

**2019 ANNUAL GROUNDWATER MONITORING
AND CORRECTIVE ACTION REPORT**

**COAL COMBUSTION RESIDUE (CCR) LANDFILL
PERMIT NO. #70-SDP-06-82P**

**MUSCATINE POWER & WATER
MUSCATINE, IOWA**

January 2020

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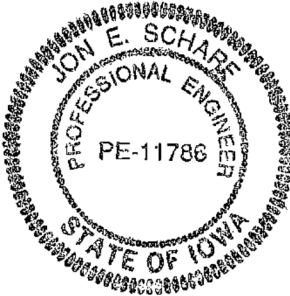

CERTIFICATION

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**CCR LANDFILL
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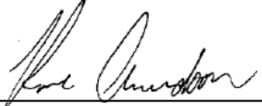
**MUSCATINE POWER & WATER
MUSCATINE, IOWA**

January 2020

	<p>I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.</p>
	<p> Date: 01/30/2019</p> <p>_____ Jon E. Scharf, P.E. License No. 11786 My renewal date is December 31, 2021</p> <p>Pages or sheets covered by this seal: ENTIRE DOCUMENT</p> <p>_____</p>

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Signature: 

Date: 01/30/2020

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I. GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

Under Federal CCR Rule 40 CFR Part 257.90 – *Groundwater Monitoring and Corrective Action*, Muscatine Power and Water (MP&W) as the owner of an existing coal combustion residue (CCR) landfill must prepare annually a Groundwater Monitoring and Corrective Action Report. The report must, for the preceding calendar year, document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. The prepared annual report must be placed in the facility’s operating record as required under Part 257.105(h)(1).

The following sections cover the annual report’s content requirements under Part 257.90(e) for calendar year 2019.

A. LOCATION AND SITE MAPS – §257.90(e)(1)

MP&W maintains a private CCR landfill that provides for the controlled disposal of CCR originating at its power generating facility located at 1700 Dick Drake Way in Muscatine. The approximate 80-acre landfill site is located 7.5 miles west of the power plant in the SW¼ of Section 16, Township 76 North, Range 3 West in Muscatine County (Figure 1, Appendix A).

The landfill has been in continuous operation since 1985. The CCR includes a mixture of gypsum, fly ash, bottom ash, and slag. The permitted disposal area is approximately 34 acres which is being developed in four phases, where the cells are constructed and filled in sequential order from east to west. Currently Phases I and II are open and actively being filled with CCR (Figure 2, Appendix A). Ongoing construction activities at this facility began in 2019 to improve stormwater and leachate management, and construct final landfill cover in areas that have reached final design grades. This construction is expected to be complete in the Spring of 2020.

The site is regulated by the Iowa Department of Natural Resources (IDNR) under [567] Iowa Administrative Code (IAC) Chapter 103 and by state Sanitary Disposal Project Permit #70-SDP-06-82P, issued August 9, 2010 and last revised June 20, 2019. The permit expires August 9, 2020.

A comprehensive list of references for this facility is provided in Section II. Of primary interest herein is: *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, revised May 2, 2017). That document addresses the groundwater monitoring and corrective action requirements of the Federal CCR Rule Part 257.90-98 and is posted as a reference on MP&W’s publicly accessible Internet site at <https://www.mpw.org/utilities/electric/ccr-rule>.

B. IDENTIFICATION OF WELLS – §257.90(e)(2)

Table 1 provides a summary of the existing groundwater monitoring wells for the federal groundwater monitoring program under 257.90 (Appendix B).

Well MW-22 was installed in February 2018 to provide an additional background quality monitoring point. This well is incorporated into the statistical analysis and interpretations herein.

It was determined that well MW-13 was no longer an effective monitoring point and was abandoned in April 2019 following IDNR approval. In March 2019, bentonite was observed in the casing of MW-18A, indicating damage to the point where it could no longer be used and it was abandoned in August 2019. No other monitoring wells under the federal monitoring program were decommissioned or abandoned in 2019.

In addition, there are other facility wells which are not part of the current federal CCR groundwater monitoring system because under §257.95(f-g) there has been no statistical trigger to further characterize the nature of a release. These other wells are part of the State of Iowa CCR rule [567] IAC Chapter 103 and include: MW-23, MW-24, and MW-25 installed in 2018, and MW-26 proposed for 2020. In 2020, MW-23 will be included into the federal monitoring system as an additional background quality monitoring point.

C. SUMMARY OF SAMPLE COLLECTION AND ANALYSIS – §257.90(e)(3)

Sample Collection and Results

Under 40 CFR Part 257.93(a) the Groundwater Monitoring Program (GMP) includes the following groundwater monitoring points: Upgradient wells: MW-8, MW-10, and MW-22 used to establish background quality; and Downgradient wells: MW-4A, MW-5B, MW-6A, MW-13, MW-14A, MW-15A, MW-18A, and MW-21 to monitor for downgradient impacts. A further discussion of MW-13 and MW-18A are included above in Section I.B.

Table 1 provides a summary of the groundwater monitoring points (Appendix B), including:

- (1) Location coordinates (see also Figure 2),
- (2) Construction details,
- (3) Function as a monitoring well or water level measuring point,
- (4) Hydrogeologic unit monitored, and
- (5) Recent water level measurement used for the current evaluation of horizontal groundwater flow pattern and vertical gradients.

The monitoring wells are sampled for the constituents specified in Appendix III and Appendix IV of Part 257, as follows:

- Appendix III: boron, calcium, chloride, fluoride, pH, sulfates, and total dissolved solids.
- Appendix IV: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, selenium, thallium,

and radium 226 & 228 combined.

Table 2 (Appendix B) provides the implementation schedule for the GMP, consisting of:

- (1) Well function as either an upgradient or downgradient monitoring point
- (2) Number of samples collected in each monitoring program,
- (3) Dates of completed sampling events, constituents tested, and reason for sampling including:
 - a. Establish background quality,
 - b. Detection monitoring,
 - c. Resampling events to verify an initial SSI,
 - d. Assessment monitoring, and
 - e. Corrective action monitoring.

Samples are collected and handled as described in *Procedure for Groundwater and Surface Water Sampling* (HR Green). Samples are then analyzed for the Appendix III and/or Appendix IV lists by certified testing laboratory TestAmerica Laboratories, Inc. in Cedar Falls, Iowa.

A summary tabulation of the groundwater sampling data obtained under §257.90 through §257.98 is provided in Appendix C. This tabulation covers the period of June 2016 through December 2019, including 13 events used to establish background quality, the first detection (compliance) event, a resampling event, and the assessment monitoring events in 2019.

The laboratory's analytical reports, the field low-flow sampling forms, and the DNR Sampling Forms are also provided for the sampling events in Appendix C.

Analysis

The analyzed data were then used to calculate statistical limits for each well/constituent pair. Statistical calculations were performed by Groundwater Stats Consulting using industry standard SANITAS™ Statistical Software, an EPA-compliant package (EPA 2009, Unified Guidance). The full procedure is as detailed in the document entitled: *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, revised May 2, 2017).

The statistical report dated November 4, 2019 incorporates all data collected through 2019 and the corresponding statistical analyses, including narratives, background limits, prediction limits, statistically significant increases (SSI), trend tests, confidence intervals, statistically significant Levels (SSL), and groundwater protection standards (GWPS), etc., and is provided herein for reference (Appendix D) and discussed below.

D. DISCUSSION OF FINDINGS – §257.90(e)(4)

The review was being conducted in accordance with the statistical methodologies presented in *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, May 2017; see Tables III-4, III-6, III-8, and III-9 in Appendix D).

The implementation schedule (Table 2) and monitoring program summary (Table 3) track the major milestones of the MP&W groundwater monitoring system and sampling and analysis program.

Appendix III constituents include: boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids.

Appendix IV constituents include: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, combined radium 226+228, fluoride, lead, lithium, mercury, molybdenum, selenium, and thallium.

Year 2017

Establishment of background water quality occurred by testing all wells for Appendix III & IV constituents during the period of June 2016 through August 2017 (8 sampling events, spaced to capture seasonality), following which the detection monitoring program was initiated.

The first detection monitoring event was on October 16, 2017, where Appendix III constituents were tested. An initial 22 well/constituent pairs were determined to exceed their respective statistical limits (Groundwater Stats Consulting, November 15, 2017), which are called initial SSI, or statistically significant increase above background concentration.

A resampling event for the 22 well/constituent pairs was conducted on November 28, 2017 to confirm that each is in fact an SSI and not a false positive. Based on re-sampling and statistical analysis there were 3 false positives (calcium, sulfate, and total dissolved solids at MW-13) and 19 confirmed SSI (Groundwater Stats Consulting, December 19, 2017).

Under §257.95(a), the confirmed SSI directed the facility transition into assessment monitoring beginning in 2018.

Year 2018

Assessment monitoring commenced in 2018 with the analysis of Appendix III & IV constituents. The events were conducted March 6, June 19, and August 28, 2018. These events were intended to satisfy the requirements of both the initial scan and the semi-annual and assessment monitoring requirements.¹ Specifically,

¹ Under §257.95(b), assessment monitoring requires an initial scan of Appendix IV constituents, followed under §257.95(d)(1) by semi-annual testing for Appendix III list plus detected Appendix IV constituents. To streamline the tracking of sampling requirements and results, and to align the federal and state sampling schedules, MP&W elects to test for full Appendix III and Appendix IV

assessment monitoring was initiated at the March 6, 2018 event, where the full Appendix III and Appendix IV constituent lists were tested.

Year 2019

For additional assessment monitoring, Appendix III & IV constituents were tested during 2019. The events were conducted March 18 and August 6, 2019. These events are intended to satisfy the requirements of both the initial scan and the semi-annual and assessment monitoring requirements.²

Assessment monitoring continued during the 2019 events, where the full Appendix III and Appendix IV constituent lists were tested. The Appendix IV constituents that were detected are shown below.

	MW-	4A	5B	6A	8	10	14A	15A	21	22
Arsenic						X				
Barium		X	X	X	X	X	X	X	X	X
Chromium									X	
Cobalt					X	X				
Fluoride		X		X	X	X		X		X
Lithium									X	
Molybdenum			X			X				X
Selenium							X		X	
Combined Radium 226+226		X	X	X						

Table 3 (Appendix B) provides a groundwater monitoring program summary including:

- (1) The current monitoring program status,
- (2) Planned change in monitoring program status for the next sampling event,
- (3) Confirmed statistically significant increases (SSI) over background,
- (4) Statistically significant trends,
- (5) Statistically significant level (SSL) over a groundwater protection standard (GWPS), and
- (6) Upcoming sampling dates and constituents (as best as can be determined at this point in time).

The information shown in Table 3 shows that the concentrations of several constituents remain at statistically significant levels above background (i.e., SSI), but that all confidence interval concentrations are below the GWPS, that is, there were no SSLs determined.

Because there were no SSL's determined during 2019, the facility is required to

constituent lists during each sampling event, except for combined radium which has not been detected over a reporting limit.

² Under §257.95(b), assessment monitoring requires an initial scan of Appendix IV constituents, followed under §257.95(d)(1) by semi-annual testing for Appendix III list plus detected Appendix IV constituents. To streamline the tracking of sampling requirements and results, and to align the federal and state sampling schedules, MP&W elects to test for full Appendix III and Appendix IV constituent lists during each sampling event, except for combined radium which has not been detected over a reporting limit.

continue in assessment monitoring in 2019, as shown in Table 3.

The GWPS values are shown in Table 4 and were established as the appropriate Maximum Contaminant Level (MCL) or Regional Screening Level (RSL)³. Also shown in Table 4 is the background statistical limit.

1. SUMMARY

In brief narrative summary, the current-year review indicates:

1. Monitoring wells remain viable sampling points as they are physically intact, void of excessive sediment, and provide the anticipated recharge during sampling with the exception of MW-13 and MW-18A.
2. Horizontal and vertical groundwater flow gradients appear stable and consistent with historic observations. The primary groundwater flow path is lateral, with flow across the filled landfill area traveling from the southeast toward the northwest (Figure 2).
3. Analytical results indicate the landfill's primary impact on groundwater quality is from Appendix III constituents, including boron, calcium, sulfate, and TDS in the immediate area downgradient of the active landfill (MW-14A and MW-15A) and vicinity of the sediment runoff control pond (MW-21). These are areas where CCR has been historically deposited and/or accumulated. All wells are within 50 feet of a waste fill perimeter or accumulation/deposition area.

Statistical analysis indicates that the concentrations of multiple constituents remain above background limits (see SSI on Table 3), however, during 2019 there were no Appendix IV constituents that exhibited a statistically significant level (SSL) above a groundwater protection standard (GWPS). As such, under Assessment Monitoring Program §257.95(f) this site must continue in assessment monitoring.

E. SUPPLEMENTAL INFORMATION – §257.90(e)(5)

The following information is provided to fill in context for the MP&W CCR facility.

Monitored Hydrogeologic Unit

For a full discussion of the GMP, reference the document *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, Revised May 2, 2017, original May 18, 2016).

Of particular relevance herein is that the GMP wells monitor (1) water levels to determine horizontal and vertical groundwater flow paths, and (2) for downgradient groundwater quality impacts to the uppermost continuous aquifer beneath the site.

³ The RSL values under §257.95(h)(2) were set for cobalt, lithium and molybdenum in Federal Register Volume 83, No. 146 dated July 30, 2018. These four constituents do not have an established MCL.

The aquifer and gradients are discussed below.

Uppermost Continuous Aquifer:

As a whole, a deep un-weathered and un-oxidized clay-rich glacial till functions as a lower confining unit with field hydraulic conductivity values of less than $1 \times 10E-7$ cm/sec. Over most of the site, this underlying low permeability glacial till confining unit is overlain by a sequence of weathered oxidized till, sand, and clayey silt (loess) which collectively constitute the uppermost continuous aquifer beneath the site. This aquifer exhibits hydraulic conductivity values as great as $1.7 \times 10E-4$ cm/sec and which are two to three orders of magnitude greater than the underlying confining unit. Therefore, the assemblage of deposits generally at depths of less than 50 feet is interpreted to function as the uppermost continuous aquifer beneath the landfill. This is also the unit, within which the water table fluctuates, which means the uppermost continuous aquifer is one in the same hydrogeologic unit as the shallow water table aquifer. This uppermost continuous aquifer is the unit monitored by the GMP groundwater monitoring wells.

Groundwater Flow:

The pre-landfill groundwater flow direction in the uppermost aquifer was dominantly horizontal from the southeast toward the northwest with natural convergence along an ephemeral stream that formerly drained the undeveloped site.

Under current conditions the dominant flow direction remains the same except that convergence is now to the runoff control pond located west of the landfill in the area of the original ephemeral stream. The current year water table contours and primary flow path directions are depicted on Figure 2.

The observed vertical flow components are recharge (downward) in the upland area of the southeast corner of the site (MW-8/9) and discharge (upward) in the lowland area along the drainage way in the northeast corner of the site (MW-10/11) (see Table 1).

State Monitoring Requirements

Monitoring at this facility is also conducted under the State of Iowa Department of Natural Resources in accordance with Sanitary Disposal Permit #70-SDP-06-82P and per the approved Hydrologic Monitoring System Plan (HMSP).

The state's monitoring and analysis requirements are not addressed further herein but can be found in the Annual Water Quality Report to Iowa DNR (submitted to DNR annually by January 31).

Regulatory Status

The facility is regulated by the Iowa Department of Natural Resources (IDNR) under [567] Iowa Administrative Code (IAC) Chapter 103 and by state Sanitary Disposal Project Permit, issued August 9, 2010, revised November 29, 2018 and

March 4 and 20, April 29, and June 20, 2019, and with an expiration date of August 9, 2020.

The IDNR also regulates the site under the National Pollution Discharge Elimination System NPDES Permit #7000109. MP&W is authorized to discharge storm water runoff from the sediment runoff pond and two groundwater cut-off drains. Quarterly monitoring of the designated Farm Pond outfall and quarterly reporting are completed by MP&W in accordance with this permit.

II. REFERENCES CITED

- Green Environmental Services (GES), November 21, 1991. Coal Combustion Residue Landfill Development Plans and Supporting Documentation, Muscatine Power and Water; and Supplemental Plan Sheets 16 and 18 dated January 29, 1993.
- Green Environmental Services (GES), October 25, 1991. Hydrogeologic Evaluation of the Muscatine Power and Water Coal Combustion Residue Landfill.
- Green Environmental Services (GES), June, 1990. Hydrogeologic Evaluation Work Plan for the Muscatine Power and Water Coal Combustion Residue Landfill.
- Groundwater Stats Consulting, November 4, 2019. Summary of statistical analysis used to establish baseline water quality, SSI and SSL. Includes the analysis of 46 sample events conducted from June 2016 through August 2019.
- HR Green, January, 2020. Annual Water Quality Report, addressing State of Iowa [567] IAC Chapter 103 rule and landfill operating permit requirements.
- HR Green, December 23, 2019. Annual Inspection Report, Muscatine Power & Water, CCR Landfill.
- HR Green, December 19, 2019. Annual CCR Fugitive Dust Control Report, Muscatine Power & Water, CCR Landfill.
- HR Green, April 22, 2019. Existing Final Cover Verification Report, Muscatine Power & Water, CCR Landfill.
- HR Green, December 5, 2018. CCR Fugitive Dust Prevention and Control Plan, Muscatine Power & Water, CCR Landfill (original October 19, 2015).
- HR Green, June 2017. Procedure for Groundwater and Surface Water Sampling. (Updated November 2018.)
- HR Green, October 17, 2016. Closure and Post-Closure Plan, Muscatine Power & Water, CCR Landfill.
- HR Green, October 17, 2016. Run-On and Run-Off Control System Plan, Muscatine Power & Water, CCR Landfill.
- HR Green, May 2, 2017. Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill (original May 18, 2016).
- HR Green, January 17, 2012. CCR Landfill Cell Development – Phase II Expansion Plans, Muscatine Power and Water.

Iowa Administrative Code [567], Chapter 103 Sanitary Landfills: Coal Combustion Residue.

Iowa Department of Natural Resources (IDNR) Landfill Operating Permit No. 70-SDP-06-82P dated August 9, 2010 and revised November 29, 2018 and March 4 and 20, April 29, and June 20, 2019, Muscatine Power and Water.

Iowa Geological Survey, 2010. The Iowa State-Wide Trace Element Soil Sampling Project: Design and Implementation: Iowa Department of Natural Resources, Iowa Geological and Water Survey, Open File Report 10-1, June 2010.

Muscatine Power and Water. Federal *CCR Rule Compliance Data and Information*, publicly accessible Internet site at <https://www.mpw.org/utilities/electric/ccr-rule>.

Muscatine Power and Water, October 2, 2008, December 17, 2009, and March 30, 2010. Supplemental Information relating to landfill development.

U.S. Environmental Protection Agency (EPA), 2015. Published in Federal Register Volume 80, No. 74 published on April 17, 2015, *Final Rule 40 CFR Part 257 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities*; and *Technical Amendments* published in Federal Register Volume 80, No. 127 on July 2, 2015 (correcting the effective date); and Volume 83, No. 146 on July 30, 2018 (revising groundwater protection standards for four constituents which do not have an established MCL).

