficient of Variation	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
Minimum	67
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
Minimum	220
Maximum	450
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

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	220
Mean	199
Geometric Mean	198.7
Median	195
Standard Deviation	11.01
Coefficient of Variation	0.0553

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
Maximum	0.23
Mean	0.198
Geometric Mean	0.194
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

5.110/29/2018 3:42:57 PM
eet.xls

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

11
0.19
11.18
0.894
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 5.1 From File WorkSheet Full Precision OFF Confidence Coefficient 0.95 Level of Significance 0.05

ProUCL 5.110/29/2018 3:48:37 PM WorkSheet.xls

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
Number of Missing Events	0
Number or Reported Events Used	10
Number Values Reported (n)	10
Minimum	20
Maximum	49
Mean	29.1
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
Minimum	18
Maximum	53
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
Maximum	980
Mean	842
Geometric Mean	836.9
Median	810
Standard Deviation	98.07
Coefficient of Variation	0.116

Mann-Kendall Test

M-K Test Value (S)	-2
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	54.93
Coefficient of Variation	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
Minimum	290
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
Minimum	700
Maximum	1200
Mean	953
Geometric Mean	940.8
Median	1000
Standard Deviation	156.6
Coefficient of Variation	0.164

Mann-Kendall Test

21
0.036
10.79
1.854
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

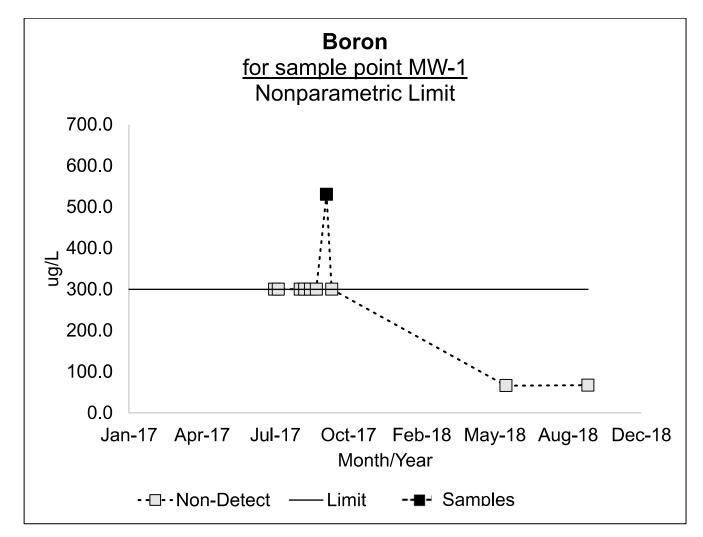
Mann-Kendall Test

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

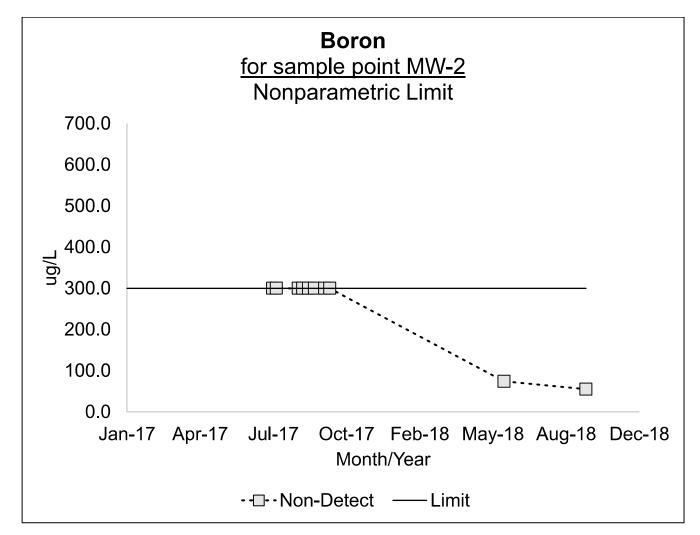
Insufficient evidence to identify a significant