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

APPENDIX A

FIGURES

Figure 1: Location Map

Figure 2: Site Map

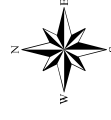
Figure 1

LOCATION MAP

CCR Landfill
Muscatine Power and Water

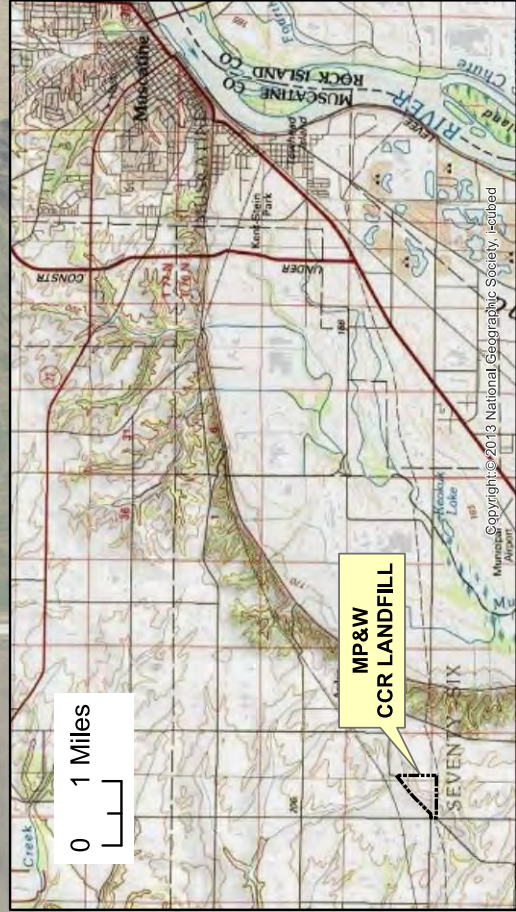
Legend

- Property Line (Approx.)
- Permitted Fill Area



0 500 Feet

Projected Coordinate System:
NAD 1983 StatePlane Iowa_South



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

Figure 2
SITE MAP

CCR Landfill
Muscatine Power and Water

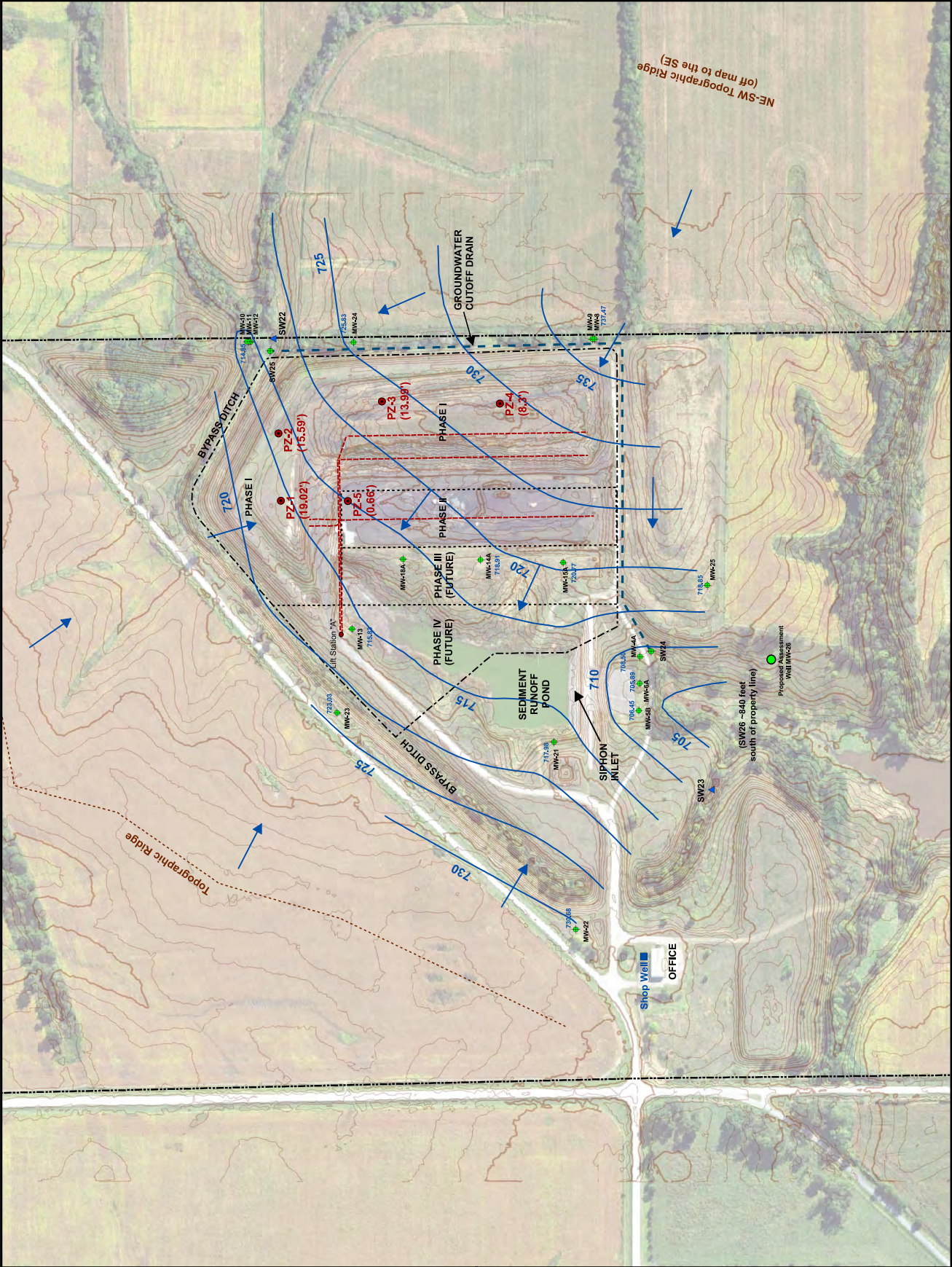
Legend

- ▲ Surface Water Points
 - ◆ Groundwater Points
 - Piezometers (Head, in feet)
 - Shop Well
 - Water Table (3/20/2019)
 - - - Leachate Collection System
 - - - Groundwater Cut-Off Drain
 - Permitted Fill Area
 - Phase Boundaries
 - Property Line (Approx.)
 - Groundwater Flow Direction
 - Proposed Assessment Well
- MW-13, MW-18A, PZ-1, PZ-2, PZ-3, and PZ-4 were abandoned in 2019.



0 320 Feet

Projected Coordinate System:
NAD 1983 StatePlane Iowa_South



APPENDIX B

TABLES

Table 1	Summary of Monitoring Wells and Piezometers
Table 2	Implementation Schedule
Table 3	Groundwater Monitoring Program Summary
Table 4	Groundwater Protection Standards (GWPS)

Table 1

Summary of Monitoring Wells and Piezometers
2019 Groundwater Monitoring and Corrective Action Report
Muscatine Power & Water CCR Landfill
Permit No. #70-SDP-06-82P

Well ID	State Plane ⁽¹⁾		Elevation			WELL CONSTRUCTION ⁽²⁾				Function	Hydrogeologic Unit	WATER LEVELS (Feet, amsl) ⁽³⁾			
	Northing	Easting	Top of Well Casing	Well Depth		Screen Length	Screened Lithology	Low	High			Vertical Gradient 3/2019 ⁽⁴⁾	8/6/2019	3/20/2019	
				Ground											
PZ-1	511,728	2,269,506	751.05	749.00	38.75	1	CCR	Piezometer	CCR	727.78	730.4	N/A	N/A	731.32	
PZ-2	511,736	2,269,740	746.47	744.34	41.65	1	CCR	Piezometer	CCR	719.08	719.77	N/A	N/A	720.41	
PZ-3	511,377	2,269,851	761.14	758.99	40.95	1	CCR	Piezometer	CCR	730.24	731.63	N/A	N/A	734.18	
PZ-4	510,967	2,269,843	768.05	765.90	45.85	1	CCR	Piezometer	CCR	729.82	730.93	N/A	N/A	730.50	
PZ-5	511,495	2,269,505	729.63	727	10.00	1	CCR	Piezometer	CCR	DRY	DRY	N/A	N/A	719.97	
MW-4A	510,481	2,268,964	713.45	711.18	24.55	10	Clay, Silt	Monitoring	Uppermost Aquifer	705.73	710.01	N/A	N/A	708.50	
MW-5B	510,485	2,268,777	709.10	706.73	25.30	10	Silt, Clay	Monitoring	Uppermost Aquifer	704.07	707.48	N/A	N/A	706.45	
MW-6A	510,482	2,268,871	708.92	706.49	25.35	10	Silt, Sand	Monitoring	Uppermost Aquifer	704.47	706.82	N/A	N/A	705.89	
MW-8	510,639	2,270,068	747.36	744.37	42.95	10	Till	Monitoring	Uppermost Aquifer	728.06	737.74	0.526	732.91	737.47	
MW-9	510,646	2,270,068	747.12	744.40	58.74	10	Till	Piezometer	Uppermost Aquifer	721.96	729.75	N/A	N/A	729.16	
MW-10	511,846	2,270,058	718.51	716.32	20.32	10	Silt, Till	Monitoring	Uppermost Aquifer	710.89	715.10	-0.011	713.96	714.85	
MW-11	511,840	2,270,058	718.34	716.00	55.97	10	Till, Sand	Piezometer	Uppermost Aquifer	713.44	718.34	-0.035	N/A	715.24	
MW-12	511,833	2,270,057	717.75	715.40	86.42	5	Till	Piezometer	Lower Confining Unit	713.13	717.75	N/A	N/A	716.39	
MW-13	511,481	2,269,061	717.63	715.44	20.00	10	Silt, Till, Sand	Monitoring	Uppermost Aquifer	709.35	719.13	N/A	NA	715.83	
MW-14A	511,035	2,269,301	729.00	726.19	20.50	10	Silt, Till, Clay	Monitoring	Uppermost Aquifer	712.59	718.91	N/A	718.39	718.91	
MW-15A	510,748	2,269,291	729.99	727.12	20.50	10	Silt, Clay	Monitoring	Uppermost Aquifer	713.83	720.77	N/A	720.14	720.77	
MW-18A	511,304	2,269,303	729.13	726.06	23.10	10	Clay, Silt	Monitoring	Uppermost Aquifer	711.92	714.82	N/A	NA	NA	
MW-21	510,779	2,268,668	725.75	722.81	22.20	10	Silt, Clay	Monitoring	Uppermost Aquifer	713.16	721.01	N/A	715.92	717.98	
MW-22 ⁽⁵⁾	510,704	2,268,017	744.27	741.13	41	10	Clay Till	Monitoring	Uppermost Aquifer	727.43	730.68	N/A	729.12	730.68	
MW-23 ⁽⁵⁾	511,532	2,268,770	726.90	723.73	25	10	Clay Till	Assessment	Uppermost Aquifer	719.37	721.50	N/A	720.95	723.03	
MW-24 ⁽⁵⁾	511,476	2,270,056	735.32	732.10	20	10	Clay Till	Assessment	Uppermost Aquifer	718.47	725.83	N/A	720.28	725.83	
MW-25 ⁽⁵⁾	510,247	2,269,213	739.12	736.14	35	10	Clay Till	Assessment	Uppermost Aquifer	717.60	718.85	N/A	720.58	718.85	

From: MuscF

Well #
LPZ-01
LPZ-02
LPZ-03
LPZ-04
LPZ-05
MW-4A
MW-5B
MW-6A
MW-08
MW-09
MW-10
MW-11
MW-12
MW-13
MW-14A
MW-15A
MW-18A
MW-21

(1) State Plane coordinates from MP&W in email dated 1/20/16 and 6/28/18. MP&W has transited away from Site System coordinates-see 2017 AWRQ Table F-1.

(2) DNR original well construction forms. Top of casings at piezometers re-surveyed May 2018.

(3) Period of record: 2002-2019 (except for the A-series wells which started in 2012). Current review uses March 18, 2019.

(4) Negative value is a discharge gradient; positive value is a recharge gradient. Well clusters are MW-8/MW-9 and MW-10/11/12.

(5) MW-22 installed February 20, 2018. MW-23 installed 5/15/2018. MW-24 installed June 5, 2018. MW-25 installed June 7, 2018. Wells MW-23, MW-24, and MW-25 are currently being utilized as assessment wells under the State of low a CCR rule.

NA not available; N/A not applicable.

VERTICAL C

8-9

10-11

11-12

Table 2

Implementation Schedule
2019 Groundwater Monitoring and Corrective Action Report
Muscatine Power & Water CCR Landfill
Permit No. #70-SDP-06-82P

Monitoring Well	Well Function	Number Of Samples Collected In Each Monitoring Program June 2016 through 2019				Dates Of Completed Sampling Events And Constituents Tested				Corrective Action			
		Background	Detection	Assessment	Corrective Action	Establish Background Levels (Initial 8 Events)		Detection Monitoring	Resampling Events To Verify Initial SSI Over Background		Assessment Monitoring ⁽¹⁾		
						2016: Jun 6, Aug 15, Oct 10, Dec 12	2017: Feb 17, Apr 17, Jun 19, Aug 7,						
MW-4A	Downgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III	11/28/2017	3/6/2018 / 6/19/2018 / 8/29/2018 / 3/18/2019 / 8/6/2019	Appendix III & IV	N/A	
MW-5B	Downgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III	Chloride		Appendix III & IV	N/A	
MW-6A	Downgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III			Appendix III & IV	N/A	
MW-8	Upgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III			Appendix III & IV	N/A	
MW-10	Upgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III			Appendix III & IV	N/A	
MW-13 ⁽⁴⁾	Downgradient	11	1	3	N/A	Appendix III & IV	Appendix III & IV	Appendix III	Boron, calcium, sulfate, TDS		Appendix III & IV	N/A	
MW-14A	Downgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III	Boron, calcium, chloride, sulfate, TDS		Appendix III & IV	N/A	
MW-15A	Downgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III	Boron, calcium, chloride, sulfate, TDS		Appendix III & IV	N/A	
MW-18A ⁽⁴⁾	Downgradient	11	1	3	N/A	Appendix III & IV	Appendix III & IV	Appendix III	Boron, calcium, chloride, sulfate, TDS		Appendix III & IV	N/A	
MW-21	Downgradient	13	1	5	N/A	Appendix III & IV	Appendix III & IV	Appendix III	Boron, pH		Appendix III & IV	N/A	
MW-22 ⁽²⁾	Upgradient	5	1	5	N/A	2018: Mar 6, June 19, Aug 29	2019: Mar 18, Aug 6	N/A	N/A		N/A	N/A	N/A

(1) Assessment monitoring: the full Appendix III & IV constituent lists are tested, except for radium which is not tested because it was not flagged as an SSI. Radium is tested annually in all wells (March 2019).

(2) MW-22 installed in February 2018 as an additional background well.

(3) Additional assessment wells MW-23, MW-24 and MW-25 were installed in May/June 2018 under the State of Iowa CCR Rule. Incorporation of new data into this federal report will occur as federal rule-triggers apply.

(4) MW-13 and MW-18A were closed in 2019 due to damage and site construction following IDNR approval.

Table 3

Groundwater Monitoring Program Summary
2019 Groundwater Monitoring and Corrective Action Report
Muscatine Power & Water CCR Landfill
Permit No. #70-SDP-06-82P

Monitoring Well	Current Monitoring Program Status	Planned Change in Monitoring Program Status For The Next Sampling Event	Confirmed Statistically Significant Increase (SSI) Over Background	Statistically Significant Trends	Statistically Significant Level (SSL) Over GWPS	Upcoming Sampling Dates And Constituents			
						Resample	Semi-Annual Assessment Monitoring: March 2020	Semi-Annual Assessment Monitoring: September 2020	Others TBD, if needed
MW-4A	Assessment	None	None	None	None	N/A	Appendix III & IV	Appendix III & IV	
MW-5B	Assessment	None	Chloride	None	None	N/A	Appendix III & IV	Appendix III & IV	
MW-6A	Assessment	None	None	None	None	N/A	Appendix III & IV	Appendix III & IV	
MW-8	Background	None	None	None	None	N/A	Appendix III & IV	Appendix III & IV	
MW-10	Background	None	None	None	None	N/A	Appendix III & IV	Appendix III & IV	
MW-13	Abandoned ⁽¹⁾	None	N/A	N/A	N/A	N/A	N/A	N/A	
MW-14A	Assessment	None	Boron, calcium, sulfate, TDS	None	None	N/A	Appendix III & IV	Appendix III & IV	
MW-15A	Assessment	None	Boron, TDS	Downward: Boron	None	N/A	Appendix III & IV	Appendix III & IV	
MW-18A	Abandoned ⁽¹⁾	None	N/A	N/A	N/A	N/A	N/A	N/A	
MW-21	Assessment	None	Boron, pH, Sulfate, TDS	Downward: TDS	None	N/A	Appendix III & IV	Appendix III & IV	
MW-22	Background	None	None	None	None	N/A	Appendix III & IV	Appendix III & IV	
MW-23	Background	None	None	None	None	N/A	Appendix III & IV	Appendix III & IV	

Assessment monitoring program triggered upon receipt of confirmed (by resample) SSI on December 19, 2017 and continuing SSI in 2018.

To simplify the sampling program, MP&W elects to sample for Appendix III & IV constituents, except radium, during all events (as opposed to Appendix III + detected Appendix IV constituents).

SSI = Statistically Significant Increase above background

N/A = Not Applicable

(1) MW-13 and MW-18A were closed in 2019 due to damage and site construction following IDNR approval.

Table 4

**Groundwater Protection Standards
 2019 Groundwater Monitoring and Corrective Action Report
 Muscatine Power & Water CCR Landfill
 Permit No. #70-SDP-06-82P**

Constituent	Unit	MCL	RSL	Statistical Background Limit	GWPS
Antimony	(mg/L)	0.006		0.001	0.006
Arsenic	(mg/L)	0.01		0.0078	0.01
Barium	(mg/L)	2		0.22	2
Beryllium	(mg/L)	0.004		0.001	0.004
Cadmium	(mg/L)	0.005		0.0005	0.005
Chromium	(mg/L)	0.1		0.005	0.1
Cobalt	(mg/L)	N/A	0.006	0.0056	0.006
Combined Radium	(pCi/L)	5		0.88	5
Fluoride	(mg/L)	4		0.83	4
Lead	(mg/L)	0.015		0.0005	0.015
Lithium	(mg/L)	N/A	0.04	0.01	0.04
Mercury	(mg/L)	0.002		0.0002	0.002
Molybdenum	(mg/L)	N/A	0.1	0.0057	0.1
Selenium	(mg/L)	0.05		0.005	0.05
Thallium	(mg/L)	0.002		0.001	0.002

All metals as Total recoverable.

MCL: Maximum Contaminant Level

RSL: Regional Screening Level

Statistical Background Limit: Groundwater Stats Consulting, 11/4/2019

GWPS: Ground Water Protection Standard

APPENDIX C

SAMPLING DATA

- March 18 and August 6, 2019 Sampling Events
 - Laboratory analytical Reports
 - Ground water sampling forms
 - Low Flow Sampling Forms
- Summary Tabulations of Analytical Results

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

TestAmerica Job ID: 310-151604-1

Client Project/Site: Muscatine Power & Water CCR

For:

Muscatine Power & Water
1700 Dick Drake Way
PO BOX 899
Muscatine, Iowa 52761

Attn: Sam Bennett



Authorized for release by:
4/3/2019 3:23:32 PM

Shawn Hayes, Senior Project Manager
(319)229-8211
shawn.hayes@testamericainc.com

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Case Narrative

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Job ID: 310-151604-1

Laboratory: TestAmerica Cedar Falls

Narrative

Job Narrative
310-151604-1

Comments

No additional comments.

Receipt

The samples were received on 3/22/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.3° C.

HPLC/IC

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

Metals

Method(s) 6020A: Due to sample matrix effect on the internal standard (ISTD), a dilution was required for the following sample: MW-25 (310-151604-3).

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

General Chemistry

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

Sample Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-151604-1	MW-23	Water	03/19/19 10:50	03/22/19 09:00



Detection Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Client Sample ID: MW-23

Lab Sample ID: 310-151604-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	10.5		5.00		mg/L	5		9056A	Total/NA
Sulfate	26.2		5.00		mg/L	5		9056A	Total/NA
Barium	0.0922		0.00200		mg/L	1		6020A	Total/NA
Calcium	59.7		0.500		mg/L	1		6020A	Total/NA
Cobalt	0.00176		0.000500		mg/L	1		6020A	Total/NA
Lead	0.00204		0.000500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	296		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.5	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Cedar Falls

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Client Sample ID: MW-23
Date Collected: 03/19/19 10:50
Date Received: 03/22/19 09:00

Lab Sample ID: 310-151604-1
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	10.5		5.00		mg/L	-		03/26/19 10:43	5
Fluoride	<0.500		0.500		mg/L	-		03/26/19 10:43	5
Sulfate	26.2		5.00		mg/L	-		03/26/19 10:43	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Arsenic	<0.00200		0.00200		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Barium	0.0922		0.00200		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Beryllium	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Boron	<0.200		0.200		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Cadmium	<0.000500		0.000500		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Calcium	59.7		0.500		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Chromium	<0.00500		0.00500		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Cobalt	0.00176		0.000500		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Lead	0.00204		0.000500		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Lithium	<0.0100		0.0100		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Molybdenum	<0.00200		0.00200		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Selenium	<0.00500		0.00500		mg/L	-	03/25/19 08:00	03/28/19 15:14	1
Thallium	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/28/19 15:14	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L	-	03/25/19 13:04	03/26/19 11:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	296		30.0		mg/L	-		03/22/19 14:03	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.5	HF	0.1		SU	-		03/22/19 15:35	1

Definitions/Glossary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

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

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-233635/3
Matrix: Water
Analysis Batch: 233635

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			03/26/19 10:04	1
Fluoride	<0.100		0.100		mg/L			03/26/19 10:04	1
Sulfate	<1.00		1.00		mg/L			03/26/19 10:04	1

Lab Sample ID: LCS 310-233635/4
Matrix: Water
Analysis Batch: 233635

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7.50	7.132		mg/L		95	90 - 110
Fluoride	1.50	1.534		mg/L		102	90 - 110
Sulfate	7.50	7.558		mg/L		101	90 - 110

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 310-233322/1-A
Matrix: Water
Analysis Batch: 233992

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 233322

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/25/19 08:00	03/28/19 15:07	1
Arsenic	<0.00200		0.00200		mg/L		03/25/19 08:00	03/28/19 15:07	1
Barium	<0.00200		0.00200		mg/L		03/25/19 08:00	03/28/19 15:07	1
Beryllium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/28/19 15:07	1
Boron	<0.200		0.200		mg/L		03/25/19 08:00	03/28/19 15:07	1
Cadmium	<0.000500		0.000500		mg/L		03/25/19 08:00	03/28/19 15:07	1
Calcium	<0.500		0.500		mg/L		03/25/19 08:00	03/28/19 15:07	1
Chromium	<0.00500		0.00500		mg/L		03/25/19 08:00	03/28/19 15:07	1
Cobalt	<0.000500		0.000500		mg/L		03/25/19 08:00	03/28/19 15:07	1
Lead	<0.000500		0.000500		mg/L		03/25/19 08:00	03/28/19 15:07	1
Lithium	<0.0100		0.0100		mg/L		03/25/19 08:00	03/28/19 15:07	1
Molybdenum	<0.00200		0.00200		mg/L		03/25/19 08:00	03/28/19 15:07	1
Selenium	<0.00500		0.00500		mg/L		03/25/19 08:00	03/28/19 15:07	1
Thallium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/28/19 15:07	1

Lab Sample ID: LCS 310-233322/2-A
Matrix: Water
Analysis Batch: 233992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233322

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.0200	0.01741		mg/L		87	80 - 120
Arsenic	0.0400	0.03970		mg/L		99	80 - 120
Barium	0.0400	0.03464		mg/L		87	80 - 120
Beryllium	0.0200	0.01723		mg/L		86	80 - 120
Boron	0.880	0.7331		mg/L		83	80 - 120
Cadmium	0.0200	0.01752		mg/L		88	80 - 120
Calcium	2.00	1.763		mg/L		88	80 - 120
Chromium	0.0400	0.03577		mg/L		89	80 - 120

TestAmerica Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

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

Lab Sample ID: LCS 310-233322/2-A
Matrix: Water
Analysis Batch: 233992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233322
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cobalt	0.0200	0.01830		mg/L		91	80 - 120
Lead	0.0200	0.01728		mg/L		86	80 - 120
Molybdenum	0.0400	0.03628		mg/L		91	80 - 120
Selenium	0.0400	0.03389		mg/L		85	80 - 120
Thallium	0.0160	0.01412		mg/L		88	80 - 120

Lab Sample ID: LCS 310-233322/2-A
Matrix: Water
Analysis Batch: 234056

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233322
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Lithium	0.100	0.09127		mg/L		91	80 - 120

Lab Sample ID: 310-151604-1 DU
Matrix: Water
Analysis Batch: 233992

Client Sample ID: MW-23
Prep Type: Total/NA
Prep Batch: 233322

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Antimony	<0.00100		<0.00100		mg/L		NC	20
Arsenic	<0.00200		<0.00200		mg/L		NC	20
Barium	0.0922		0.1061		mg/L		14	20
Beryllium	<0.00100		<0.00100		mg/L		NC	20
Boron	<0.200		<0.200		mg/L		NC	20
Cadmium	<0.000500		<0.000500		mg/L		NC	20
Calcium	59.7		66.86		mg/L		11	20
Chromium	<0.00500		<0.00500		mg/L		NC	20
Cobalt	0.00176		0.002073		mg/L		16	20
Lead	0.00204		0.002369		mg/L		15	20
Lithium	<0.0100		<0.0100		mg/L		NC	20
Molybdenum	<0.00200		<0.00200		mg/L		NC	20
Selenium	<0.00500		<0.00500		mg/L		NC	20
Thallium	<0.00100		<0.00100		mg/L		NC	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 310-233442/1-A
Matrix: Water
Analysis Batch: 233627

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 233442

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 13:04	03/26/19 10:35	1

Lab Sample ID: LCS 310-233442/2-A
Matrix: Water
Analysis Batch: 233627

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233442
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.00167	0.001669		mg/L		100	80 - 120

TestAmerica Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

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

Lab Sample ID: MB 310-233311/1
Matrix: Water
Analysis Batch: 233311

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<30.0		30.0		mg/L			03/22/19 14:03	1

Lab Sample ID: LCS 310-233311/2
Matrix: Water
Analysis Batch: 233311

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	1004		mg/L		100	90 - 110

Lab Sample ID: 310-151604-1 DU
Matrix: Water
Analysis Batch: 233311

Client Sample ID: MW-23
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	296		312.0		mg/L		NC	24

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-233319/1
Matrix: Water
Analysis Batch: 233319

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	98 - 102

Lab Sample ID: 310-151604-1 DU
Matrix: Water
Analysis Batch: 233319

Client Sample ID: MW-23
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.5	HF	7.5		SU		0.3	20

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

HPLC/IC

Analysis Batch: 233635

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	9056A	
MB 310-233635/3	Method Blank	Total/NA	Water	9056A	
LCS 310-233635/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 233322

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	3010A	
MB 310-233322/1-A	Method Blank	Total/NA	Water	3010A	
LCS 310-233322/2-A	Lab Control Sample	Total/NA	Water	3010A	
310-151604-1 DU	MW-23	Total/NA	Water	3010A	

Prep Batch: 233442

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	7470A	
MB 310-233442/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-233442/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 233627

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	7470A	233442
MB 310-233442/1-A	Method Blank	Total/NA	Water	7470A	233442
LCS 310-233442/2-A	Lab Control Sample	Total/NA	Water	7470A	233442

Analysis Batch: 233992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	6020A	233322
MB 310-233322/1-A	Method Blank	Total/NA	Water	6020A	233322
LCS 310-233322/2-A	Lab Control Sample	Total/NA	Water	6020A	233322
310-151604-1 DU	MW-23	Total/NA	Water	6020A	233322

Analysis Batch: 234056

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 310-233322/2-A	Lab Control Sample	Total/NA	Water	6020A	233322

General Chemistry

Analysis Batch: 233311

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	SM 2540C	
MB 310-233311/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-233311/2	Lab Control Sample	Total/NA	Water	SM 2540C	
310-151604-1 DU	MW-23	Total/NA	Water	SM 2540C	

Analysis Batch: 233319

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	SM 4500 H+ B	
LCS 310-233319/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
310-151604-1 DU	MW-23	Total/NA	Water	SM 4500 H+ B	

TestAmerica Cedar Falls

Lab Chronicle

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Client Sample ID: MW-23
Date Collected: 03/19/19 10:50
Date Received: 03/22/19 09:00

Lab Sample ID: 310-151604-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233635	03/26/19 10:43	MLU	TAL CF
Total/NA	Prep	3010A			233322	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	233992	03/28/19 15:14	SAD	TAL CF
Total/NA	Prep	7470A			233442	03/25/19 13:04	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 11:11	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233311	03/22/19 14:03	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:35	JWG	TAL CF

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: Muscatine Power & Water

TestAmerica Job ID: 310-151604-1

Project/Site: Muscatine Power & Water CCR

Laboratory: TestAmerica Cedar Falls

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
AIHA-LAP, LLC	IHLAP		101044	11-01-20
Georgia	State Program	4	IA100001 (OR)	09-29-19
Illinois	NELAP	5	200024	11-29-19
Iowa	State Program	7	007	12-01-19
Kansas	NELAP	7	E-10341	01-31-20
Minnesota	NELAP	5	019-999-319	12-31-19
Minnesota (Petrofund)	State Program	1	3349	08-22-19
North Dakota	State Program	8	R-186	09-29-19
Oregon	NELAP	10	IA100001	09-29-19
USDA	Federal		P330-19-00003	01-02-22

Method Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151604-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF
6020A	Metals (ICP/MS)	SW846	TAL CF
7470A	Mercury (CVAA)	SW846	TAL CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CF
SM 4500 H+ B	pH	SM	TAL CF
3010A	Preparation, Total Metals	SW846	TAL CF
7470A	Preparation, Mercury	SW846	TAL CF

Protocol References:

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

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

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401



Cooler/Sample Receipt and Temperature Log Form

Client Information	
Client: Muscatine Power & Water	
City/State: Muscatine IA	Project: Muscatine Power & Water
Receipt Information	
Date/Time Received: 3/22/19 0900	Received By: JB
Delivery Type: <input checked="" type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> TA Courier <input type="checkbox"/> TA Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____	
Condition of Cooler/Containers	
Sample(s) received in Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____
Multiple Coolers? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # 1 of 1
Cooler Custody Seals Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓
Temperature Record	
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE	
Thermometer ID: M	Correction Factor (°C): -0.1
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature	
Uncorrected Temp (°C): 0.4	Corrected Temp (°C): 0.3
• Sample Container Temperature	
Container type(s) used: _____	
Uncorrected Temp (°C): _____	Corrected Temp (°C): _____
Exceptions Noted	
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No	
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No	
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No	
NOTE: If yes, contact PM before proceeding. If no, proceed with login	
Additional Comments	

Chain of Custody Record

Client Information		Sampler: Sam Bennett/ Neil Hoskins		Lab PM: Hayes, Shawn M		Carrier Tracking No(s):		COC No:	
Client Contact: Sam Bennett		Phone: 563-262-3583		E-Mail: shawn.hayes@testamericainc.com		Page: Page 1 of 1		Job #:	
Company: Muscatine Power & Water		Address: 1700 Dick Drake Way		City: Muscatine		State, Zip: IA, 52761		PO #: 191195	
Phone: 563-262-3583(Tel)		WO #: sbennett@mpw.org		Project Name: Muscatine Power & Water CCR		Site: Iowa		SSOW#:	
Due Date Requested:		TAT Requested (days):		Field Filled Sample (Yes or No)		Perform MS/MSD (Yes or No)		Appendix III / Appendix IV per quote 31010959-0	
Appendix III / Appendix IV per quote 31010959-0		Appendix III / Appendix IV (minus Radium) per quote 31010959-0		Appendix III / Appendix IV per quote 31010959-0		Total Number of Containers		Special Instructions/Note:	
Sample Identification		Sample Date		Sample Time		Sample Type (C=comp, G=grab)		Matrix (Water, Groundwater, Over-sat, etc.)	
MW-23		3/19/19		1050		G		Water	
MW-24		3/18/19		1315		G		Water	
MW-25		3/18/19		1415		G		Water	
SW-22		3/20/19		1430		G		Water	
SW-23		3/20/19		1335		G		Water	
SW-24		3/20/19		1310		G		Water	
SW-25		3/20/19		1410		G		Water	
SW-26		3/18/19		1520		G		Water	
DUP		3/18/19		1200		G		Water	
<p>Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological</p> <p>Deliverable Requested: I, II, III, IV, Other (specify)</p>									
<p>Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months</p> <p>Special Instructions/QC Requirements:</p>									
<p>Empty Kit Relinquished by: _____ Date: _____</p> <p>Relinquished by: <i>Sam Bennett</i> Date/Time: <i>3-21-19 0830</i> Company: _____</p> <p>Relinquished by: _____ Date/Time: _____ Company: _____</p> <p>Relinquished by: _____ Date/Time: _____ Company: _____</p> <p>Custody Seals Intact: _____ Custody Seal No.: _____ Δ Yes Δ No</p>									
<p>Received by: <i>Lamirsky</i> Date/Time: <i>3/22/19 0900</i> Company: <i>TP</i></p> <p>Received by: _____ Date/Time: _____ Company: _____</p> <p>Received by: _____ Date/Time: _____ Company: _____</p> <p>Cooler Temperature(s) °C and Other Remarks:</p>									



Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container pH</u>	<u>Preservative Added (mls)</u>	<u>Lot #</u>
MW-23	310-151604-A-1	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-23	310-151604-C-1	Plastic 1 liter - Nitric Acid	<2	_____	_____
MW-23	310-151604-D-1	Plastic 1 liter - Nitric Acid	<2	_____	_____
MW-24	310-151604-A-2	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-25	310-151604-A-3	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-22	310-151604-A-4	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-23	310-151604-A-5	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-24	310-151604-A-6	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-25	310-151604-A-7	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-26	310-151604-A-8	Plastic 250ml - with Nitric Acid	<2	_____	_____
DUP	310-151604-A-9	Plastic 250ml - with Nitric Acid	<2	_____	_____

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151604-1

Login Number: 151604

List Source: TestAmerica Cedar Falls

List Number: 1

Creator: Bovy, Lorrainna L

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-151604-2

Client Project/Site: Muscatine Power & Water CCR

For:

Muscatine Power & Water
1700 Dick Drake Way
PO BOX 899
Muscatine, Iowa 52761

Attn: Sam Bennett



Authorized for release by:
5/6/2019 11:26:00 AM

Shawn Hayes, Senior Project Manager
(319)229-8211

shawn.hayes@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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Case Narrative

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Job ID: 310-151604-2

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

**Job Narrative
310-151604-2**

Comments

No additional comments.

Receipt

The samples were received on 3/22/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.3° C.

RAD

Method(s) 9315: Ra-226 Prep Batch 160-423097

The LCS spike recovery (73%) is just below the lower QC limit (75%) indicating a potential low bias to sample results. The MS and MSD spike recoveries are within limits demonstrating acceptable method performance, the MS/MSD RPD is within limits demonstrating good replicate precision, and the MB is less than the MDC. All of the sample results are well below the Ra-226 RL of 1 pCi/L (maximum result of 0.22 pCi/L), and the Combined Ra-226 + Ra-228 results are considerably (~5 times or more) below the CCR regulatory limit of 5 pCi/L. The laboratory does not believe this excursion significantly affects the data."

Method(s) PrecSep_0: Radium 228 Prep Batch 160-423098:

The following sample was prepared at a reduced aliquot due to discoloration and heavy sediment levels: MW-23 (310-151604-1).

Method(s) PrecSep-21: Radium 226 Prep Batch 160-423097:

The following sample was prepared at a reduced aliquot due to discoloration and heavy sediment levels: MW-23 (310-151604-1).

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

Sample Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-151604-1	MW-23	Water	03/19/19 10:50	03/22/19 09:00



Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Client Sample ID: MW-23

Lab Sample ID: 310-151604-1

Date Collected: 03/19/19 10:50

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.215		0.145	0.147	1.00	0.196	pCi/L	04/09/19 06:13	05/01/19 07:06	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.5		40 - 110					04/09/19 06:13	05/01/19 07:06	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.785		0.490	0.496	1.00	0.749	pCi/L	04/09/19 06:46	04/23/19 08:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.5		40 - 110					04/09/19 06:46	04/23/19 08:53	1
Y Carrier	90.5		40 - 110					04/09/19 06:46	04/23/19 08:53	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.00		0.511	0.517	5.00	0.749	pCi/L		05/06/19 11:12	1

Definitions/Glossary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Qualifiers

Rad

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

Glossary

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

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-423097/24-A
 Matrix: Water
 Analysis Batch: 426332

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 423097

Analyte	MB	MB	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.01750	U	0.0379	0.0379	1.00	0.0709	pCi/L	04/09/19 06:13	05/01/19 07:10	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Ba Carrier	108		40 - 110					04/09/19 06:13	05/01/19 07:10	1

Lab Sample ID: LCS 160-423097/1-A
 Matrix: Water
 Analysis Batch: 426333

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 423097

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Radium-226	11.4	8.305	*	0.903	1.00	0.0784	pCi/L	73	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits		Prepared	Analyzed	Dil Fac		
Ba Carrier	97.1		40 - 110					04/09/19 06:13	05/01/19 07:10

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-423098/24-A
 Matrix: Water
 Analysis Batch: 425108

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 423098

Analyte	MB	MB	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	-0.06022	U	0.185	0.186	1.00	0.342	pCi/L	04/09/19 06:46	04/23/19 08:59	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Ba Carrier	108		40 - 110					04/09/19 06:46	04/23/19 08:59	1
Y Carrier	89.3		40 - 110		04/09/19 06:46	04/23/19 08:59	1			

Lab Sample ID: LCS 160-423098/1-A
 Matrix: Water
 Analysis Batch: 425247

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 423098

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Radium-228	9.27	8.862		1.02	1.00	0.335	pCi/L	96	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits		Prepared	Analyzed	Dil Fac		
Ba Carrier	97.1		40 - 110					04/09/19 06:46	04/23/19 08:59
Y Carrier	90.1		40 - 110		04/09/19 06:46	04/23/19 08:59	1		

QC Association Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Rad

Prep Batch: 423097

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	PrecSep-21	
MB 160-423097/24-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-423097/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 423098

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151604-1	MW-23	Total/NA	Water	PrecSep_0	
MB 160-423098/24-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-423098/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Client Sample ID: MW-23

Lab Sample ID: 310-151604-1

Date Collected: 03/19/19 10:50

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423097	04/09/19 06:13	JLC	TAL SL
Total/NA	Analysis	9315		1	426331	05/01/19 07:06	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423098	04/09/19 06:46	JLC	TAL SL
Total/NA	Analysis	9320		1	425247	04/23/19 08:53	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426780	05/06/19 11:12	SMP	TAL SL

Laboratory References:

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

Accreditation/Certification Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Laboratory: Eurofins TestAmerica, Cedar Falls

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
AIHA-LAP, LLC	IHLAP		101044	11-01-20
Georgia	State Program	4	IA100001 (OR)	09-29-19
Illinois	NELAP	5	200024	11-29-19
Iowa	State Program	7	007	12-01-19
Kansas	NELAP	7	E-10341	01-31-20
Minnesota	NELAP	5	019-999-319	12-31-19
Minnesota (Petrofund)	State Program	1	3349	08-22-19
North Dakota	State Program	8	R-186	09-29-19
Oregon	NELAP	10	IA100001	09-29-19
USDA	Federal		P330-19-00003	01-02-22

Laboratory: Eurofins 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	06-30-19
ANAB	DoD		L2305	04-06-22
Arizona	State Program	9	AZ0813	12-08-19
California	State Program	9	2886	06-30-19 *
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-19 *
Hawaii	State Program	9	NA	06-30-19
Illinois	NELAP	5	200023	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-19
Louisiana (DW)	NELAP	6	LA011	12-31-19
Maryland	State Program	3	310	09-30-19
Michigan	State Program	5	9005	06-30-19
Missouri	State Program	7	780	06-30-19
Nevada	State Program	9	MO000542018-1	07-31-19
New Jersey	NELAP	2	MO002	06-30-19 *
New York	NELAP	2	11616	03-31-20
North Dakota	State Program	8	R207	06-30-19 *
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-19
Pennsylvania	NELAP	3	68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-19
Texas	NELAP	6	T104704193-18-13	07-31-19
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542018-10	07-31-19
Virginia	NELAP	3	460230	06-14-19 *
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19

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

Method Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

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

Protocol References:

None = None

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

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

Laboratory References:

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



Cooler/Sample Receipt and Temperature Log Form

Client Information	
Client: Muscatine Power & Water	
City/State: Muscatine IA	Project: Muscatine Power & Water
Receipt Information	
Date/Time Received: 3/22/19 0900	Received By: JB
Delivery Type: <input checked="" type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> TA Courier <input type="checkbox"/> TA Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____	
Condition of Cooler/Containers	
Sample(s) received in Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____
Multiple Coolers? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # 1 of 1
Cooler Custody Seals Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓
Temperature Record	
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE	
Thermometer ID: M	Correction Factor (°C): -0.1
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature	
Uncorrected Temp (°C): 0.4	Corrected Temp (°C): 0.3
• Sample Container Temperature	
Container type(s) used: _____	
Uncorrected Temp (°C): _____	Corrected Temp (°C): _____
Exceptions Noted	
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No	
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No	
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No	
NOTE: If yes, contact PM before proceeding. If no, proceed with login	
Additional Comments	

Chain of Custody Record

Client Information		Sampler: Sam Bennett/ Neil Hoskins		Lab PM: Hayes, Shawn M		Carrier Tracking No(s):	
Client Contact: Sam Bennett		Phone: 563-262-3583		E-Mail: shawn.hayes@lestamericainc.com		Page: Page 1 of 1	
Company: Muscatine Power & Water		Address: 1700 Dick Drake Way		City: Muscatine		Job #:	
State, Zip: IA, 52761		PO #: 191195		WO #:		Project #:	
Phone: 563-262-3583(Tel)		Email: sbennett@mpw.org		Project Name: Muscatine Power & Water CCR		Site: Iowa	
Due Date Requested:		TAT Requested (days):		Field Filled Sample (Yes or No)		Perform MS/MSD (Yes or No)	
Appendix III / Appendix IV per quote 31010959-0		Appendix III / Appendix IV (minus Radium) per quote 31010959-0		Appendix III / Appendix IV per quote 31010959-0		Total Number of Containers	
Special Instructions/Note:		Preservation Codes:		Special Instructions/Note:		Preservation Codes:	
A - HCL		M - Hexane		A - HCL		M - Hexane	
B - NaOH		N - None		B - NaOH		N - None	
C - Zn Acetate		O - AsNaO2		C - Zn Acetate		O - AsNaO2	
D - Nitric Acid		P - Na2O4S		D - Nitric Acid		P - Na2O4S	
E - NaHSO4		Q - Na2SO3		E - NaHSO4		Q - Na2SO3	
F - MeOH		R - Na2SO3		F - MeOH		R - Na2SO3	
G - Amchlor		S - H2SO4		G - Amchlor		S - H2SO4	
H - Ascorbic Acid		T - TSP Dodecahydrate		H - Ascorbic Acid		T - TSP Dodecahydrate	
I - Ice		U - Acetone		I - Ice		U - Acetone	
J - DI Water		V - MCAA		J - DI Water		V - MCAA	
K - EDTA		W - pH 4-5		K - EDTA		W - pH 4-5	
L - EDA		Z - other (specify)		L - EDA		Z - other (specify)	
Other:							

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (Water, Groundwater, Over-sat, etc.)	Preservation Code	Field Filled Sample (Yes or No)	Perform MS/MSD (Yes or No)	Appendix III / Appendix IV per quote 31010959-0	Appendix III / Appendix IV (minus Radium) per quote 31010959-0	Appendix III / Appendix IV per quote 31010959-0	Total Number of Containers	Special Instructions/Note:
MW-23	3/19/19	1050	G	Water		X	X					
MW-24	3/18/19	1315	G	Water		X	X					
MW-25	3/18/19	1415	G	Water		X	X					
SW-22	3/20/19	1430	G	Water		X	X					
SW-23	3/20/19	1335	G	Water		X	X					
SW-24	3/20/19	1310	G	Water		X	X					
SW-25	3/20/19	1410	G	Water		X	X					
SW-26	3/18/19	1520	G	Water		X	X					
DUP	3/18/19	1200	G	Water		X	X					

Possible Hazard Identification
 Non-Hazard Flammable Skin Irritant Poison B Unknown Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Empty Kit Relinquished by: _____ Date: _____

Relinquished by: *Sam Bennett* Date/Time: *3-21-19 0830* Company: _____

Relinquished by: _____ Date/Time: _____ Company: _____

Relinquished by: _____ Date/Time: _____ Company: _____

Custody Seals Intact: _____ Custody Seal No.: _____
 Δ Yes Δ No

Received by: *Lamin* Date/Time: *3/22/19 0900* Company: _____

Received by: _____ Date/Time: _____ Company: _____

Received by: _____ Date/Time: _____ Company: _____

Special Instructions/QC Requirements:

Return To Client Disposal By Lab Archive For _____ Months

Method of Shipment: _____

Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container pH</u>	<u>Preservative Added (mls)</u>	<u>Lot #</u>
MW-23	310-151604-A-1	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-23	310-151604-C-1	Plastic 1 liter - Nitric Acid	<2	_____	_____
MW-23	310-151604-D-1	Plastic 1 liter - Nitric Acid	<2	_____	_____
MW-24	310-151604-A-2	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-25	310-151604-A-3	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-22	310-151604-A-4	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-23	310-151604-A-5	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-24	310-151604-A-6	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-25	310-151604-A-7	Plastic 250ml - with Nitric Acid	<2	_____	_____
SW-26	310-151604-A-8	Plastic 250ml - with Nitric Acid	<2	_____	_____
DUP	310-151604-A-9	Plastic 250ml - with Nitric Acid	<2	_____	_____

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151604-2

Login Number: 151604

List Source: Eurofins TestAmerica, Cedar Falls

List Number: 1

Creator: Bovy, Lorrainna L

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151604-2

Login Number: 151604

List Source: Eurofins TestAmerica, St. Louis

List Number: 2

List Creation: 03/25/19 08:09 AM

Creator: Hellm, Michael

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	22.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Tracer/Carrier Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151604-2

Method: 9315 - Radium-226 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)		
310-151604-1	MW-23	88.5		
LCS 160-423097/1-A	Lab Control Sample	97.1		
MB 160-423097/24-A	Method Blank	108		

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)		
310-151604-1	MW-23	88.5	90.5		
LCS 160-423098/1-A	Lab Control Sample	97.1	90.1		
MB 160-423098/24-A	Method Blank	108	89.3		

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

TestAmerica Job ID: 310-151614-1

Client Project/Site: Muscatine Power & Water CCR

For:

Muscatine Power & Water
1700 Dick Drake Way
PO BOX 899
Muscatine, Iowa 52761

Attn: Sam Bennett



Authorized for release by:
4/3/2019 4:40:53 PM

Shawn Hayes, Senior Project Manager
(319)229-8211
shawn.hayes@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Case Narrative

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Job ID: 310-151614-1

Laboratory: TestAmerica Cedar Falls

Narrative

Job Narrative
310-151614-1

Comments

No additional comments.