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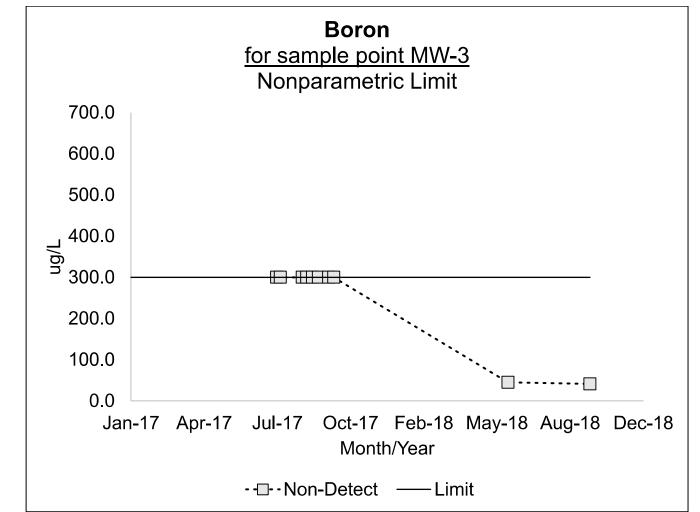
Attachment C



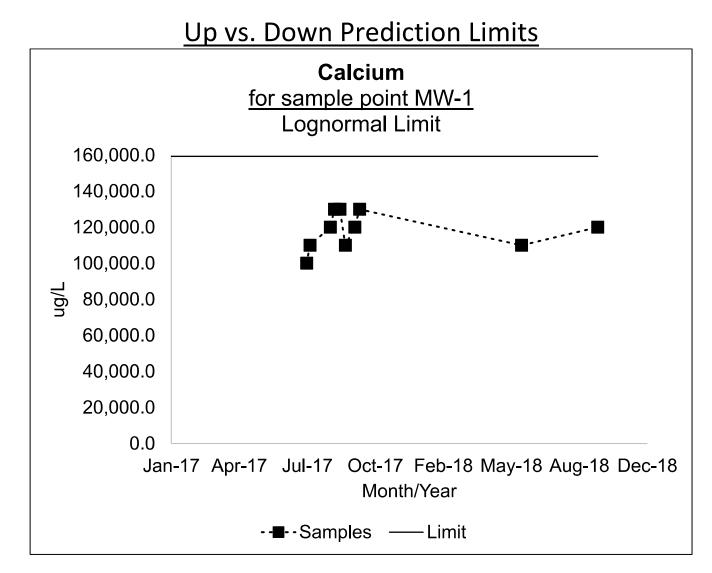
*Measurements obtained during redevelopment of the wells on 5/30/2018 were not used in the statistical analysis because they are not representative of undisturbed steady-state conditions



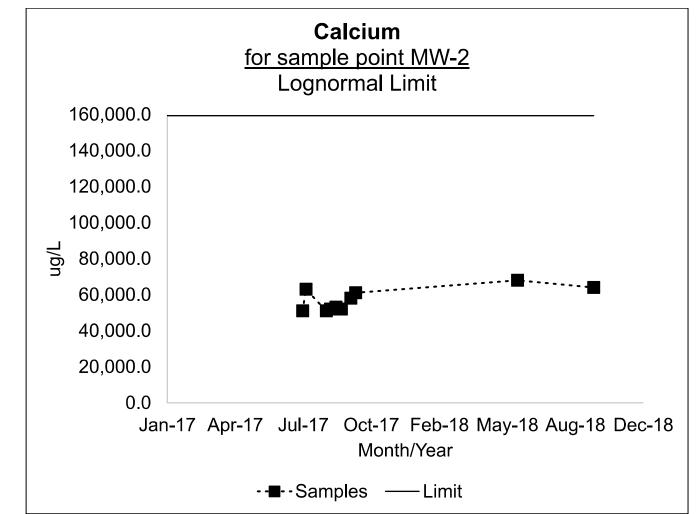
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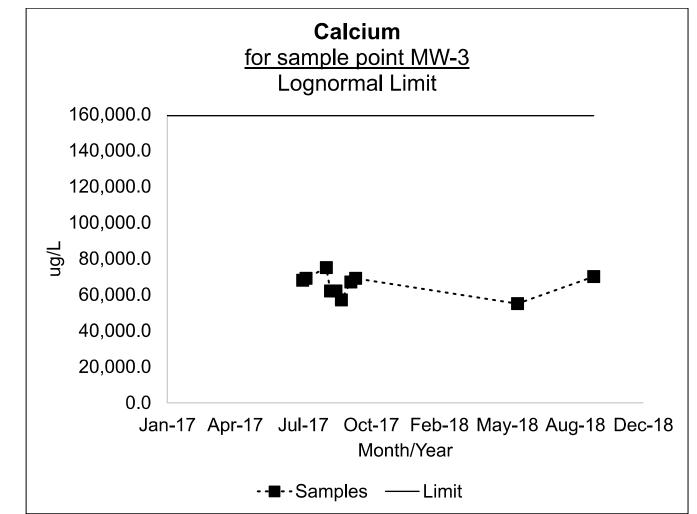
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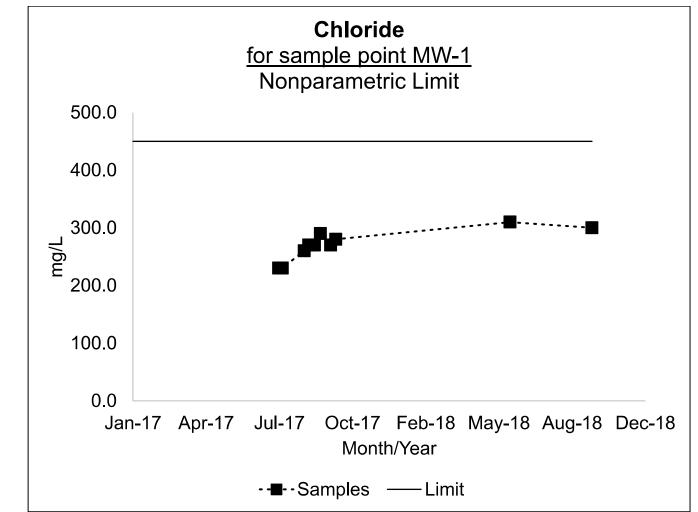
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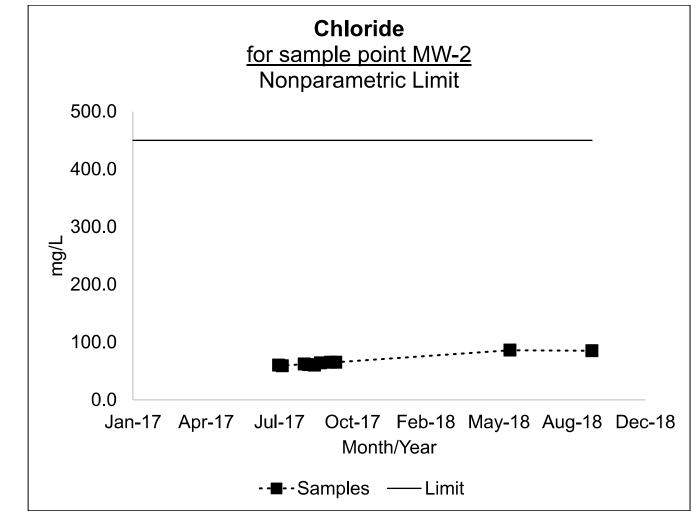