Receipt

The samples were received on 3/22/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.7° C.

HPLC/IC

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

Metals

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

General Chemistry

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

Sample Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-151614-1	MW-14A	Water	03/20/19 11:20	03/22/19 09:00
310-151614-2	MW-15A	Water	03/20/19 10:00	03/22/19 09:00
310-151614-3	MW-21	Water	03/20/19 08:20	03/22/19 09:00
310-151614-4	MW-22	Water	03/19/19 11:45	03/22/19 09:00
310-151614-5	DUP	Water	03/20/19 12:00	03/22/19 09:00

Detection Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-14A

Lab Sample ID: 310-151614-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	25.8		5.00		mg/L	5		9056A	Total/NA
Sulfate	1050		50.0		mg/L	50		9056A	Total/NA
Barium	0.0328		0.00200		mg/L	1		6020A	Total/NA
Boron	15.5		1.40		mg/L	7		6020A	Total/NA
Calcium	290		0.500		mg/L	1		6020A	Total/NA
Selenium	0.00569		0.00500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	1690		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.1	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-15A

Lab Sample ID: 310-151614-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	8.54		5.00		mg/L	5		9056A	Total/NA
Fluoride	0.523		0.500		mg/L	5		9056A	Total/NA
Sulfate	351		50.0		mg/L	50		9056A	Total/NA
Barium	0.0370		0.00200		mg/L	1		6020A	Total/NA
Boron	8.35		0.800		mg/L	4		6020A	Total/NA
Calcium	118		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	724		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.5	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-21

Lab Sample ID: 310-151614-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	8.30		5.00		mg/L	5		9056A	Total/NA
Sulfate	442		20.0		mg/L	20		9056A	Total/NA
Barium	0.0511		0.00200		mg/L	1		6020A	Total/NA
Boron	6.95		0.800		mg/L	4		6020A	Total/NA
Calcium	142		0.500		mg/L	1		6020A	Total/NA
Chromium	0.00647		0.00500		mg/L	1		6020A	Total/NA
Lithium	0.0277		0.0100		mg/L	1		6020A	Total/NA
Selenium	0.0102		0.00500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	872		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.7	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-22

Lab Sample ID: 310-151614-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	27.6		5.00		mg/L	5		9056A	Total/NA
Sulfate	134		5.00		mg/L	5		9056A	Total/NA
Barium	0.209		0.00200		mg/L	1		6020A	Total/NA
Boron	0.299		0.200		mg/L	1		6020A	Total/NA
Calcium	91.6		0.500		mg/L	1		6020A	Total/NA
Molybdenum	0.00263		0.00200		mg/L	1		6020A	Total/NA
Total Dissolved Solids	456		30.0		mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Cedar Falls

Detection Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-22 (Continued)

Lab Sample ID: 310-151614-4

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.6	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: DUP

Lab Sample ID: 310-151614-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	9.04		5.00		mg/L	5		9056A	Total/NA
Sulfate	447		20.0		mg/L	20		9056A	Total/NA
Barium	0.0516		0.00200		mg/L	1		6020A	Total/NA
Boron	6.73		0.800		mg/L	4		6020A	Total/NA
Calcium	139		0.500		mg/L	1		6020A	Total/NA
Chromium	0.00635		0.00500		mg/L	1		6020A	Total/NA
Lithium	0.0258		0.0100		mg/L	1		6020A	Total/NA
Molybdenum	0.00981		0.00200		mg/L	1		6020A	Total/NA
Selenium	0.00997		0.00500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	892		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.7	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Cedar Falls

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-14A

Lab Sample ID: 310-151614-1

Date Collected: 03/20/19 11:20

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	25.8		5.00		mg/L	-		03/27/19 12:16	5
Fluoride	<0.500		0.500		mg/L	-		03/27/19 12:16	5
Sulfate	1050		50.0		mg/L	-		03/27/19 12:29	50

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Arsenic	<0.00200		0.00200		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Barium	0.0328		0.00200		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Beryllium	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Boron	15.5		1.40		mg/L	-	03/25/19 08:00	03/27/19 13:44	7
Cadmium	<0.000500		0.000500		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Calcium	290		0.500		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Chromium	<0.00500		0.00500		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Cobalt	<0.000500		0.000500		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Lead	<0.000500		0.000500		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Lithium	<0.0100		0.0100		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Molybdenum	<0.00200		0.00200		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Selenium	0.00569		0.00500		mg/L	-	03/25/19 08:00	03/26/19 22:37	1
Thallium	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/26/19 22:37	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L	-	03/25/19 14:51	03/26/19 13:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1690		30.0		mg/L	-		03/25/19 14:37	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.1	HF	0.1		SU	-		03/22/19 15:38	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-15A

Lab Sample ID: 310-151614-2

Date Collected: 03/20/19 10:00

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	8.54		5.00		mg/L	-		03/27/19 12:42	5
Fluoride	0.523		0.500		mg/L	-		03/27/19 12:42	5
Sulfate	351		50.0		mg/L	-		03/27/19 12:54	50

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Arsenic	<0.00200		0.00200		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Barium	0.0370		0.00200		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Beryllium	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Boron	8.35		0.800		mg/L	-	03/25/19 08:00	03/27/19 13:47	4
Cadmium	<0.000500		0.000500		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Calcium	118		0.500		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Chromium	<0.00500		0.00500		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Cobalt	<0.000500		0.000500		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Lead	<0.000500		0.000500		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Lithium	<0.0100		0.0100		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Molybdenum	<0.00200		0.00200		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Selenium	<0.00500		0.00500		mg/L	-	03/25/19 08:00	03/26/19 22:40	1
Thallium	<0.00100		0.00100		mg/L	-	03/25/19 08:00	03/26/19 22:40	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L	-	03/25/19 14:51	03/26/19 13:50	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	724		30.0		mg/L	-		03/25/19 14:37	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.5	HF	0.1		SU	-		03/22/19 15:40	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-21
Date Collected: 03/20/19 08:20
Date Received: 03/22/19 09:00

Lab Sample ID: 310-151614-3
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	8.30		5.00		mg/L			03/27/19 13:48	5
Fluoride	<0.500		0.500		mg/L			03/27/19 13:48	5
Sulfate	442		20.0		mg/L			03/27/19 14:01	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:43	1
Arsenic	<0.00200		0.00200		mg/L		03/25/19 08:00	03/26/19 22:43	1
Barium	0.0511		0.00200		mg/L		03/25/19 08:00	03/26/19 22:43	1
Beryllium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:43	1
Boron	6.95		0.800		mg/L		03/25/19 08:00	03/27/19 13:51	4
Cadmium	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:43	1
Calcium	142		0.500		mg/L		03/25/19 08:00	03/26/19 22:43	1
Chromium	0.00647		0.00500		mg/L		03/25/19 08:00	03/26/19 22:43	1
Cobalt	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:43	1
Lead	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:43	1
Lithium	0.0277		0.0100		mg/L		03/25/19 08:00	03/26/19 22:43	1
Molybdenum	<0.00200		0.00200		mg/L		03/25/19 08:00	03/26/19 22:43	1
Selenium	0.0102		0.00500		mg/L		03/25/19 08:00	03/26/19 22:43	1
Thallium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:43	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 13:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	872		30.0		mg/L			03/25/19 14:37	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.7	HF	0.1		SU			03/22/19 15:41	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-22
Date Collected: 03/19/19 11:45
Date Received: 03/22/19 09:00

Lab Sample ID: 310-151614-4
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	27.6		5.00		mg/L			03/27/19 14:14	5
Fluoride	<0.500		0.500		mg/L			03/27/19 14:14	5
Sulfate	134		5.00		mg/L			03/27/19 14:14	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:47	1
Arsenic	<0.00200		0.00200		mg/L		03/25/19 08:00	03/26/19 22:47	1
Barium	0.209		0.00200		mg/L		03/25/19 08:00	03/26/19 22:47	1
Beryllium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:47	1
Boron	0.299		0.200		mg/L		03/25/19 08:00	03/26/19 22:47	1
Cadmium	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:47	1
Calcium	91.6		0.500		mg/L		03/25/19 08:00	03/26/19 22:47	1
Chromium	<0.00500		0.00500		mg/L		03/25/19 08:00	03/26/19 22:47	1
Cobalt	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:47	1
Lead	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:47	1
Lithium	<0.0100		0.0100		mg/L		03/25/19 08:00	03/26/19 22:47	1
Molybdenum	0.00263		0.00200		mg/L		03/25/19 08:00	03/26/19 22:47	1
Selenium	<0.00500		0.00500		mg/L		03/25/19 08:00	03/26/19 22:47	1
Thallium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:47	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 13:52	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	456		30.0		mg/L			03/25/19 14:37	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.6	HF	0.1		SU			03/22/19 15:47	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: DUP

Lab Sample ID: 310-151614-5

Date Collected: 03/20/19 12:00

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.04		5.00		mg/L			03/27/19 14:27	5
Fluoride	<0.500		0.500		mg/L			03/27/19 14:27	5
Sulfate	447		20.0		mg/L			03/27/19 14:41	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:50	1
Arsenic	<0.00200		0.00200		mg/L		03/25/19 08:00	03/26/19 22:50	1
Barium	0.0516		0.00200		mg/L		03/25/19 08:00	03/26/19 22:50	1
Beryllium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:50	1
Boron	6.73		0.800		mg/L		03/25/19 08:00	03/27/19 13:54	4
Cadmium	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:50	1
Calcium	139		0.500		mg/L		03/25/19 08:00	03/26/19 22:50	1
Chromium	0.00635		0.00500		mg/L		03/25/19 08:00	03/26/19 22:50	1
Cobalt	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:50	1
Lead	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 22:50	1
Lithium	0.0258		0.0100		mg/L		03/25/19 08:00	03/26/19 22:50	1
Molybdenum	0.00981		0.00200		mg/L		03/25/19 08:00	03/26/19 22:50	1
Selenium	0.00997		0.00500		mg/L		03/25/19 08:00	03/26/19 22:50	1
Thallium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 22:50	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 13:54	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	892		30.0		mg/L			03/25/19 14:37	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.7	HF	0.1		SU			03/22/19 15:25	1

Definitions/Glossary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

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

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-233804/3
Matrix: Water
Analysis Batch: 233804

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			03/27/19 08:38	1
Fluoride	<0.100		0.100		mg/L			03/27/19 08:38	1
Sulfate	<1.00		1.00		mg/L			03/27/19 08:38	1

Lab Sample ID: LCS 310-233804/4
Matrix: Water
Analysis Batch: 233804

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7.50	7.209		mg/L		96	90 - 110
Fluoride	1.50	1.516		mg/L		101	90 - 110
Sulfate	7.50	7.559		mg/L		101	90 - 110

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 310-233321/1-A
Matrix: Water
Analysis Batch: 233682

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 233321

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 21:08	1
Arsenic	<0.00200		0.00200		mg/L		03/25/19 08:00	03/26/19 21:08	1
Barium	<0.00200		0.00200		mg/L		03/25/19 08:00	03/26/19 21:08	1
Beryllium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 21:08	1
Boron	<0.200		0.200		mg/L		03/25/19 08:00	03/26/19 21:08	1
Cadmium	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 21:08	1
Calcium	<0.500		0.500		mg/L		03/25/19 08:00	03/26/19 21:08	1
Chromium	<0.00500		0.00500		mg/L		03/25/19 08:00	03/26/19 21:08	1
Cobalt	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 21:08	1
Lead	<0.000500		0.000500		mg/L		03/25/19 08:00	03/26/19 21:08	1
Lithium	<0.0100		0.0100		mg/L		03/25/19 08:00	03/26/19 21:08	1
Molybdenum	0.003067		0.00200		mg/L		03/25/19 08:00	03/26/19 21:08	1
Selenium	<0.00500		0.00500		mg/L		03/25/19 08:00	03/26/19 21:08	1
Thallium	<0.00100		0.00100		mg/L		03/25/19 08:00	03/26/19 21:08	1

Lab Sample ID: MB 310-233321/1-A
Matrix: Water
Analysis Batch: 233844

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 233321

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	<0.00200		0.00200		mg/L		03/25/19 08:00	03/27/19 13:41	1

Lab Sample ID: LCS 310-233321/2-A
Matrix: Water
Analysis Batch: 233682

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233321

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.0200	0.01908		mg/L		95	80 - 120
Arsenic	0.0400	0.04063		mg/L		102	80 - 120

TestAmerica Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

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

Lab Sample ID: LCS 310-233321/2-A
 Matrix: Water
 Analysis Batch: 233682

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 233321
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Barium	0.0400	0.03873		mg/L		97	80 - 120
Beryllium	0.0200	0.01863		mg/L		93	80 - 120
Boron	0.880	0.8397		mg/L		95	80 - 120
Cadmium	0.0200	0.01924		mg/L		96	80 - 120
Calcium	2.00	1.977		mg/L		99	80 - 120
Chromium	0.0400	0.03843		mg/L		96	80 - 120
Cobalt	0.0200	0.01871		mg/L		94	80 - 120
Lead	0.0200	0.01872		mg/L		94	80 - 120
Lithium	0.100	0.09683		mg/L		97	80 - 120
Molybdenum	0.0400	0.03737		mg/L		93	80 - 120
Selenium	0.0400	0.03809		mg/L		95	80 - 120
Thallium	0.0160	0.01498		mg/L		94	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 310-233467/1-A
 Matrix: Water
 Analysis Batch: 233627

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 233467

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 13:43	1

Lab Sample ID: LCS 310-233467/2-A
 Matrix: Water
 Analysis Batch: 233627

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 233467
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.00167	0.001701		mg/L		102	80 - 120

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

Lab Sample ID: MB 310-233456/1
 Matrix: Water
 Analysis Batch: 233456

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<30.0		30.0		mg/L			03/25/19 14:37	1

Lab Sample ID: LCS 310-233456/2
 Matrix: Water
 Analysis Batch: 233456

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Total Dissolved Solids	1000	982.0		mg/L		98	90 - 110

TestAmerica Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-233319/1
Matrix: Water
Analysis Batch: 233319

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	98 - 102



QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

HPLC/IC

Analysis Batch: 233804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	9056A	
310-151614-1	MW-14A	Total/NA	Water	9056A	
310-151614-2	MW-15A	Total/NA	Water	9056A	
310-151614-2	MW-15A	Total/NA	Water	9056A	
310-151614-3	MW-21	Total/NA	Water	9056A	
310-151614-3	MW-21	Total/NA	Water	9056A	
310-151614-4	MW-22	Total/NA	Water	9056A	
310-151614-5	DUP	Total/NA	Water	9056A	
310-151614-5	DUP	Total/NA	Water	9056A	
MB 310-233804/3	Method Blank	Total/NA	Water	9056A	
LCS 310-233804/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 233321

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	3010A	
310-151614-2	MW-15A	Total/NA	Water	3010A	
310-151614-3	MW-21	Total/NA	Water	3010A	
310-151614-4	MW-22	Total/NA	Water	3010A	
310-151614-5	DUP	Total/NA	Water	3010A	
MB 310-233321/1-A	Method Blank	Total/NA	Water	3010A	
LCS 310-233321/2-A	Lab Control Sample	Total/NA	Water	3010A	

Prep Batch: 233467

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	7470A	
310-151614-2	MW-15A	Total/NA	Water	7470A	
310-151614-3	MW-21	Total/NA	Water	7470A	
310-151614-4	MW-22	Total/NA	Water	7470A	
310-151614-5	DUP	Total/NA	Water	7470A	
MB 310-233467/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-233467/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 233627

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	7470A	233467
310-151614-2	MW-15A	Total/NA	Water	7470A	233467
310-151614-3	MW-21	Total/NA	Water	7470A	233467
310-151614-4	MW-22	Total/NA	Water	7470A	233467
310-151614-5	DUP	Total/NA	Water	7470A	233467
MB 310-233467/1-A	Method Blank	Total/NA	Water	7470A	233467
LCS 310-233467/2-A	Lab Control Sample	Total/NA	Water	7470A	233467

Analysis Batch: 233682

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	6020A	233321
310-151614-2	MW-15A	Total/NA	Water	6020A	233321
310-151614-3	MW-21	Total/NA	Water	6020A	233321
310-151614-4	MW-22	Total/NA	Water	6020A	233321

TestAmerica Cedar Falls

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Metals (Continued)

Analysis Batch: 233682 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-5	DUP	Total/NA	Water	6020A	233321
MB 310-233321/1-A	Method Blank	Total/NA	Water	6020A	233321
LCS 310-233321/2-A	Lab Control Sample	Total/NA	Water	6020A	233321

Analysis Batch: 233685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-4	MW-22	Total/NA	Water	6020A	233321
MB 310-233321/1-A	Method Blank	Total/NA	Water	6020A	233321
LCS 310-233321/2-A	Lab Control Sample	Total/NA	Water	6020A	233321

Analysis Batch: 233844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	6020A	233321
310-151614-2	MW-15A	Total/NA	Water	6020A	233321
310-151614-3	MW-21	Total/NA	Water	6020A	233321
310-151614-5	DUP	Total/NA	Water	6020A	233321
MB 310-233321/1-A	Method Blank	Total/NA	Water	6020A	233321

General Chemistry

Analysis Batch: 233319

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	SM 4500 H+ B	
310-151614-2	MW-15A	Total/NA	Water	SM 4500 H+ B	
310-151614-3	MW-21	Total/NA	Water	SM 4500 H+ B	
310-151614-4	MW-22	Total/NA	Water	SM 4500 H+ B	
310-151614-5	DUP	Total/NA	Water	SM 4500 H+ B	
LCS 310-233319/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 233456

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	SM 2540C	
310-151614-2	MW-15A	Total/NA	Water	SM 2540C	
310-151614-3	MW-21	Total/NA	Water	SM 2540C	
310-151614-4	MW-22	Total/NA	Water	SM 2540C	
310-151614-5	DUP	Total/NA	Water	SM 2540C	
MB 310-233456/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-233456/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-14A

Date Collected: 03/20/19 11:20

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151614-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 12:16	MLU	TAL CF
Total/NA	Analysis	9056A		50	233804	03/27/19 12:29	MLU	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	233682	03/26/19 22:37	SAD	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		7	233844	03/27/19 13:44	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 13:47	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233456	03/25/19 14:37	LBB	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:38	JWG	TAL CF

Client Sample ID: MW-15A

Date Collected: 03/20/19 10:00

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151614-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 12:42	MLU	TAL CF
Total/NA	Analysis	9056A		50	233804	03/27/19 12:54	MLU	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	233682	03/26/19 22:40	SAD	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		4	233844	03/27/19 13:47	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 13:50	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233456	03/25/19 14:37	LBB	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:40	JWG	TAL CF

Client Sample ID: MW-21

Date Collected: 03/20/19 08:20

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151614-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 13:48	MLU	TAL CF
Total/NA	Analysis	9056A		20	233804	03/27/19 14:01	MLU	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	233682	03/26/19 22:43	SAD	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		4	233844	03/27/19 13:51	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 13:56	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233456	03/25/19 14:37	LBB	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:41	JWG	TAL CF

TestAmerica Cedar Falls

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Client Sample ID: MW-22

Date Collected: 03/19/19 11:45

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151614-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 14:14	MLU	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	233682	03/26/19 22:47	SAD	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	233685	03/26/19 22:47	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 13:52	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233456	03/25/19 14:37	LBB	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:47	JWG	TAL CF

Client Sample ID: DUP

Date Collected: 03/20/19 12:00

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151614-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 14:27	MLU	TAL CF
Total/NA	Analysis	9056A		20	233804	03/27/19 14:41	MLU	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	233682	03/26/19 22:50	SAD	TAL CF
Total/NA	Prep	3010A			233321	03/25/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		4	233844	03/27/19 13:54	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 13:54	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233456	03/25/19 14:37	LBB	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:25	JWG	TAL CF

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Laboratory: TestAmerica Cedar Falls

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
AIHA-LAP, LLC	IHLAP		101044	11-01-20
Georgia	State Program	4	IA100001 (OR)	09-29-19
Illinois	NELAP	5	200024	11-29-19
Iowa	State Program	7	007	12-01-19
Kansas	NELAP	7	E-10341	01-31-20
Minnesota	NELAP	5	019-999-319	12-31-19
Minnesota (Petrofund)	State Program	1	3349	08-22-19
North Dakota	State Program	8	R-186	09-29-19
Oregon	NELAP	10	IA100001	09-29-19
USDA	Federal		P330-19-00003	01-02-22

Method Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151614-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF
6020A	Metals (ICP/MS)	SW846	TAL CF
7470A	Mercury (CVAA)	SW846	TAL CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CF
SM 4500 H+ B	pH	SM	TAL CF
3010A	Preparation, Total Metals	SW846	TAL CF
7470A	Preparation, Mercury	SW846	TAL CF

Protocol References:

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

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

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401



Cooler/Sample Receipt and Temperature Log Form

Client Information	
Client: Muscatine Power & Water	
City/State: Muscatine IA	Project:
Receipt Information	
Date/Time Received: 3/22/19 0900	Received By: JB
Delivery Type: <input checked="" type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> TA Courier <input type="checkbox"/> TA Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____	
Condition of Cooler/Containers	
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes: Cooler ID: _____
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Cooler # _____ of _____
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Which VOA samples are in cooler? ↓
Temperature Record	
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE	
Thermometer ID: M	Correction Factor (°C): -0.1
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature	
Uncorrected Temp (°C): 1.8	Corrected Temp (°C): 1.7
• Sample Container Temperature	
Container type(s) used:	
Uncorrected Temp (°C):	Corrected Temp (°C):
Exceptions Noted	
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No	
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No	
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No	
NOTE: If yes, contact PM before proceeding. If no, proceed with login	
Additional Comments	
MW 14A on COC's, bottles JB 3/22/19	

Chain of Custody Record

Client Information Client Contact: Sam Bennett Company: Muscatine Power & Water Address: 1700 Dick Drake Way City: Muscatine State, Zip: IA, 52761 Phone: 563-262-3583 (Tel) Email: sbennett@mpw.org Project Name: Muscatine Power & Water CCR Site: Iowa		Sampler: Sam Bennett/ Neil Hoskins Lab PM: Hayes, Shawn M Phone: 563-262-3583 E-Mail: shawn.hayes@testamericainc.com		Carrier Tracking No(s): Job #:		COC No: Page: Page 1 of 1	
Due Date Requested: TAT Requested (days): PO #: 191195 WO #:		Analysis Requested		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:		Preservation Codes: M - Hexane N - None O - AcNaO2 P - Na2O4S Q - Na2SO3 R - Na2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)	
Sample Identification MW-14A MW-15A MW-21 MW-22 DUP		Sample Date 3/20/19 3/20/19 3/20/19 3/19/19 3/20/19		Sample Time 1120 1000 0820 1145 1200		Matrix (Water, Solid, Oil) Water Water Water Water Water	
Field Filtered Sample (Yes or No) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Perform MS/MSD (Yes or No) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No State Parameters per quote 31010959-0 Appendix III / Appendix IV per quote 31010959-0 Appendix III / Appendix IV (minus Radium) per quote 31010959-0 Total Number of Containers		Sample Date 3/20/19 3/20/19 3/20/19 3/19/19 3/20/19		Sample Time 1120 1000 0820 1145 1200		Matrix (Water, Solid, Oil) Water Water Water Water Water	
Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological							
Deliverable Requested: I, II, III, IV, Other (specify)							
Empty Kit Relinquished by:							
Relinquished by: Sam Bennett Date/Time: 3-21-19 0830 Company:		Relinquished by:		Relinquished by:		Relinquished by:	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months	



Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container pH</u>	<u>Preservative Added (mls)</u>	<u>Lot #</u>
MW-14A	310-151614-A-1	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-14A	310-151614-C-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-14A	310-151614-D-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-15A	310-151614-A-2	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-15A	310-151614-C-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-15A	310-151614-D-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-21	310-151614-A-3	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-21	310-151614-C-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-21	310-151614-D-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-22	310-151614-A-4	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-22	310-151614-C-4	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-22	310-151614-D-4	Plastic 1 liter - Nitric Acid	<	_____	_____
DUP	310-151614-A-5	Plastic 250ml - with Nitric Acid	<	_____	_____
DUP	310-151614-C-5	Plastic 1 liter - Nitric Acid	<	_____	_____
DUP	310-151614-D-5	Plastic 1 liter - Nitric Acid	<	_____	_____

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151614-1

Login Number: 151614

List Source: TestAmerica Cedar Falls

List Number: 1

Creator: Bovy, Lorrainna L

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Time on bottles for DUP says 0820, logged per COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-151614-2

Client Project/Site: Muscatine Power & Water CCR

For:

Muscatine Power & Water
1700 Dick Drake Way
PO BOX 899
Muscatine, Iowa 52761

Attn: Sam Bennett



Authorized for release by:
5/6/2019 11:32:39 AM

Shawn Hayes, Senior Project Manager
(319)229-8211

shawn.hayes@testamericainc.com

LINKS

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results through
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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Case Narrative

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Job ID: 310-151614-2

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

Job Narrative
310-151614-2

Comments

No additional comments.

Receipt

The samples were received on 3/22/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.7° C.

RAD

Method(s) 9315: Ra-226 Prep Batch 160-423095

The Laboratory Control Sample Duplicate (LCSD) recovered just below the 75% threshold (74.4%). The Laboratory Control Sample (LCS) recovered within our parameters (81%), and each sample's activity and MDC was well below the RL. The laboratory does not believe this excursion significantly affects the data. MW-21 (310-151614-3) and MW-22 (310-151614-4)

Method(s) 904.0, 9320: Radium-228 Prep Batch 160-423142

The Radium-228 laboratory control sample (LCS) recovery (129%) associated with the following samples is outside the upper QC limit of 125%, 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. MW-14A (310-151614-1) and MW-15A (310-151614-2)

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

Sample Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-151614-1	MW-14A	Water	03/20/19 11:20	03/22/19 09:00
310-151614-2	MW-15A	Water	03/20/19 10:00	03/22/19 09:00
310-151614-3	MW-21	Water	03/20/19 08:20	03/22/19 09:00
310-151614-4	MW-22	Water	03/19/19 11:45	03/22/19 09:00

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Client Sample ID: MW-14A

Lab Sample ID: 310-151614-1

Date Collected: 03/20/19 11:20

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0588	U	0.0499	0.0502	1.00	0.0711	pCi/L	04/09/19 11:22	05/01/19 21:42	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	96.5		40 - 110					04/09/19 11:22	05/01/19 21:42	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0365	U *	0.204	0.204	1.00	0.376	pCi/L	04/09/19 11:39	04/16/19 16:00	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	96.5		40 - 110					04/09/19 11:39	04/16/19 16:00	1
Y Carrier	84.9		40 - 110					04/09/19 11:39	04/16/19 16:00	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.0223	U	0.210	0.210	5.00	0.376	pCi/L		05/06/19 10:34	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Client Sample ID: MW-15A

Lab Sample ID: 310-151614-2

Date Collected: 03/20/19 10:00

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0609	U	0.0518	0.0521	1.00	0.0751	pCi/L	04/09/19 11:22	05/01/19 21:42	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.9		40 - 110					04/09/19 11:22	05/01/19 21:42	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.330	U *	0.252	0.254	1.00	0.396	pCi/L	04/09/19 11:39	04/16/19 16:00	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.9		40 - 110					04/09/19 11:39	04/16/19 16:00	1
Y Carrier	85.2		40 - 110					04/09/19 11:39	04/16/19 16:00	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.391	U	0.257	0.259	5.00	0.396	pCi/L		05/06/19 10:34	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Client Sample ID: MW-21

Lab Sample ID: 310-151614-3

Date Collected: 03/20/19 08:20

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.117	*	0.0686	0.0694	1.00	0.0841	pCi/L	04/09/19 05:49	05/01/19 23:50	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	91.2		40 - 110					04/09/19 05:49	05/01/19 23:50	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.170	U	0.203	0.203	1.00	0.334	pCi/L	04/09/19 06:11	04/22/19 09:07	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	95.3		40 - 110					04/09/19 06:11	04/22/19 09:07	1
Y Carrier	89.7		40 - 110					04/09/19 06:11	04/22/19 09:07	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.287	U	0.214	0.215	5.00	0.334	pCi/L		05/06/19 10:34	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Client Sample ID: MW-22

Lab Sample ID: 310-151614-4

Date Collected: 03/19/19 11:45

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.116	*	0.0680	0.0688	1.00	0.0821	pCi/L	04/09/19 05:49	05/01/19 23:50	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.1		40 - 110					04/09/19 05:49	05/01/19 23:50	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.226	U	0.250	0.251	1.00	0.411	pCi/L	04/09/19 06:11	04/22/19 09:07	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	96.2		40 - 110					04/09/19 06:11	04/22/19 09:07	1
Y Carrier	90.8		40 - 110					04/09/19 06:11	04/22/19 09:07	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.343	U	0.259	0.260	5.00	0.411	pCi/L		05/06/19 10:34	1

Definitions/Glossary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Qualifiers

Rad

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

Glossary

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

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-423095/23-A
 Matrix: Water
 Analysis Batch: 426506

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 423095

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	-0.02645	U	0.0297	0.0298	1.00	0.0861	pCi/L	04/09/19 05:49	05/02/19 07:40	1
Carrier	MB MB		Limits		Prepared	Analyzed	Dil Fac			
Ba Carrier	%Yield	Qualifier	Limits							
Ba Carrier	97.2		40 - 110		04/09/19 05:49	05/02/19 07:40	1			

Lab Sample ID: LCS 160-423095/1-A
 Matrix: Water
 Analysis Batch: 426331

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 423095

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Radium-226	11.4	9.174		0.971	1.00	0.0883	pCi/L	81	75 - 125
Carrier	LCS LCS		Limits		Prepared	Analyzed	Dil Fac		
Ba Carrier	%Yield	Qualifier	Limits						
Ba Carrier	92.7		40 - 110						

Lab Sample ID: LCSD 160-423095/2-A
 Matrix: Water
 Analysis Batch: 426331

Client Sample ID: Lab Control Sample Dup
 Prep Type: Total/NA
 Prep Batch: 423095

Analyte	Spike Added	LCSD Result	LCSD Qual	Total	RL	MDC	Unit	%Rec	%Rec. Limits	RER	Limit
				Uncert. (2σ+/-)							
Radium-226	11.4	8.450	*	0.901	1.00	0.0771	pCi/L	74	75 - 125	0.39	1
Carrier	LCSD LCSD		Limits		Prepared	Analyzed	Dil Fac				
Ba Carrier	%Yield	Qualifier	Limits								
Ba Carrier	98.6		40 - 110								

Lab Sample ID: MB 160-423138/18-A
 Matrix: Water
 Analysis Batch: 426331

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 423138

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.01499	U	0.0315	0.0315	1.00	0.0590	pCi/L	04/09/19 11:22	05/01/19 23:48	1
Carrier	MB MB		Limits		Prepared	Analyzed	Dil Fac			
Ba Carrier	%Yield	Qualifier	Limits							
Ba Carrier	108		40 - 110		04/09/19 11:22	05/01/19 23:48	1			

Lab Sample ID: LCS 160-423138/1-A
 Matrix: Water
 Analysis Batch: 426331

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 423138

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Radium-226	11.4	8.462		0.918	1.00	0.0958	pCi/L	75	75 - 125

Eurofins TestAmerica, Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Method: 9315 - Radium-226 (GFPC) (Continued)

Lab Sample ID: LCS 160-423138/1-A
 Matrix: Water
 Analysis Batch: 426331

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 423138

Carrier	LCS LCS		Limits
	%Yield	Qualifier	
Ba Carrier	74.3		40 - 110

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-423096/23-A
 Matrix: Water
 Analysis Batch: 424954

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 423096

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	0.1189	U	0.193	0.193	1.00	0.326	pCi/L	04/09/19 06:11	04/22/19 09:10	1

Carrier	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Yield	Qualifier				
Ba Carrier	101		40 - 110	04/09/19 06:11	04/22/19 09:10	1
Y Carrier	91.6		40 - 110	04/09/19 06:11	04/22/19 09:10	1

Lab Sample ID: LCS 160-423096/1-A
 Matrix: Water
 Analysis Batch: 424956

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 423096

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Radium-228	9.28	9.141		1.05	1.00	0.341	pCi/L	99	75 - 125

Carrier	LCS LCS		Limits
	%Yield	Qualifier	
Ba Carrier	96.8		40 - 110
Y Carrier	92.0		40 - 110

Lab Sample ID: LCSD 160-423096/2-A
 Matrix: Water
 Analysis Batch: 424956

Client Sample ID: Lab Control Sample Dup
 Prep Type: Total/NA
 Prep Batch: 423096

Analyte	Spike Added	LCSD Result	LCSD Qual	Total	RL	MDC	Unit	%Rec	%Rec.	RER
				Uncert. (2σ+/-)					Limits	RER
Radium-228	9.28	8.206		0.943	1.00	0.295	pCi/L	88	75 - 125	0.47

Carrier	LCSD LCSD		Limits
	%Yield	Qualifier	
Ba Carrier	103		40 - 110
Y Carrier	95.3		40 - 110

Lab Sample ID: MB 160-423142/18-A
 Matrix: Water
 Analysis Batch: 424048

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 423142

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	0.1947	U	0.226	0.227	1.00	0.372	pCi/L	04/09/19 11:39	04/16/19 16:05	1

Eurofins TestAmerica, Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Method: 9320 - Radium-228 (GFPC) (Continued)

Lab Sample ID: MB 160-423142/18-A
 Matrix: Water
 Analysis Batch: 424048

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 423142

Carrier	MB	MB	Limits
	%Yield	Qualifier	
Ba Carrier	108		40 - 110
Y Carrier	81.9		40 - 110

Prepared	Analyzed	Dil Fac
04/09/19 11:39	04/16/19 16:05	1
04/09/19 11:39	04/16/19 16:05	1

Lab Sample ID: LCS 160-423142/1-A
 Matrix: Water
 Analysis Batch: 424031

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 423142

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec.
									Limits
Radium-228	9.29	11.96	*	1.42	1.00	0.540	pCi/L	129	75 - 125

Carrier	LCS	LCS	Limits
	%Yield	Qualifier	
Ba Carrier	74.3		40 - 110
Y Carrier	81.1		40 - 110

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Rad

Prep Batch: 423095

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-3	MW-21	Total/NA	Water	PrecSep-21	
310-151614-4	MW-22	Total/NA	Water	PrecSep-21	
MB 160-423095/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-423095/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-423095/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	

Prep Batch: 423096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-3	MW-21	Total/NA	Water	PrecSep_0	
310-151614-4	MW-22	Total/NA	Water	PrecSep_0	
MB 160-423096/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-423096/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-423096/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Prep Batch: 423138

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	PrecSep-21	
310-151614-2	MW-15A	Total/NA	Water	PrecSep-21	
MB 160-423138/18-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-423138/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 423142

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151614-1	MW-14A	Total/NA	Water	PrecSep_0	
310-151614-2	MW-15A	Total/NA	Water	PrecSep_0	
MB 160-423142/18-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-423142/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Client Sample ID: MW-14A

Lab Sample ID: 310-151614-1

Date Collected: 03/20/19 11:20

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423138	04/09/19 11:22	JLC	TAL SL
Total/NA	Analysis	9315		1	426331	05/01/19 21:42	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423142	04/09/19 11:39	JLC	TAL SL
Total/NA	Analysis	9320		1	424031	04/16/19 16:00	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426774	05/06/19 10:34	SMP	TAL SL

Client Sample ID: MW-15A

Lab Sample ID: 310-151614-2

Date Collected: 03/20/19 10:00

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423138	04/09/19 11:22	JLC	TAL SL
Total/NA	Analysis	9315		1	426331	05/01/19 21:42	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423142	04/09/19 11:39	JLC	TAL SL
Total/NA	Analysis	9320		1	424031	04/16/19 16:00	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426774	05/06/19 10:34	SMP	TAL SL

Client Sample ID: MW-21

Lab Sample ID: 310-151614-3

Date Collected: 03/20/19 08:20

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423095	04/09/19 05:49	JLC	TAL SL
Total/NA	Analysis	9315		1	426331	05/01/19 23:50	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423096	04/09/19 06:11	JLC	TAL SL
Total/NA	Analysis	9320		1	424956	04/22/19 09:07	TJR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426774	05/06/19 10:34	SMP	TAL SL

Client Sample ID: MW-22

Lab Sample ID: 310-151614-4

Date Collected: 03/19/19 11:45

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423095	04/09/19 05:49	JLC	TAL SL
Total/NA	Analysis	9315		1	426331	05/01/19 23:50	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423096	04/09/19 06:11	JLC	TAL SL
Total/NA	Analysis	9320		1	424956	04/22/19 09:07	TJR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426774	05/06/19 10:34	SMP	TAL SL

Laboratory References:

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

Accreditation/Certification Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Laboratory: Eurofins TestAmerica, Cedar Falls

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
AIHA-LAP, LLC	IHLAP		101044	11-01-20
Georgia	State Program	4	IA100001 (OR)	09-29-19
Illinois	NELAP	5	200024	11-29-19
Iowa	State Program	7	007	12-01-19
Kansas	NELAP	7	E-10341	01-31-20
Minnesota	NELAP	5	019-999-319	12-31-19
Minnesota (Petrofund)	State Program	1	3349	08-22-19
North Dakota	State Program	8	R-186	09-29-19
Oregon	NELAP	10	IA100001	09-29-19
USDA	Federal		P330-19-00003	01-02-22

Laboratory: Eurofins 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	06-30-19
ANAB	DoD		L2305	04-06-22
Arizona	State Program	9	AZ0813	12-08-19
California	State Program	9	2886	06-30-19 *
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-19 *
Hawaii	State Program	9	NA	06-30-19
Illinois	NELAP	5	200023	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-19
Louisiana (DW)	NELAP	6	LA011	12-31-19
Maryland	State Program	3	310	09-30-19
Michigan	State Program	5	9005	06-30-19
Missouri	State Program	7	780	06-30-19
Nevada	State Program	9	MO000542018-1	07-31-19
New Jersey	NELAP	2	MO002	06-30-19 *
New York	NELAP	2	11616	03-31-20
North Dakota	State Program	8	R207	06-30-19 *
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-19
Pennsylvania	NELAP	3	68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-19
Texas	NELAP	6	T104704193-18-13	07-31-19
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542018-10	07-31-19
Virginia	NELAP	3	460230	06-14-19 *
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19

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

Method Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

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

Protocol References:

None = None

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

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

Laboratory References:

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



Cooler/Sample Receipt and Temperature Log Form

Client Information	
Client: Muscatine Power & Water	
City/State: Muscatine IA	Project:
Receipt Information	
Date/Time Received: 3/22/19 0900	Received By: JB
Delivery Type: <input checked="" type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> TA Courier <input type="checkbox"/> TA Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____	
Condition of Cooler/Containers	
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes: Cooler ID: _____
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Cooler # _____ of _____
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Which VOA samples are in cooler? ↓
Temperature Record	
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE	
Thermometer ID: M	Correction Factor (°C): -0.1
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature	
Uncorrected Temp (°C): 1.8	Corrected Temp (°C): 1.7
• Sample Container Temperature	
Container type(s) used:	
Uncorrected Temp (°C):	Corrected Temp (°C):
Exceptions Noted	
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No	
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No	
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No	
NOTE: If yes, contact PM before proceeding. If no, proceed with login	
Additional Comments	
MW 14A on COC's, bottles JB 3/22/19	

Chain of Custody Record

Client Information Client Contact: Sam Bennett Company: Muscatine Power & Water Address: 1700 Dick Drake Way City: Muscatine State, Zip: IA, 52761 Phone: 563-262-3583 (Tel) Email: sbennett@mpw.org Project Name: Muscatine Power & Water CCR Site: Iowa		Sampler: Sam Bennett/ Neil Hoskins Lab PM: Hayes, Shawn M Phone: 563-262-3583 E-Mail: shawn.hayes@testamericainc.com		Carrier Tracking No(s): Job #:		COC No: Page: Page 1 of 1	
Due Date Requested: TAT Requested (days): PO #: 191195 WO #:		Analysis Requested		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:		Total Number of Containers	
Sample Identification MW-14A MW-15A MW-21 MW-22 DUP		Sample Date 3/20/19 3/20/19 3/20/19 3/19/19 3/20/19		Sample Time 1120 1000 0820 1145 1200		Matrix (Water, Sewage, Oil, Other)	
Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological		Deliverable Requested: I, II, III, IV, Other (specify)		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months		Special Instructions/Note:	
Empty Kit Relinquished by:		Date:		Method of Shipment:		Special Instructions/OC Requirements:	
Relinquished by: Sam Bennett Relinquished by:		Date/Time: 3-21-19 0830 Date/Time:		Received by: [Signature] Date/Time: 3/22/19 0940 Company: TA		Company:	
Relinquished by:		Date/Time:		Received by:		Date/Time:	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		Company:	



Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container pH</u>	<u>Preservative Added (mls)</u>	<u>Lot #</u>
MW-14A	310-151614-A-1	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-14A	310-151614-C-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-14A	310-151614-D-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-15A	310-151614-A-2	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-15A	310-151614-C-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-15A	310-151614-D-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-21	310-151614-A-3	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-21	310-151614-C-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-21	310-151614-D-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-22	310-151614-A-4	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-22	310-151614-C-4	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-22	310-151614-D-4	Plastic 1 liter - Nitric Acid	<	_____	_____
DUP	310-151614-A-5	Plastic 250ml - with Nitric Acid	<	_____	_____
DUP	310-151614-C-5	Plastic 1 liter - Nitric Acid	<	_____	_____
DUP	310-151614-D-5	Plastic 1 liter - Nitric Acid	<	_____	_____

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151614-2

Login Number: 151614

List Source: Eurofins TestAmerica, Cedar Falls

List Number: 1

Creator: Bovy, Lorrainna L

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Time on bottles for DUP says 0820, logged per COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151614-2

Login Number: 151614

List Source: Eurofins TestAmerica, St. Louis

List Number: 2

List Creation: 03/25/19 08:09 AM

Creator: Hellm, Michael

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	22.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Tracer/Carrier Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151614-2

Method: 9315 - Radium-226 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)
310-151614-1	MW-14A	96.5
310-151614-2	MW-15A	92.9
310-151614-3	MW-21	91.2
310-151614-4	MW-22	92.1
LCS 160-423095/1-A	Lab Control Sample	92.7
LCS 160-423138/1-A	Lab Control Sample	74.3
LCSD 160-423095/2-A	Lab Control Sample Dup	98.6
MB 160-423095/23-A	Method Blank	97.2
MB 160-423138/18-A	Method Blank	108

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)
310-151614-1	MW-14A	96.5	84.9
310-151614-2	MW-15A	92.9	85.2
310-151614-3	MW-21	95.3	89.7
310-151614-4	MW-22	96.2	90.8
LCS 160-423096/1-A	Lab Control Sample	96.8	92.0
LCS 160-423142/1-A	Lab Control Sample	74.3	81.1
LCSD 160-423096/2-A	Lab Control Sample Dup	103	95.3
MB 160-423096/23-A	Method Blank	101	91.6
MB 160-423142/18-A	Method Blank	108	81.9

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

TestAmerica Job ID: 310-151622-1

Client Project/Site: Muscatine Power & Water CCR

For:

Muscatine Power & Water
1700 Dick Drake Way
PO BOX 899
Muscatine, Iowa 52761

Attn: Sam Bennett



Authorized for release by:
4/3/2019 4:55:38 PM

Shawn Hayes, Senior Project Manager
(319)229-8211
shawn.hayes@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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Case Narrative

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Job ID: 310-151622-1

Laboratory: TestAmerica Cedar Falls

Narrative

Job Narrative
310-151622-1

Comments

No additional comments.