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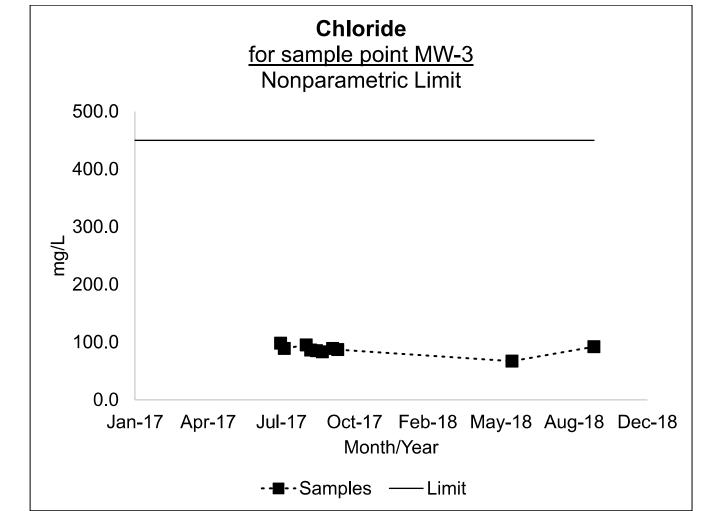
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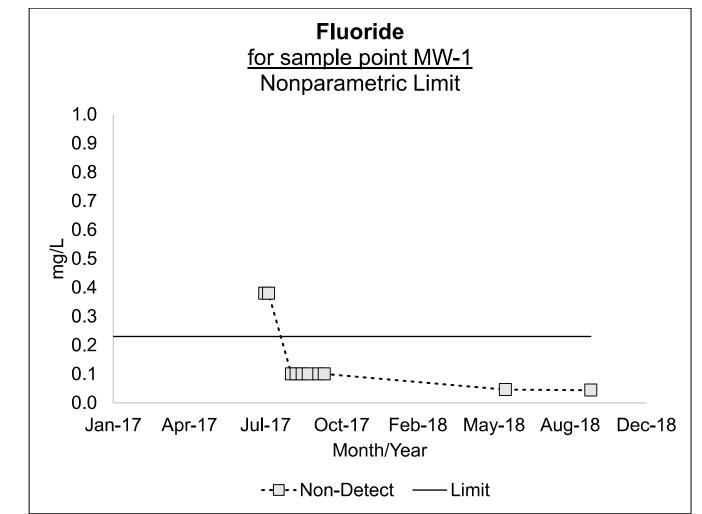
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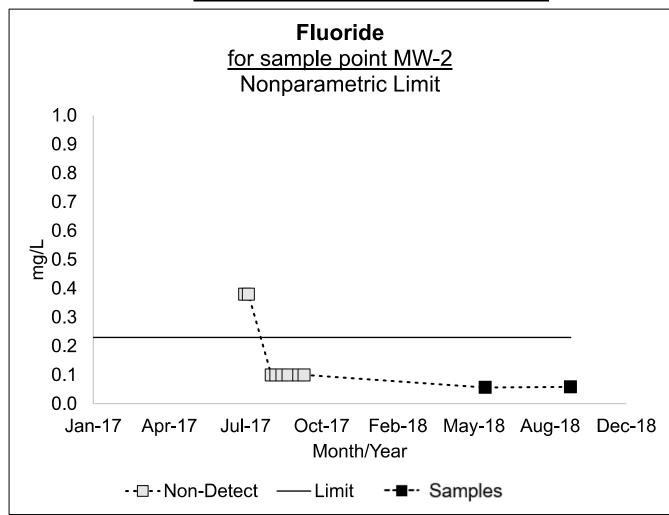
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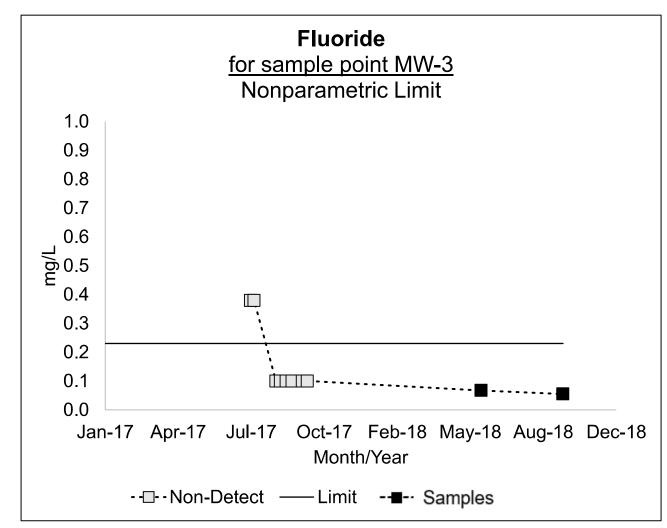
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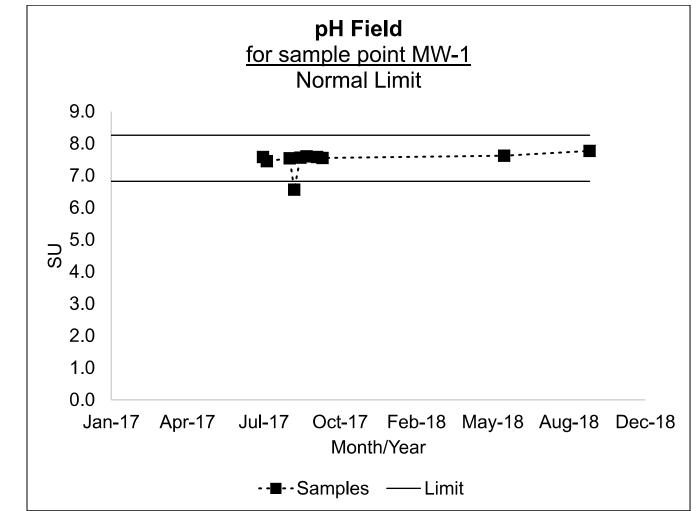
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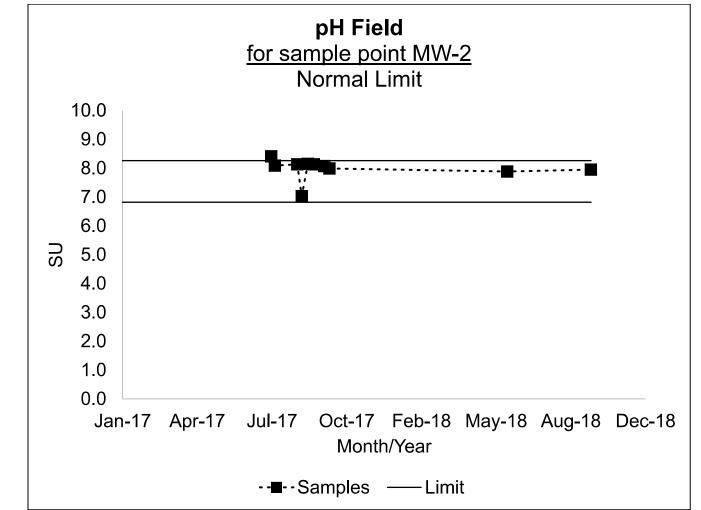
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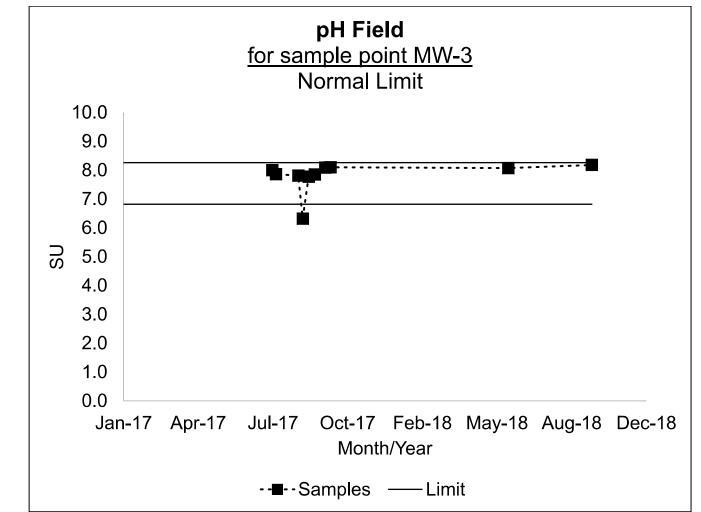