Receipt

The samples were received on 3/22/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.4° C.

HPLC/IC

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

Metals

Method(s) 6020A: The continuing calibration verification (CCV) associated with batch 310-234169 recovered above the upper control limit for Boron. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The following samples are impacted: MW-4B (310-151622-1), MW-5B (310-151622-2), MW-6A (310-151622-3), MW-08 (310-151622-4) and MW-10 (310-151622-5).

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

General Chemistry

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

Sample Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-151622-1	MW-4B	Water	03/19/19 13:05	03/22/19 09:00
310-151622-2	MW-5B	Water	03/19/19 15:00	03/22/19 09:00
310-151622-3	MW-6A	Water	03/19/19 14:00	03/22/19 09:00
310-151622-4	MW-08	Water	03/18/19 12:15	03/22/19 09:00
310-151622-5	MW-10	Water	03/19/19 09:40	03/22/19 09:00

Detection Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-4B

Lab Sample ID: 310-151622-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	16.0		5.00		mg/L	5		9056A	Total/NA
Fluoride	0.771		0.500		mg/L	5		9056A	Total/NA
Sulfate	48.0		5.00		mg/L	5		9056A	Total/NA
Barium	0.161		0.00200		mg/L	1		6020A	Total/NA
Calcium	99.7		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	398		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.7	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-5B

Lab Sample ID: 310-151622-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	55.0		5.00		mg/L	5		9056A	Total/NA
Sulfate	85.0		5.00		mg/L	5		9056A	Total/NA
Barium	0.326		0.00200		mg/L	1		6020A	Total/NA
Calcium	134		0.500		mg/L	1		6020A	Total/NA
Molybdenum	0.00212		0.00200		mg/L	1		6020A	Total/NA
Total Dissolved Solids	562		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.3	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-6A

Lab Sample ID: 310-151622-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.200		0.00200		mg/L	1		6020A	Total/NA
Calcium	73.2		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	320		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.4	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-08

Lab Sample ID: 310-151622-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	16.1		5.00		mg/L	5		9056A	Total/NA
Sulfate	223		5.00		mg/L	5		9056A	Total/NA
Barium	0.0751		0.00200		mg/L	1		6020A	Total/NA
Calcium	97.6		0.500		mg/L	1		6020A	Total/NA
Cobalt	0.00177		0.000500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	612		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.3	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-10

Lab Sample ID: 310-151622-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	42.8		5.00		mg/L	5		9056A	Total/NA
Arsenic	0.00560		0.00200		mg/L	1		6020A	Total/NA
Barium	0.185		0.00200		mg/L	1		6020A	Total/NA
Calcium	76.3		0.500		mg/L	1		6020A	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Cedar Falls

Detection Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-10 (Continued)

Lab Sample ID: 310-151622-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cobalt	0.000783		0.000500		mg/L	1		6020A	Total/NA
Molybdenum	0.00341		0.00200		mg/L	1		6020A	Total/NA
Total Dissolved Solids	326		30.0		mg/L	1		SM 2540C	Total/NA
Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.3	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Cedar Falls

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-4B

Lab Sample ID: 310-151622-1

Date Collected: 03/19/19 13:05

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	16.0		5.00		mg/L			03/27/19 14:53	5
Fluoride	0.771		0.500		mg/L			03/27/19 14:53	5
Sulfate	48.0		5.00		mg/L			03/27/19 14:53	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:26	1
Arsenic	<0.00200		0.00200		mg/L		03/26/19 08:00	03/29/19 23:26	1
Barium	0.161		0.00200		mg/L		03/26/19 08:00	03/29/19 23:26	1
Beryllium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:26	1
Boron	<0.200	^	0.200		mg/L		03/26/19 08:00	03/29/19 23:26	1
Cadmium	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:26	1
Calcium	99.7		0.500		mg/L		03/26/19 08:00	03/29/19 23:26	1
Chromium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:26	1
Cobalt	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:26	1
Lead	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:26	1
Lithium	<0.0100		0.0100		mg/L		03/26/19 08:00	03/29/19 23:26	1
Molybdenum	<0.00200		0.00200		mg/L		03/26/19 08:00	03/29/19 23:26	1
Selenium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:26	1
Thallium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:26	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 13:58	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	398		30.0		mg/L			03/22/19 14:03	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.7	HF	0.1		SU			03/22/19 20:13	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-5B

Lab Sample ID: 310-151622-2

Date Collected: 03/19/19 15:00

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	55.0		5.00		mg/L			03/27/19 15:06	5
Fluoride	<0.500		0.500		mg/L			03/27/19 15:06	5
Sulfate	85.0		5.00		mg/L			03/27/19 15:06	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:29	1
Arsenic	<0.00200		0.00200		mg/L		03/26/19 08:00	03/29/19 23:29	1
Barium	0.326		0.00200		mg/L		03/26/19 08:00	03/29/19 23:29	1
Beryllium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:29	1
Boron	<0.200	^	0.200		mg/L		03/26/19 08:00	03/29/19 23:29	1
Cadmium	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:29	1
Calcium	134		0.500		mg/L		03/26/19 08:00	03/29/19 23:29	1
Chromium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:29	1
Cobalt	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:29	1
Lead	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:29	1
Lithium	<0.0100		0.0100		mg/L		03/26/19 08:00	03/29/19 23:29	1
Molybdenum	0.00212		0.00200		mg/L		03/26/19 08:00	03/29/19 23:29	1
Selenium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:29	1
Thallium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:29	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 14:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	562		30.0		mg/L			03/22/19 14:03	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1		SU			03/22/19 15:53	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-6A

Lab Sample ID: 310-151622-3

Date Collected: 03/19/19 14:00

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L	-		03/27/19 15:19	5
Fluoride	<0.500		0.500		mg/L	-		03/27/19 15:19	5
Sulfate	<5.00		5.00		mg/L	-		03/27/19 15:19	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Arsenic	<0.00200		0.00200		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Barium	0.200		0.00200		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Beryllium	<0.00100		0.00100		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Boron	<0.200	^	0.200		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Cadmium	<0.000500		0.000500		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Calcium	73.2		0.500		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Chromium	<0.00500		0.00500		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Cobalt	<0.000500		0.000500		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Lead	<0.000500		0.000500		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Lithium	<0.0100		0.0100		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Molybdenum	<0.00200		0.00200		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Selenium	<0.00500		0.00500		mg/L	-	03/26/19 08:00	03/29/19 23:33	1
Thallium	<0.00100		0.00100		mg/L	-	03/26/19 08:00	03/29/19 23:33	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L	-	03/25/19 14:51	03/26/19 14:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	320		30.0		mg/L	-		03/22/19 14:03	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.4	HF	0.1		SU	-		03/22/19 15:52	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-08
Date Collected: 03/18/19 12:15
Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-4
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	16.1		5.00		mg/L			03/27/19 15:31	5
Fluoride	<0.500		0.500		mg/L			03/27/19 15:31	5
Sulfate	223		5.00		mg/L			03/27/19 15:31	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:36	1
Arsenic	<0.00200		0.00200		mg/L		03/26/19 08:00	03/29/19 23:36	1
Barium	0.0751		0.00200		mg/L		03/26/19 08:00	03/29/19 23:36	1
Beryllium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:36	1
Boron	<0.200	^	0.200		mg/L		03/26/19 08:00	03/29/19 23:36	1
Cadmium	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:36	1
Calcium	97.6		0.500		mg/L		03/26/19 08:00	03/29/19 23:36	1
Chromium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:36	1
Cobalt	0.00177		0.000500		mg/L		03/26/19 08:00	03/29/19 23:36	1
Lead	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:36	1
Lithium	<0.0100		0.0100		mg/L		03/26/19 08:00	03/29/19 23:36	1
Molybdenum	<0.00200		0.00200		mg/L		03/26/19 08:00	03/29/19 23:36	1
Selenium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:36	1
Thallium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:36	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 14:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	612		30.0		mg/L			03/22/19 14:03	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1		SU			03/22/19 15:50	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-10
Date Collected: 03/19/19 09:40
Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-5
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			03/27/19 15:44	5
Fluoride	<0.500		0.500		mg/L			03/27/19 15:44	5
Sulfate	42.8		5.00		mg/L			03/27/19 15:44	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:39	1
Arsenic	0.00560		0.00200		mg/L		03/26/19 08:00	03/29/19 23:39	1
Barium	0.185		0.00200		mg/L		03/26/19 08:00	03/29/19 23:39	1
Beryllium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:39	1
Boron	<0.200	^	0.200		mg/L		03/26/19 08:00	03/29/19 23:39	1
Cadmium	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:39	1
Calcium	76.3		0.500		mg/L		03/26/19 08:00	03/29/19 23:39	1
Chromium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:39	1
Cobalt	0.000783		0.000500		mg/L		03/26/19 08:00	03/29/19 23:39	1
Lead	<0.000500		0.000500		mg/L		03/26/19 08:00	03/29/19 23:39	1
Lithium	<0.0100		0.0100		mg/L		03/26/19 08:00	03/29/19 23:39	1
Molybdenum	0.00341		0.00200		mg/L		03/26/19 08:00	03/29/19 23:39	1
Selenium	<0.00500		0.00500		mg/L		03/26/19 08:00	03/29/19 23:39	1
Thallium	<0.00100		0.00100		mg/L		03/26/19 08:00	03/29/19 23:39	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 14:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	326		30.0		mg/L			03/22/19 14:03	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1		SU			03/22/19 15:48	1

Definitions/Glossary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Qualifiers

Metals

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

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

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

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-233804/3
Matrix: Water
Analysis Batch: 233804

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			03/27/19 08:38	1
Fluoride	<0.100		0.100		mg/L			03/27/19 08:38	1
Sulfate	<1.00		1.00		mg/L			03/27/19 08:38	1

Lab Sample ID: LCS 310-233804/4
Matrix: Water
Analysis Batch: 233804

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7.50	7.209		mg/L		96	90 - 110
Fluoride	1.50	1.516		mg/L		101	90 - 110
Sulfate	7.50	7.559		mg/L		101	90 - 110

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 310-233449/1-A
Matrix: Water
Analysis Batch: 234466

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 233449

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		03/26/19 08:00	04/02/19 14:46	1
Arsenic	<0.00200		0.00200		mg/L		03/26/19 08:00	04/02/19 14:46	1
Barium	<0.00200		0.00200		mg/L		03/26/19 08:00	04/02/19 14:46	1
Beryllium	<0.00100		0.00100		mg/L		03/26/19 08:00	04/02/19 14:46	1
Boron	<0.200		0.200		mg/L		03/26/19 08:00	04/02/19 14:46	1
Cadmium	<0.000500		0.000500		mg/L		03/26/19 08:00	04/02/19 14:46	1
Calcium	<0.500		0.500		mg/L		03/26/19 08:00	04/02/19 14:46	1
Chromium	<0.00500		0.00500		mg/L		03/26/19 08:00	04/02/19 14:46	1
Cobalt	<0.000500		0.000500		mg/L		03/26/19 08:00	04/02/19 14:46	1
Lead	<0.000500		0.000500		mg/L		03/26/19 08:00	04/02/19 14:46	1
Lithium	<0.0100		0.0100		mg/L		03/26/19 08:00	04/02/19 14:46	1
Molybdenum	<0.00200		0.00200		mg/L		03/26/19 08:00	04/02/19 14:46	1
Selenium	<0.00500		0.00500		mg/L		03/26/19 08:00	04/02/19 14:46	1
Thallium	<0.00100		0.00100		mg/L		03/26/19 08:00	04/02/19 14:46	1

Lab Sample ID: LCS 310-233449/2-A
Matrix: Water
Analysis Batch: 234466

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233449

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.0200	0.01943		mg/L		97	80 - 120
Arsenic	0.0400	0.04408		mg/L		110	80 - 120
Barium	0.0400	0.04078		mg/L		102	80 - 120
Beryllium	0.0200	0.01935		mg/L		97	80 - 120
Boron	0.880	1.037		mg/L		118	80 - 120
Cadmium	0.0200	0.01948		mg/L		97	80 - 120
Calcium	2.00	2.025		mg/L		101	80 - 120
Chromium	0.0400	0.03562		mg/L		89	80 - 120

TestAmerica Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

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

Lab Sample ID: LCS 310-233449/2-A
 Matrix: Water
 Analysis Batch: 234466

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 233449
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cobalt	0.0200	0.01994		mg/L		100	80 - 120
Lead	0.0200	0.01979		mg/L		99	80 - 120
Lithium	0.100	0.1074		mg/L		107	80 - 120
Molybdenum	0.0400	0.03937		mg/L		98	80 - 120
Selenium	0.0400	0.04272		mg/L		107	80 - 120
Thallium	0.0160	0.01564		mg/L		98	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 310-233467/1-A
 Matrix: Water
 Analysis Batch: 233627

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 233467

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		03/25/19 14:51	03/26/19 13:43	1

Lab Sample ID: LCS 310-233467/2-A
 Matrix: Water
 Analysis Batch: 233627

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 233467
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.00167	0.001701		mg/L		102	80 - 120

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

Lab Sample ID: MB 310-233311/1
 Matrix: Water
 Analysis Batch: 233311

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<30.0		30.0		mg/L			03/22/19 14:03	1

Lab Sample ID: LCS 310-233311/2
 Matrix: Water
 Analysis Batch: 233311

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Total Dissolved Solids	1000	1004		mg/L		100	90 - 110

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-233319/1
 Matrix: Water
 Analysis Batch: 233319

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
pH	7.00	7.0		SU		100	98 - 102

TestAmerica Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Method: SM 4500 H+ B - pH (Continued)

Lab Sample ID: LCS 310-233344/1
Matrix: Water
Analysis Batch: 233344

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		99	98 - 102

Lab Sample ID: LCS 310-233344/27
Matrix: Water
Analysis Batch: 233344

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	98 - 102

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

HPLC/IC

Analysis Batch: 233804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	9056A	
310-151622-2	MW-5B	Total/NA	Water	9056A	
310-151622-3	MW-6A	Total/NA	Water	9056A	
310-151622-4	MW-08	Total/NA	Water	9056A	
310-151622-5	MW-10	Total/NA	Water	9056A	
MB 310-233804/3	Method Blank	Total/NA	Water	9056A	
LCS 310-233804/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 233449

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	3010A	
310-151622-2	MW-5B	Total/NA	Water	3010A	
310-151622-3	MW-6A	Total/NA	Water	3010A	
310-151622-4	MW-08	Total/NA	Water	3010A	
310-151622-5	MW-10	Total/NA	Water	3010A	
MB 310-233449/1-A	Method Blank	Total/NA	Water	3010A	
LCS 310-233449/2-A	Lab Control Sample	Total/NA	Water	3010A	

Prep Batch: 233467

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	7470A	
310-151622-2	MW-5B	Total/NA	Water	7470A	
310-151622-3	MW-6A	Total/NA	Water	7470A	
310-151622-4	MW-08	Total/NA	Water	7470A	
310-151622-5	MW-10	Total/NA	Water	7470A	
MB 310-233467/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-233467/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 233627

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	7470A	233467
310-151622-2	MW-5B	Total/NA	Water	7470A	233467
310-151622-3	MW-6A	Total/NA	Water	7470A	233467
310-151622-4	MW-08	Total/NA	Water	7470A	233467
310-151622-5	MW-10	Total/NA	Water	7470A	233467
MB 310-233467/1-A	Method Blank	Total/NA	Water	7470A	233467
LCS 310-233467/2-A	Lab Control Sample	Total/NA	Water	7470A	233467

Analysis Batch: 234169

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	6020A	233449
310-151622-2	MW-5B	Total/NA	Water	6020A	233449
310-151622-3	MW-6A	Total/NA	Water	6020A	233449
310-151622-4	MW-08	Total/NA	Water	6020A	233449
310-151622-5	MW-10	Total/NA	Water	6020A	233449

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Metals (Continued)

Analysis Batch: 234466

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-233449/1-A	Method Blank	Total/NA	Water	6020A	233449
LCS 310-233449/2-A	Lab Control Sample	Total/NA	Water	6020A	233449

General Chemistry

Analysis Batch: 233311

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	SM 2540C	
310-151622-2	MW-5B	Total/NA	Water	SM 2540C	
310-151622-3	MW-6A	Total/NA	Water	SM 2540C	
310-151622-4	MW-08	Total/NA	Water	SM 2540C	
310-151622-5	MW-10	Total/NA	Water	SM 2540C	
MB 310-233311/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-233311/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 233319

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-2	MW-5B	Total/NA	Water	SM 4500 H+ B	
310-151622-3	MW-6A	Total/NA	Water	SM 4500 H+ B	
310-151622-4	MW-08	Total/NA	Water	SM 4500 H+ B	
310-151622-5	MW-10	Total/NA	Water	SM 4500 H+ B	
LCS 310-233319/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 233344

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	SM 4500 H+ B	
LCS 310-233344/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCS 310-233344/27	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-4B

Date Collected: 03/19/19 13:05

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 14:53	MLU	TAL CF
Total/NA	Prep	3010A			233449	03/26/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	234169	03/29/19 23:26	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 13:58	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233311	03/22/19 14:03	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233344	03/22/19 20:13	JMH	TAL CF

Client Sample ID: MW-5B

Date Collected: 03/19/19 15:00

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 15:06	MLU	TAL CF
Total/NA	Prep	3010A			233449	03/26/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	234169	03/29/19 23:29	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 14:00	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233311	03/22/19 14:03	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:53	JWG	TAL CF

Client Sample ID: MW-6A

Date Collected: 03/19/19 14:00

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 15:19	MLU	TAL CF
Total/NA	Prep	3010A			233449	03/26/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	234169	03/29/19 23:33	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 14:07	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233311	03/22/19 14:03	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:52	JWG	TAL CF

Client Sample ID: MW-08

Date Collected: 03/18/19 12:15

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 15:31	MLU	TAL CF
Total/NA	Prep	3010A			233449	03/26/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	234169	03/29/19 23:36	SAD	TAL CF

TestAmerica Cedar Falls

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Client Sample ID: MW-08

Date Collected: 03/18/19 12:15

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 14:09	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233311	03/22/19 14:03	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:50	JWG	TAL CF

Client Sample ID: MW-10

Date Collected: 03/19/19 09:40

Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	233804	03/27/19 15:44	MLU	TAL CF
Total/NA	Prep	3010A			233449	03/26/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	234169	03/29/19 23:39	SAD	TAL CF
Total/NA	Prep	7470A			233467	03/25/19 14:51	JNR	TAL CF
Total/NA	Analysis	7470A		1	233627	03/26/19 14:11	JNR	TAL CF
Total/NA	Analysis	SM 2540C		1	233311	03/22/19 14:03	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	233319	03/22/19 15:48	JWG	TAL CF

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Laboratory: TestAmerica Cedar Falls

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
AIHA-LAP, LLC	IHLAP		101044	11-01-20
Georgia	State Program	4	IA100001 (OR)	09-29-19
Illinois	NELAP	5	200024	11-29-19
Iowa	State Program	7	007	12-01-19
Kansas	NELAP	7	E-10341	01-31-20
Minnesota	NELAP	5	019-999-319	12-31-19
Minnesota (Petrofund)	State Program	1	3349	08-22-19
North Dakota	State Program	8	R-186	09-29-19
Oregon	NELAP	10	IA100001	09-29-19
USDA	Federal		P330-19-00003	01-02-22

Method Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

TestAmerica Job ID: 310-151622-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF
6020A	Metals (ICP/MS)	SW846	TAL CF
7470A	Mercury (CVAA)	SW846	TAL CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CF
SM 4500 H+ B	pH	SM	TAL CF
3010A	Preparation, Total Metals	SW846	TAL CF
7470A	Preparation, Mercury	SW846	TAL CF

Protocol References:

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

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

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401



Cooler/Sample Receipt and Temperature Log Form

Client Information	
Client: <i>Muscataie Power+Water</i>	
City/State: <i>Muscataie IA</i>	Project: <i>MUSCATAIE Power+Water CCR</i>
Receipt Information	
Date/Time Received: <i>3/22/19 0900</i>	Received By: <i>ZB</i>
Delivery Type: <input checked="" type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> TA Courier <input type="checkbox"/> TA Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____	
Condition of Cooler/Containers	
Sample(s) received in Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____
Multiple Coolers? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # _____ of _____
Cooler Custody Seals Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓
Temperature Record	
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE	
Thermometer ID: <i>M</i>	Correction Factor (°C): <i>-0.1</i>
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature	
Uncorrected Temp (°C): <i>0.5</i>	Corrected Temp (°C): <i>0.4</i>
• Sample Container Temperature	
Container type(s) used: _____	
Uncorrected Temp (°C): _____	Corrected Temp (°C): _____
Exceptions Noted	
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No	
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No	
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No	
NOTE: If yes, contact PM before proceeding. If no, proceed with login	
Additional Comments	
<i>MW-4B on COC-bottles say MW-4A</i>	

Client Information Client Contact: Sam Bennett Phone: 563-262-3583 E-Mail: shawn.hayes@lestamericainc.com		Lab PM: Hayes, Shawn M E-Mail: shawn.hayes@lestamericainc.com		Carrier Tracking No(s): Page: Page 1 of 1 Job #:	
Company: Muscatine Power & Water Address: 1700 Dick Drake Way City: Muscatine State, Zip: IA, 52761 Phone: 563-262-3583 (Tel) Email: sbennett@mpw.org Project Name: Muscatine Power & Water CCR Site: Iowa		Due Date Requested: TAT Requested (days): PO #: 191195 WO #: Project #: SSOW#:		Analysis Requested Appendix III / Appendix IV (minus Radium) per quote 3101959-0 Appendix III / Appendix IV per quote 3101959-0 State Parameters per quote 3101959-0 Perform MS/MSD (Yes or No) Field Filtered Sample (Yes or No)	
Sample Identification MW-4B MW-5B MW-6A MW-08 MW-10		Sample Date 3/19/19 3/19/19 3/19/19 3/18/19 3/19/19		Sample Time 1305 1500 1400 1215 0940	
Matrix (Water, Soak, Over-sat, etc.) Preservation Code:		G G G G G		Water Water Water Water Water	
Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological		Deliverable Requested: I, II, III, IV, Other (specify)		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months	
Empty Kit Relinquished by: Sam Bennett Relinquished by: Sam Bennett Relinquished by: Relinquished by:		Date/Time: 3-21-19 0830 Date/Time: Date/Time:		Method of Shipment: Date/Time: 3/22/19 0900 Date/Time: Date/Time:	
Custody Seals Intact: Δ Yes Δ No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:	



Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container</u> pH	<u>Preservative</u> Added (mls)	<u>Lot #</u>
MW-4B	310-151622-A-1	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-4B	310-151622-C-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-4B	310-151622-D-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-5B	310-151622-A-2	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-5B	310-151622-C-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-5B	310-151622-D-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-6A	310-151622-A-3	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-6A	310-151622-C-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-6A	310-151622-D-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-08	310-151622-A-4	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-08	310-151622-C-4	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-08	310-151622-D-4	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-10	310-151622-A-5	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-10	310-151622-C-5	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-10	310-151622-D-5	Plastic 1 liter - Nitric Acid	<	_____	_____



Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151622-1

Login Number: 151622

List Source: TestAmerica Cedar Falls

List Number: 1

Creator: Bovy, Lorrainna L

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-151622-2

Client Project/Site: Muscatine Power & Water CCR

For:

Muscatine Power & Water
1700 Dick Drake Way
PO BOX 899
Muscatine, Iowa 52761

Attn: Sam Bennett



Authorized for release by:
5/6/2019 12:07:34 PM

Shawn Hayes, Senior Project Manager
(319)229-8211
shawn.hayes@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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Case Narrative

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Job ID: 310-151622-2

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

Job Narrative
310-151622-2

Comments

No additional comments.