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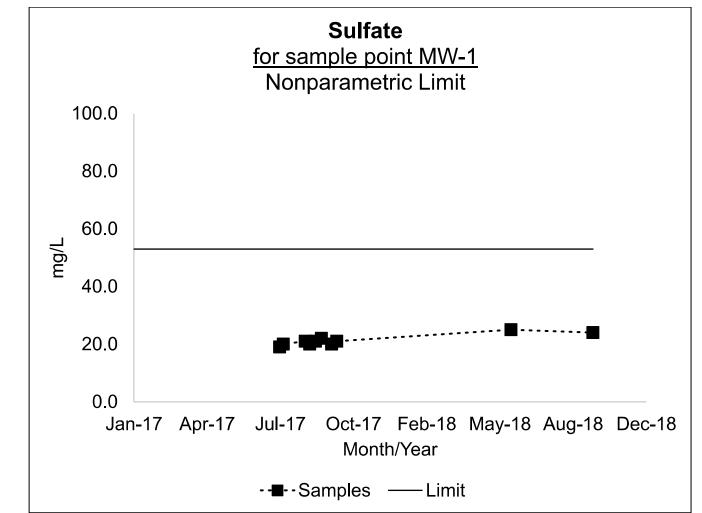
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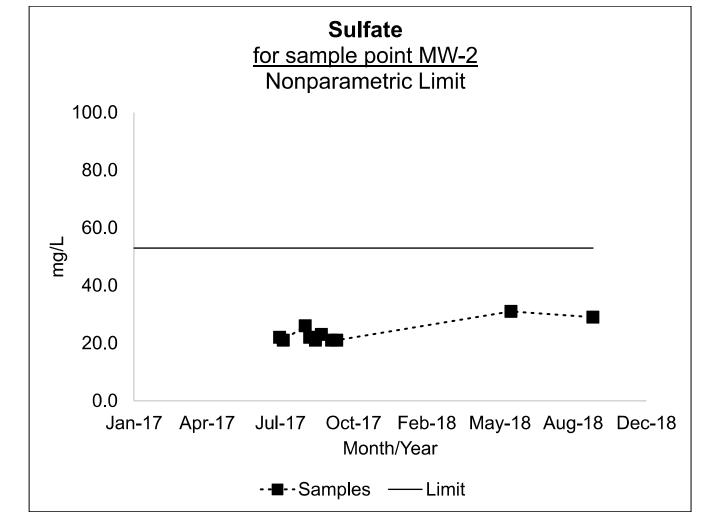
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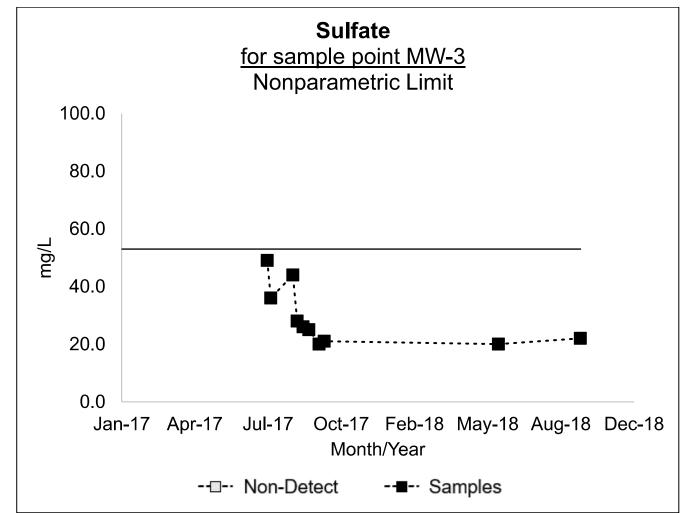
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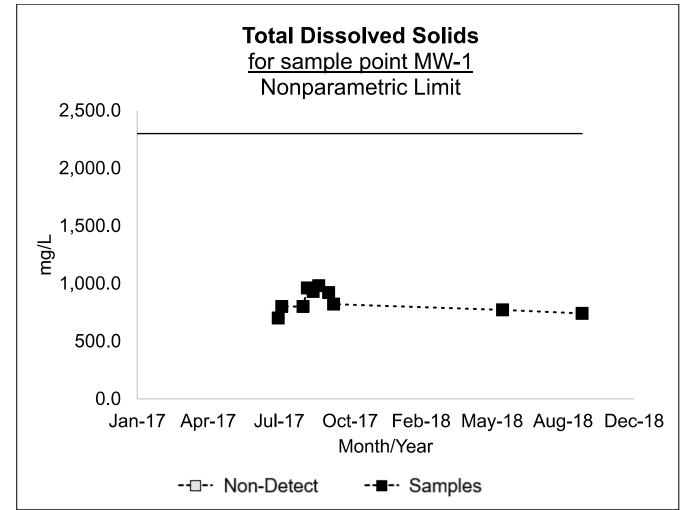