Receipt

The samples were received on 3/22/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.4° C.

RAD

Method(s) 9315: Ra-226 Prep Batch 160-423097

The LCS spike recovery (73%) is just below the lower QC limit (75%) indicating a potential low bias to sample results. The MS and MSD spike recoveries are within limits demonstrating acceptable method performance, the MS/MSD RPD is within limits demonstrating good replicate precision, and the MB is less than the MDC. All of the sample results are well below the Ra-226 RL of 1 pCi/L (maximum result of 0.22 pCi/L), and the Combined Ra-226 + Ra-228 results are considerably (~5 times or more) below the CCR regulatory limit of 5 pCi/L. The laboratory does not believe this excursion significantly affects the data.

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

Sample Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-151622-1	MW-4B	Water	03/19/19 13:05	03/22/19 09:00
310-151622-2	MW-5B	Water	03/19/19 15:00	03/22/19 09:00
310-151622-3	MW-6A	Water	03/19/19 14:00	03/22/19 09:00
310-151622-4	MW-08	Water	03/18/19 12:15	03/22/19 09:00
310-151622-5	MW-10	Water	03/19/19 09:40	03/22/19 09:00

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Client Sample ID: MW-4B

Lab Sample ID: 310-151622-1

Date Collected: 03/19/19 13:05

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.218	*	0.0904	0.0926	1.00	0.0936	pCi/L	04/09/19 06:13	05/01/19 07:04	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	99.4		40 - 110					04/09/19 06:13	05/01/19 07:04	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.218	U	0.206	0.207	1.00	0.333	pCi/L	04/09/19 06:46	04/23/19 08:52	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	99.4		40 - 110					04/09/19 06:46	04/23/19 08:52	1
Y Carrier	90.5		40 - 110					04/09/19 06:46	04/23/19 08:52	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.436		0.225	0.227	5.00	0.333	pCi/L		05/06/19 11:12	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Client Sample ID: MW-5B

Lab Sample ID: 310-151622-2

Date Collected: 03/19/19 15:00

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.196	*	0.0918	0.0935	1.00	0.108	pCi/L	04/09/19 06:13	05/01/19 07:04	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	97.9		40 - 110					04/09/19 06:13	05/01/19 07:04	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.372		0.234	0.236	1.00	0.360	pCi/L	04/09/19 06:46	04/23/19 08:52	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	97.9		40 - 110					04/09/19 06:46	04/23/19 08:52	1
Y Carrier	91.6		40 - 110					04/09/19 06:46	04/23/19 08:52	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.568		0.251	0.254	5.00	0.360	pCi/L		05/06/19 11:12	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Client Sample ID: MW-6A

Lab Sample ID: 310-151622-3

Date Collected: 03/19/19 14:00

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.220	*	0.0919	0.0940	1.00	0.0903	pCi/L	04/09/19 06:13	05/01/19 07:04	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	90.0		40 - 110					04/09/19 06:13	05/01/19 07:04	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.260	U	0.219	0.220	1.00	0.348	pCi/L	04/09/19 06:46	04/23/19 08:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	90.0		40 - 110					04/09/19 06:46	04/23/19 08:53	1
Y Carrier	92.7		40 - 110					04/09/19 06:46	04/23/19 08:53	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.481		0.238	0.239	5.00	0.348	pCi/L		05/06/19 11:12	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Client Sample ID: MW-08

Lab Sample ID: 310-151622-4

Date Collected: 03/18/19 12:15

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0229	U *	0.0529	0.0530	1.00	0.0980	pCi/L	04/09/19 06:13	05/01/19 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	95.9		40 - 110					04/09/19 06:13	05/01/19 07:05	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.194	U	0.181	0.182	1.00	0.291	pCi/L	04/09/19 06:46	04/23/19 08:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	95.9		40 - 110					04/09/19 06:46	04/23/19 08:53	1
Y Carrier	97.2		40 - 110					04/09/19 06:46	04/23/19 08:53	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.217	U	0.189	0.190	5.00	0.291	pCi/L		05/06/19 11:12	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Client Sample ID: MW-10

Lab Sample ID: 310-151622-5

Date Collected: 03/19/19 09:40

Matrix: Water

Date Received: 03/22/19 09:00

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.153	*	0.0808	0.0820	1.00	0.0936	pCi/L	04/09/19 06:13	05/01/19 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	90.3		40 - 110					04/09/19 06:13	05/01/19 07:05	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.178	U	0.220	0.221	1.00	0.365	pCi/L	04/09/19 06:46	04/23/19 08:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	90.3		40 - 110					04/09/19 06:46	04/23/19 08:53	1
Y Carrier	92.7		40 - 110					04/09/19 06:46	04/23/19 08:53	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.331	U	0.234	0.236	5.00	0.365	pCi/L		05/06/19 11:12	1

Definitions/Glossary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Qualifiers

Rad

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

Glossary

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

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-423097/24-A
Matrix: Water
Analysis Batch: 426332

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 423097

Analyte	MB	MB	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.01750	U	0.0379	0.0379	1.00	0.0709	pCi/L	04/09/19 06:13	05/01/19 07:10	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Ba Carrier	108		40 - 110					04/09/19 06:13	05/01/19 07:10	1

Lab Sample ID: LCS 160-423097/1-A
Matrix: Water
Analysis Batch: 426333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 423097

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Radium-226	11.4	8.305	*	0.903	1.00	0.0784	pCi/L	73	75 - 125

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-423098/24-A
Matrix: Water
Analysis Batch: 425108

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 423098

Analyte	MB	MB	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	-0.06022	U	0.185	0.186	1.00	0.342	pCi/L	04/09/19 06:46	04/23/19 08:59	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Ba Carrier	108		40 - 110					04/09/19 06:46	04/23/19 08:59	1
Y Carrier	89.3		40 - 110		04/09/19 06:46	04/23/19 08:59	1			

Lab Sample ID: LCS 160-423098/1-A
Matrix: Water
Analysis Batch: 425247

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 423098

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Radium-228	9.27	8.862		1.02	1.00	0.335	pCi/L	96	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Ba Carrier	97.1		40 - 110						
Y Carrier	90.1		40 - 110						

QC Association Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Rad

Prep Batch: 423097

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	PrecSep-21	
310-151622-2	MW-5B	Total/NA	Water	PrecSep-21	
310-151622-3	MW-6A	Total/NA	Water	PrecSep-21	
310-151622-4	MW-08	Total/NA	Water	PrecSep-21	
310-151622-5	MW-10	Total/NA	Water	PrecSep-21	
MB 160-423097/24-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-423097/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 423098

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-151622-1	MW-4B	Total/NA	Water	PrecSep_0	
310-151622-2	MW-5B	Total/NA	Water	PrecSep_0	
310-151622-3	MW-6A	Total/NA	Water	PrecSep_0	
310-151622-4	MW-08	Total/NA	Water	PrecSep_0	
310-151622-5	MW-10	Total/NA	Water	PrecSep_0	
MB 160-423098/24-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-423098/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Client Sample ID: MW-4B

Lab Sample ID: 310-151622-1

Date Collected: 03/19/19 13:05

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423097	04/09/19 06:13	JLC	TAL SL
Total/NA	Analysis	9315		1	426333	05/01/19 07:04	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423098	04/09/19 06:46	JLC	TAL SL
Total/NA	Analysis	9320		1	425247	04/23/19 08:52	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426780	05/06/19 11:12	SMP	TAL SL

Client Sample ID: MW-5B

Lab Sample ID: 310-151622-2

Date Collected: 03/19/19 15:00

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423097	04/09/19 06:13	JLC	TAL SL
Total/NA	Analysis	9315		1	426333	05/01/19 07:04	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423098	04/09/19 06:46	JLC	TAL SL
Total/NA	Analysis	9320		1	425247	04/23/19 08:52	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426780	05/06/19 11:12	SMP	TAL SL

Client Sample ID: MW-6A

Lab Sample ID: 310-151622-3

Date Collected: 03/19/19 14:00

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423097	04/09/19 06:13	JLC	TAL SL
Total/NA	Analysis	9315		1	426333	05/01/19 07:04	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423098	04/09/19 06:46	JLC	TAL SL
Total/NA	Analysis	9320		1	425247	04/23/19 08:53	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426780	05/06/19 11:12	SMP	TAL SL

Client Sample ID: MW-08

Lab Sample ID: 310-151622-4

Date Collected: 03/18/19 12:15

Matrix: Water

Date Received: 03/22/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423097	04/09/19 06:13	JLC	TAL SL
Total/NA	Analysis	9315		1	426333	05/01/19 07:05	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423098	04/09/19 06:46	JLC	TAL SL
Total/NA	Analysis	9320		1	425247	04/23/19 08:53	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426780	05/06/19 11:12	SMP	TAL SL

Lab Chronicle

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Client Sample ID: MW-10
Date Collected: 03/19/19 09:40
Date Received: 03/22/19 09:00

Lab Sample ID: 310-151622-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			423097	04/09/19 06:13	JLC	TAL SL
Total/NA	Analysis	9315		1	426333	05/01/19 07:05	CDR	TAL SL
Total/NA	Prep	PrecSep_0			423098	04/09/19 06:46	JLC	TAL SL
Total/NA	Analysis	9320		1	425247	04/23/19 08:53	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	426780	05/06/19 11:12	SMP	TAL SL

Laboratory References:

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

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Accreditation/Certification Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Laboratory: Eurofins TestAmerica, Cedar Falls

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
AIHA-LAP, LLC	IHLAP		101044	11-01-20
Georgia	State Program	4	IA100001 (OR)	09-29-19
Illinois	NELAP	5	200024	11-29-19
Iowa	State Program	7	007	12-01-19
Kansas	NELAP	7	E-10341	01-31-20
Minnesota	NELAP	5	019-999-319	12-31-19
Minnesota (Petrofund)	State Program	1	3349	08-22-19
North Dakota	State Program	8	R-186	09-29-19
Oregon	NELAP	10	IA100001	09-29-19
USDA	Federal		P330-19-00003	01-02-22

Laboratory: Eurofins 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	06-30-19
ANAB	DoD		L2305	04-06-22
Arizona	State Program	9	AZ0813	12-08-19
California	State Program	9	2886	06-30-19 *
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-19 *
Hawaii	State Program	9	NA	06-30-19
Illinois	NELAP	5	200023	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-19
Louisiana (DW)	NELAP	6	LA011	12-31-19
Maryland	State Program	3	310	09-30-19
Michigan	State Program	5	9005	06-30-19
Missouri	State Program	7	780	06-30-19
Nevada	State Program	9	MO000542018-1	07-31-19
New Jersey	NELAP	2	MO002	06-30-19 *
New York	NELAP	2	11616	03-31-20
North Dakota	State Program	8	R207	06-30-19 *
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-19
Pennsylvania	NELAP	3	68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-19
Texas	NELAP	6	T104704193-18-13	07-31-19
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542018-10	07-31-19
Virginia	NELAP	3	460230	06-14-19 *
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19

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

Eurofins TestAmerica, Cedar Falls

Method Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

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

Protocol References:

None = None

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

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

Laboratory References:

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



Cooler/Sample Receipt and Temperature Log Form

Client Information	
Client: Muscatine Power & Water	
City/State: Muscatine IA	Project: Muscatine Power & Water CCR
Receipt Information	
Date/Time Received: 3/22/19 0900	Received By: ZB
Delivery Type: <input checked="" type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> TA Courier <input type="checkbox"/> TA Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____	
Condition of Cooler/Containers	
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes: Cooler ID: _____
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Cooler # _____ of _____
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Which VOA samples are in cooler? ↓
Temperature Record	
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE	
Thermometer ID: M	Correction Factor (°C): -0.1
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature	
Uncorrected Temp (°C): 0.5	Corrected Temp (°C): 0.4
• Sample Container Temperature	
Container type(s) used:	
Uncorrected Temp (°C):	Corrected Temp (°C):
Exceptions Noted	
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No	
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No	
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No	
NOTE: If yes, contact PM before proceeding. If no, proceed with login	
Additional Comments	
MW-4B on COC-bottles say MW-4A	

Client Information Client Contact: Sam Bennett Phone: 563-262-3583 E-Mail: shawn.hayes@lestamericainc.com		Lab PM: Hayes, Shawn M E-Mail: shawn.hayes@lestamericainc.com		Carrier Tracking No(s): Page: Page 1 of 1 Job #:	
Company: Muscatine Power & Water Address: 1700 Dick Drake Way City: Muscatine State, Zip: IA, 52761 Phone: 563-262-3583 (Tel) Email: sbennett@mpw.org Project Name: Muscatine Power & Water CCR Site: Iowa		Due Date Requested: TAT Requested (days): PO #: 191195 WO #: Project #: SSOW#:		Analysis Requested Appendix III / Appendix IV (minus Radium) per quote 3101959-0 Appendix III / Appendix IV per quote 3101959-0 Perform MS/MSD (Yes or No) Field Filtered Sample (Yes or No) State Parameters per quote 3101959-0 Appendix III / Appendix IV (minus Radium) per quote 3101959-0 Total Number of Containers	
Sample Identification		Sample Date Sample Time Sample Type (C=comp, G=grab) Matrix (Water, Soils, Sludge, Other) Preservation Code:		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other: M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2SO4 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 X - other (specify)	
MW-4B	3/19/19	1305	G	Water	X
MW-5B	3/19/19	1500	G	Water	X
MW-6A	3/19/19	1400	G	Water	X
MW-08	3/18/19	1215	G	Water	X
MW-10	3/19/19	0940	G	Water	X
Special Instructions/Note:					
Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological Deliverable Requested: I, II, III, IV, Other (specify)					
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months					
Special Instructions/OC Requirements:					
Empty Kit Relinquished by: Sam Bennett Relinquished by: Sam Bennett Relinquished by: Relinquished by:		Date/Time: 3-21-19 0830 Date/Time: Date/Time:		Method of Shipment: Date/Time: 3/22/19 0900 Date/Time: Company Date/Time: Company	
Custody Seals Intact: Δ Yes Δ No		Cooler Temperature(s) °C and Other Remarks:			



Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container pH</u>	<u>Preservative Added (mls)</u>	<u>Lot #</u>
MW-4B	310-151622-A-1	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-4B	310-151622-C-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-4B	310-151622-D-1	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-5B	310-151622-A-2	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-5B	310-151622-C-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-5B	310-151622-D-2	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-6A	310-151622-A-3	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-6A	310-151622-C-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-6A	310-151622-D-3	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-08	310-151622-A-4	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-08	310-151622-C-4	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-08	310-151622-D-4	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-10	310-151622-A-5	Plastic 250ml - with Nitric Acid	<	_____	_____
MW-10	310-151622-C-5	Plastic 1 liter - Nitric Acid	<	_____	_____
MW-10	310-151622-D-5	Plastic 1 liter - Nitric Acid	<	_____	_____

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151622-2

Login Number: 151622

List Source: Eurofins TestAmerica, Cedar Falls

List Number: 1

Creator: Bovy, Lorraine L

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151622-2

Login Number: 151622

List Number: 2

Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis

List Creation: 03/25/19 08:09 AM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	22.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-151622-2

Login Number: 151622

List Number: 3

Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis

List Creation: 03/25/19 08:13 AM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	22.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Tracer/Carrier Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-151622-2

Method: 9315 - Radium-226 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Percent Yield (Acceptance Limits)		
310-151622-1	MW-4B	99.4			
310-151622-2	MW-5B	97.9			
310-151622-3	MW-6A	90.0			
310-151622-4	MW-08	95.9			
310-151622-5	MW-10	90.3			
MB 160-423097/24-A	Method Blank	108			

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)	Percent Yield (Acceptance Limits)		
310-151622-1	MW-4B	99.4	90.5			
310-151622-2	MW-5B	97.9	91.6			
310-151622-3	MW-6A	90.0	92.7			
310-151622-4	MW-08	95.9	97.2			
310-151622-5	MW-10	90.3	92.7			
LCS 160-423098/1-A	Lab Control Sample	97.1	90.1			
MB 160-423098/24-A	Method Blank	108	89.3			

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-4A	
Upgradient	Downgradient <input checked="" type="checkbox"/>
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	


B. GROUNDWATER ELEVATION MEASUREMENT (\pm 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 713.45	Ground Elevation 711.18		
Depth of Well 24.55	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (\pm 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/19/2019 12:40	4.95	708.5
*After Purging	3/19/2019 13:05	5.67	707.78
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.66	
No. of Well Volumes (based on current water level) 0.21	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E. 9th St, Des Moines, IA 50319.
 Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

*D. FIELD MEASUREMENT	
Weather Conditions 45DF, NW wind 8 mph, Mostly Cloudy	
Field Measurements (after stabilization):	
Temperature 13.6	Units C
Equipment Used Horiba U-50	
pH 7.26	
Equipment Used Horiba U-50	
Specific Conductance 0.658	Units mS/m
Equipment Used Horiba U-50	

Comments

CERTIFICATION		
I certify under penalty of law I believe the information reported above is true, accurate and complete.		
Signature		Date 1/23/20
Telephone 563-262-3582	Fax	Email neil.hoskins@mpw.org
NOTE: Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.		

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-5B	
Upgradient	Downgradient ^X
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (\pm 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 709.10	Ground Elevation 706.73		
Depth of Well 25.30	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (\pm 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/19/2019 14:35	2.95	706.15
*After Purging	3/19/2019 15:00	3.29	705.81
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.66	
No. of Well Volumes (based on current water level) 0.18	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

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 Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

*D. FIELD MEASUREMENT	
Weather Conditions 47DF, WNW wind @8 mph, Cloudy	
Field Measurements (after stabilization):	
Temperature 9.95	Units C
Equipment Used Horiba U-50	
pH 7.05	
Equipment Used Horiba U-50	
Specific Conductance 0.976	Units mS/m
Equipment Used Horiba U-50	

Comments

CERTIFICATION		
I certify under penalty of law I believe the information reported above is true, accurate and complete.		
Signature		Date
Telephone 563-262-3582	Fax	Email neil.hoskins@mpw.org
NOTE: Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.		

*Omit if only measuring groundwater elevations.

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GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-6A	
Upgradient	Downgradient <input checked="" type="checkbox"/>
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation:

Top of inner well casing 708.92	Ground Elevation 706.49
Depth of Well 25.35	Inside Casing Diameter (in inches) 2"
Equipment Used Slope Indicator Co. Water level indicator Model 51453	

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/19/2019 13:35	3.03	705.89
*After Purging	3/19/2019 14:00	3.27	705.65
*Before Purging			

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 0.66	
No. of Well Volumes (based on current water level) 0.18	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

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***D. FIELD MEASUREMENT**

Weather Conditions 47 DF, NW wind @ 13 mph, Mostly Cloudy

Field Measurements (after stabilization):

Temperature 10.31

Units C

Equipment Used Horiba U-50

pH 7.15

Equipment Used Horiba U-50

Specific Conductance 0.595

Units mS/m

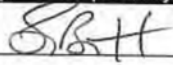
Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature



Date 1-23-20

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-08	
Upgradient <input checked="" type="checkbox"/>	Downgradient <input type="checkbox"/>
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

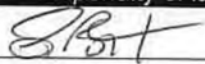
B. GROUNDWATER ELEVATION MEASUREMENT (\pm 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 747.36	Ground Elevation 744.37		
Depth of Well 42.95	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (\pm 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/18/2019 11:25	9.89	737.47
*After Purging	3/18/2019 12:15	16.49	730.87
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 1.32	
No. of Well Volumes (based on current water level) 0.24	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

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 Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

*D. FIELD MEASUREMENT	
Weather Conditions 46 DF, WSW wind @ 8 mph, Mostly Cloudy	
Field Measurements (after stabilization):	
Temperature 11.3	Units C
Equipment Used Horiba U-50	
pH 7.08	
Equipment Used Horiba U-50	
Specific Conductance 0.82	Units mS/m
Equipment Used Horiba U-50	

Comments

CERTIFICATION		
I certify under penalty of law I believe the information reported above is true, accurate and complete.		
Signature 	Date 1-23-20	
Telephone 563-262-3583	Fax	Email sbennett@mpw.org
NOTE: Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.		