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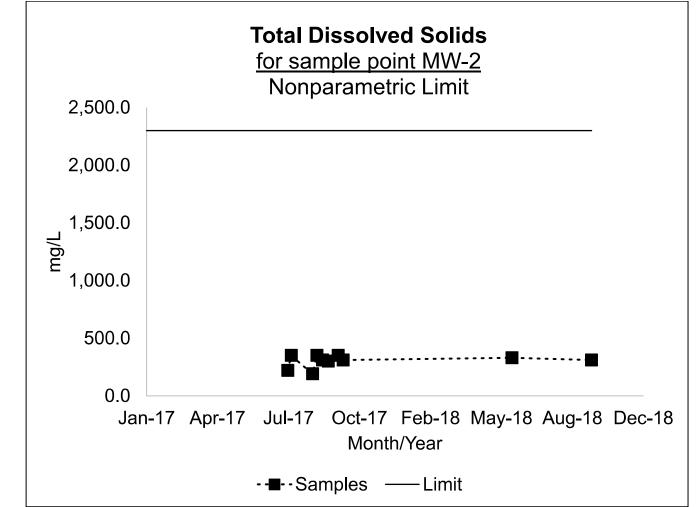
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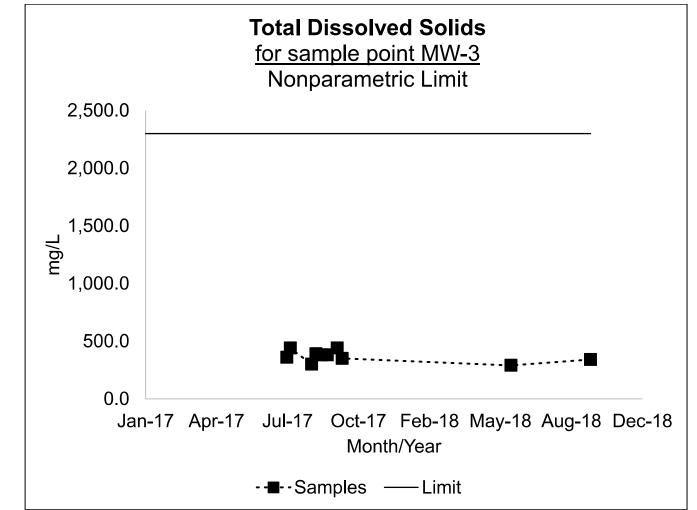
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Attachment D

False positive and false negative rates for current upgradient vs downgradient monitoring program