*Omit if only measuring groundwater elevations.

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GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-10	
Upgradient <input checked="" type="checkbox"/>	Downgradient <input type="checkbox"/>
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 718.51	Ground Elevation 716.32		
Depth of Well 20.32	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/19/2019 9:00	3.66	714.85
*After Purging	3/19/2019 9:40	3.71	714.8
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 1.06	
No. of Well Volumes (based on current water level) 0.39	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

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***D. FIELD MEASUREMENT**

Weather Conditions 41 DF, Variable wind @ 3 mph, Fair

Field Measurements (after stabilization):

Temperature 6.06	Units C
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Equipment Used Horiba U-50

pH 7.10

Equipment Used Horiba U-50

Specific Conductance 0.657	Units mS/m
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Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature 	Date 1-23-20
--	---------------------

Telephone 563-262-3583	Fax	Email sbennett@mpw.org
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NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-14A	
Upgradient	Downgradient <input checked="" type="checkbox"/>
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (\pm 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 729.00	Ground Elevation 726.19		
Depth of Well 20.50	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (\pm 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/20/2019 10:45	10.09	718.91
*After Purging	3/20/2019 11:20	12.32	716.68
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.92	
No. of Well Volumes (based on current water level) 0.54	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

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*D. FIELD MEASUREMENT	
Weather Conditions 46 DF, W wind @10 mph, Cloudy	
Field Measurements (after stabilization):	
Temperature 7.95	Units C
Equipment Used Horiba U-50	
pH 6.97	
Equipment Used Horiba U-50	
Specific Conductance 2.19	Units mS/m
Equipment Used Horiba U-50	

Comments

CERTIFICATION		
I certify under penalty of law I believe the information reported above is true, accurate and complete.		
Signature 	Date 1/23/20	
Telephone 563-262-3582	Fax	Email neil.hoskins@mpw.org
NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.		

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-15A	
Upgradient	Downgradient ^X
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (+ 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 729.99	Ground Elevation 727.12		
Depth of Well 20.50	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (+ 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/20/2019 9:40	9.22	720.77
*After Purging	3/20/2019 10:00	10.77	719.22
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.53	
No. of Well Volumes (based on current water level) 0.29	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E. 9th St, Des Moines, IA 50319.
 Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

D. FIELD MEASUREMENT*Weather Conditions** 44 DF WSW wind @ 7 mph, Haze**Field Measurements (after stabilization):****Temperature** 7.27 **Units** C**Equipment Used** Horiba U-50**pH** 7.76**Equipment Used** Horiba U-50**Specific Conductance** 1.11 **Units** mS/m**Equipment Used** Horiba U-50**Comments****CERTIFICATION**

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature **Date** 1/23/20**Telephone** 563-262-3582**Fax****Email** neil.hoskins@mpw.org**NOTE:** Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-21	
Upgradient	Downgradient <input checked="" type="checkbox"/>
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

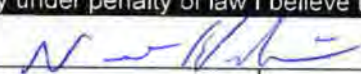
B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 725.75	Ground Elevation 722.81		
Depth of Well 22.20	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/20/2019 7:45	7.77	717.98
*After Purging	3/20/2019 8:20	8.11	717.64
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.92	
No. of Well Volumes (based on current water level) 0.39	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

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 Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

*D. FIELD MEASUREMENT	
Weather Conditions 41 DF, CALM, Cloudy	
Field Measurements (after stabilization):	
Temperature 7.41	Units C
Equipment Used Horiba U-50	
pH 6.41	
Equipment Used Horiba U-50	
Specific Conductance 1.260	Units mS/m
Equipment Used Horiba U-50	

Comments

CERTIFICATION		
I certify under penalty of law I believe the information reported above is true, accurate and complete.		
Signature 	Date 1/23/20	
Telephone 563-262-3582	Fax	Email neil.hoskins@mpw.org
NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.		

*Omit if only measuring groundwater elevations.

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 Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-22	
Upgradient	Downgradient X
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (\pm 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 744.75	Ground Elevation 742.00		
Depth of Well 43.33	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (\pm 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/19/2019 11:25	13.59	730.68
*After Purging	3/19/2019 11:45	18.29	725.98
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.53	
No. of Well Volumes (based on current water level) 0.11	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E. 9th St, Des Moines, IA 50319.
 Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

***D. FIELD MEASUREMENT**

Weather Conditions 46 DF WSW wind @ 8 mph, Mostly Cloudy

Field Measurements (after stabilization):

Temperature 11.17 **Units** C

Equipment Used Horiba U-50

pH 7.21

Equipment Used Horiba U-50

Specific Conductance 0.726 **Units** mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature *Neil Hoskins*

Date 1/23/20

Telephone 563-262-3582

Fax

Email neil.hoskins@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water Permit No. 70-SDP-6_82P
 Monitoring Well/Piezometer No. MW-23
 Upgradient Downgradient _____
 Name of person sampling Neil Hoskins

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? (please check) YES NO

If no, explain _____

Standing Water or Litter? (please check) YES NO

If yes, explain _____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation:

Top of inner well casing 726.90 Ground Elevation 723.73

Depth of Well 27.17 Inside Casing Diameter (in inches) 2

Equipment Used Slope Indicator Co. Water level indicator Model 51453

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/19/19 10:25	3.87	723.03
*After Purging	3/19/19 10:50	8.12	718.78
*Before Purging			

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 0.66

No. of Well Volumes (based on current water level) 0.17

Was well pumped/bailed dry? No

Equipment used:

Bailer type _____ Dedicated Bailer? _____

Pump type Peristaltic Dedicated Pump? Yes

If not dedicated, method of cleaning _____

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319.

Questions? Call or Email: Nina Booker Environmental Engineer Sr., 515-725-8309, nina.booker@dnr.iowa.gov

***D. FIELD MEASUREMENT**

Weather Conditions Partly Cloudy, WNW wind 7 mph

Field Measurements (after stabilization):

Temperature 7.51 Units F

Equipment Used Horiba U-50

pH 7.24

Equipment Used Horiba U-50

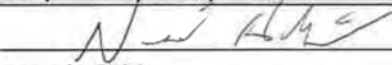
Specific Conductance 0.493 Units mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature  Date 1/23/20

Telephone 563-262-3582 Fax _____ Email neil.hoskins@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319.

Questions? Call or Email: Nina Booker Environmental Engineer Sr., 515-725-8309, nina.booker@dnr.iowa.gov

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water Permit No. 70-SDP-6_82P
 Monitoring Well/Piezometer No. MW-24
 Upgradient Downgradient _____
 Name of person sampling Sam Bennett

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? (please check) YES NO

If no, explain _____

Standing Water or Litter? (please check) YES NO

If yes, explain _____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation:

Top of inner well casing 735.32 Ground Elevation 732.10

Depth of Well 22.22 Inside Casing Diameter (in inches) 2

Equipment Used Slope Indicator Co. Water level indicator Model 51453

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/6/2019 11:20	14.91	720.41
*After Purging	8/6/2019 12:00	15.54	719.78
*Before Purging			

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 1.06

No. of Well Volumes (based on current water level) 0.89

Was well pumped/bailed dry? No

Equipment used:

Bailer type _____ Dedicated Bailer? _____

Pump type Peristaltic Dedicated Pump? Yes

If not dedicated, method of cleaning _____

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319.

Questions? Call or Email: Nina Booker Environmental Engineer Sr., 515-725-8309, nina.booker@dnr.iowa.gov

***D. FIELD MEASUREMENT**

Weather Conditions 70°F, Calm, Partly cloudy

Field Measurements (after stabilization):

Temperature 15.92 Units F

Equipment Used Horiba U-50

pH 6.87

Equipment Used Horiba U-50

Specific Conductance 0.826 Units mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature  Date 1-23-20

Telephone 563-262-3583 Fax _____ Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319.

Questions? Call or Email: Nina Booker Environmental Engineer Sr., 515-725-8309, nina.booker@dnr.iowa.gov

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water Permit No. 70-SDP-6_82P
 Monitoring Well/Piezometer No. MW-25
 Upgradient _____ Downgradient X
 Name of person sampling Sam Bennett

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? (please check) YES NO

If no, explain _____

Standing Water or Litter? (please check) YES NO

If yes, explain _____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation:

Top of inner well casing 739.12 Ground Elevation 736.14

Depth of Well 36.98 Inside Casing Diameter (in inches) 2

Equipment Used Slope Indicator Co. Water level indicator Model 51453

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/6/2019 15:00	18.54	720.58
*After Purging	8/6/2019 15:20	18.79	720.3
*Before Purging			

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 0.53

No. of Well Volumes (based on current water level) 0.18

Was well pumped/bailed dry? No

Equipment used:

Bailer type _____ Dedicated Bailer? _____

Pump type Peristaltic Dedicated Pump? Yes

If not dedicated, method of cleaning _____

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319.

Questions? Call or Email: Nina Booker Environmental Engineer Sr., 515-725-8309, nina.booker@dnr.iowa.gov

***D. FIELD MEASUREMENT**

Weather Conditions Mostly Sunny, 78°F NW wind 5mph

Field Measurements (after stabilization):

Temperature 19.22 Units F

Equipment Used Horiba U-50

pH 6.91

Equipment Used Horiba U-50

Specific Conductance 0.967 Units mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature  Date 1-23-20

Telephone 563-262-3583 Fax _____ Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319.

Questions? Call or Email: Nina Booker Environmental Engineer Sr., 515-725-8309, nina.booker@dnr.iowa.gov

LOW FLOW SAMPLING FORM

DATE: 3/19/2019 WELL ID: MW-5B SAMPLE DATE / TIME: 3/19/2019 15:00
 SITE: Muscatine Power & Water DTW: 2.95 NOTE:
 PROJECT #: WELL DEPTH: 25.30
 WEATHER: PUMP TYPE: GeoTech Peristaltic DEPTH TO INTAKE: 25'

TIME	PURGE RATE(ml)	VOL REMOVED(ml)	DTW	TEMP	Ph	ORP	SpecCond	Turbidity	DO	NOTES																								
14:35			2.95																															
14:40	100	500	3.21	9.89	7.06	-86	0.962	4.0	0.00																									
14:45	100	1000	3.25	10.02	7.06	-87	0.968	2.6	0.00																									
14:50	100	1500	3.27	10.06	7.06	-87	0.969	0.0	0.00																									
14:55	100	2000	3.28	9.98	7.05	-87	0.978	0.0	0.00																									
15:00	100	2500	3.29	9.95	7.05	-88	0.976	0.0	0.00	Sample Start																								
15:35			3.31							Sample End																								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 5%;"></th> <th style="width: 5%;"></th> <th colspan="2" style="width: 15%; text-align: center;"># of Containers</th> </tr> <tr> <td style="width: 5%;"></td> <td style="width: 5%; text-align: center;">Preservative</td> <td style="width: 5%;"></td> <td style="width: 5%;"></td> </tr> <tr> <td></td> <td>HCl</td> <td></td> <td></td> </tr> <tr> <td></td> <td>HNO₃</td> <td style="text-align: center;">3</td> <td></td> </tr> <tr> <td></td> <td>NaOH</td> <td></td> <td></td> </tr> <tr> <td></td> <td>None</td> <td style="text-align: center;">1</td> <td></td> </tr> </table>													# of Containers			Preservative				HCl				HNO ₃	3			NaOH				None	1	
		# of Containers																																
	Preservative																																	
	HCl																																	
	HNO ₃	3																																
	NaOH																																	
	None	1																																

0.5-5.0 min 200-500 ml --- minimize --- +/- 0.1 +/-10 mV +/- 3% +/- 10% +/- 10% Limits
 or +/-0.2 mg

LOW FLOW SAMPLING FORM

DATE	3/19/2019	WELL ID	MW-10	SAMPLE DATE / TIME	3/19/2019 9:40
SITE	Muscatine Power & Water	DTW	3.66	NOTE	
PROJECT #		WELL DEPTH	20.32	DEPTH TO INTAKE	15.5'
WEATHER		PUMP TYPE	GeoTech Peristaltic		

TIME	PURGE RATE(ml)	VOL REMOVED(ml)	DTW	TEMP	Ph	ORP	SpecCond	Turbidity	DO	NOTES
9:00			3.66							
9:05	100	500	3.69	6.15	6.85	-107	0.666	76.3	40.39	
9:10	100	1000	3.71	6.16	7.08	-134	0.661	85.3	0.00	
9:15	100	1500	3.71	6.14	7.12	-140	0.658	69.3	0.00	
9:20	100	2000	3.71	6.06	7.17	-145	0.655	66.4	0.00	
9:25	100	2500	3.71	6.05	7.18	-143	0.654	26.1	0.00	
9:30	100	3000	3.71	6.02	7.13	-134	0.654	11.2	0.00	
9:35	100	3500	3.71	5.99	7.11	-129	0.656	10.1	0.00	
9:40	100	4000	3.71	6.06	7.10	-126	0.657	10.5	0.00	Sample Start
10:05			3.71							Sample End
										# of Containers
										Preservative
										HCl
										HNO ₃
										NaOH
										None
0.5-5.0 min	200-500 ml	---	minimize	---	+/- 0.1	+/-10 mV	+/- 3%	+/- 10%	+/- 10%	Limits or +/-0.2 mg.

LOW FLOW SAMPLING FORM

DATE	3/20/2019	WELL ID	MW-14A	SAMPLE DATE / TIME	3/20/2019 11:20
SITE	Muscatine Power & Water	DTW	10.09	NOTE	
PROJECT #		WELL DEPTH	20.50		
WEATHER	Cloudy, 35F, NW wind 1-3 mph	PUMP TYPE	GeoTech Peristaltic	DEPTH TO INTAKE	15.5'

TIME	PURGE RATE(ml)	VOL REMOVED(m)	DTW	TEMP	Ph	ORP	SpecCond	Turbidity	DO	NOTES
10:45			10.09							
10:50	100	500	10.93	7.98	7.00	189	2.13	9.7	0.00	
10:55	100	1000	11.27	7.99	6.98	190	2.16	8.7	0.00	
11:00	100	1500	11.57	7.93	6.97	189	2.17	8.9	0.00	
11:05	100	2000	11.80	7.93	6.97	189	2.18	7.8	0.00	
11:10	100	2500	11.99	7.95	6.97	189	2.18	6.9	0.00	
11:15	100	3000	12.15	7.94	6.97	189	2.18	6.5	0.00	
11:20	100	3500	12.32	7.95	6.97	189	2.19	6.3	0.00	Sample Start
			13.32							Sample End

0.5-5.0 min 200-500 ml --- minimize --- +/- 0.1 +/-10 mV +/- 3% +/- 10% +/- 10% Limits
or +/-0.2 mg.

Preservative	# of Containers	DUP-1
HCl		
HNO ₃	3	3
NaOH		
None	1	1

LOW FLOW SAMPLING FORM

DATE _____ WELL ID MW-18A SAMPLE DATE / TIME _____
 SITE Muscataine Power & Water DTW _____ NOTE _____
 PROJECT # 23.10 WELL DEPTH _____
 WEATHER _____ PUMP TYPE GeoTech Peristaltic DEPTH TO INTAKE 21'

TIME	PURGE RATE(ml)	VOL REMOVED(ml)	DTW	TEMP	Ph	ORP	SpecCond	Turbidity	DO	NOTES		
											Preservative	# of Containers
											HCl	
											HNO ₃	3
											NaOH	
											None	1

0.5-5.0 min 200-500 ml --- minimize --- +/- 0.1 +/- 10 mV +/- 3% +/- 10% +/- 10% Limits
 or +/- 0.2 mg.

LOW FLOW SAMPLING FORM

DATE	3/19/2019	WELL ID	MW-22	SAMPLE DATE / TIME	3/19/2019 11:45
SITE	Muscataine Power & Water	DTW	13.59	NOTE	
PROJECT #		WELL DEPTH	43.33		
WEATHER		PUMP TYPE	GeoTech Peristaltic	DEPTH TO INTAKE	38'

TIME	PURGE RATE(ml)	VOL REMOVED(ml)	DTW	TEMP	Ph	ORP	SpecCond	Turbidity	DO	NOTES												
11:25			13.59																			
11:30	100	500	14.86	11.01	7.30	113	0.720	13.0	0.00													
11:35	100	1000	16.01	10.91	7.22	108	0.726	5.3	0.00													
11:40	100	1500	17.17	11.06	7.21	103	0.727	5.2	0.00													
11:45	100	2000	18.29	11.17	7.21	98	0.726	5.9	0.00	Sample Start												
			21.15							Sample End												
<table border="1" style="float: right; border-collapse: collapse;"> <tr> <th colspan="2"># of Containers</th> </tr> <tr> <td>Preservative</td> <td></td> </tr> <tr> <td>HCl</td> <td></td> </tr> <tr> <td>HNO₃</td> <td>3</td> </tr> <tr> <td>NaOH</td> <td></td> </tr> <tr> <td>None</td> <td>1</td> </tr> </table>											# of Containers		Preservative		HCl		HNO ₃	3	NaOH		None	1
# of Containers																						
Preservative																						
HCl																						
HNO ₃	3																					
NaOH																						
None	1																					

0.5-5.0 min 200-500 ml --- minimize --- +/- 0.1 +/-10 mV +/- 3% +/- 10% +/- 10% Limits
 or +/-0.2 mg.

LOW FLOW SAMPLING FORM

DATE	3/19/2019	WELL ID	MW-23	SAMPLE DATE / TIME	3/19/2019 10:50
SITE	Muscatine Power & Water	DTW	3.87	NOTE	
PROJECT #		WELL DEPTH	43.33	DEPTH TO INTAKE	38'
WEATHER		PUMP TYPE	GeoTech Peristaltic		

TIME	PURGE RATE(ml)	VOL REMOVED(ml)	DTW	TEMP	Ph	ORP	SpecCond	Turbidity	DO	NOTES	# of Containers	
											Preservative	
10:25			3.87									
10:30	100	500	5.82	6.47	7.16	-27	0.574	57.0	0.00			
10:35	100	1000	6.51	7.00	7.22	74	0.488	181.0	0.00			
10:40	100	1500	7.17	7.26	7.22	79	0.489	281.0	0.00			
10:45	100	2000	7.69	7.48	7.23	81	0.492	265.0	0.00			
10:50	100	2500	8.12	7.51	7.24	82	0.493	280.0	0.00	Sample Started		
11:15			10.15							Sample Ended		

0.5-5.0 min 200-500 ml --- minimize --- +/- 0.1 +/-10 mV +/- 3% +/- 10% +/- 10% Limits
 or +/-0.2 mg

LOW FLOW SAMPLING FORM

DATE 3/18/2019 WELL ID MW-24 SAMPLE DATE / TIME 3/18/2019 13:15

SITE Muscatine Power & Water DTW 9.49 NOTE

PROJECT # WELL DEPTH 43.33

WEATHER Cloudy, 45°F W. wind 5 mph PUMP TYPE GeoTech Peristaltic DEPTH TO INTAKE 38'

TIME	PURGE RATE(ml)	VOL REMOVED(ml)	DTW	TEMP	Ph	ORP	SpecCond	Turbidity	DO	NOTES
12:50			9.49							
12:55	100	500	9.67	13.20	7.50	82	0.635	0.0	2.41	
13:00	100	1000	9.81	12.47	7.24	90	0.654	0.0	0.00	
13:05	100	1500	9.87	12.05	7.19	95	0.656	0.0	0.00	
13:10	100	2000	9.91	11.78	7.18	99	0.660	0.0	0.00	
13:15	100	2500	9.92	11.68	7.16	102	0.665	0.0	0.00	Sample Started
13:22			9.92							Sample Ended
			---		+/- 0.1	+/-10 mV	+/- 3%	+/- 10%	+/- 10%	Limits
0.5-5.0 min 200-500 ml			---							or +/-0.2 mg.

Preservative	# of Containers	
HCl		
HNO ₃	1	
NaOH		
None	1	

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-162164-1
Client Project/Site: Muscatine Power & Water CCR

For:
Muscatine Power & Water
1700 Dick Drake Way
PO BOX 899
Muscatine, Iowa 52761

Attn: Sam Bennett



Authorized for release by:
8/23/2019 2:15:16 PM

Shawn Hayes, Senior Project Manager
(319)229-8211
shawn.hayes@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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Case Narrative

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Job ID: 310-162164-1

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

Job Narrative
310-162164-1

Comments

No additional comments.

Receipt

The samples were received on 8/9/2019 9:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.0° C.

HPLC/IC

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

Metals

Method(s) 6020A: The continuing calibration verification (CCV) associated with batch 310-249700 recovered above the upper control limit for Boron. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The following samples are impacted: MW-10 (310-162164-2), MW-22 (310-162164-3), MW-23 (310-162164-4), MW-4A (310-162164-5), MW-5B (310-162164-6), MW-6A (310-162164-7) and MW-24 (310-162164-11).

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

General Chemistry

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

Sample Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
310-162164-1	MW-08	Ground Water	08/06/19 10:40	08/09/19 09:10	
310-162164-2	MW-10	Ground Water	08/07/19 10:25	08/09/19 09:10	
310-162164-3	MW-22	Ground Water	08/06/19 13:25	08/09/19 09:10	
310-162164-4	MW-23	Ground Water	08/06/19 14:30	08/09/19 09:10	
310-162164-5	MW-4A	Ground Water	08/07/19 11:30	08/09/19 09:10	
310-162164-6	MW-5B	Ground Water	08/07/19 13:30	08/09/19 09:10	
310-162164-7	MW-6A	Ground Water	08/07/19 12:50	08/09/19 09:10	
310-162164-8	MW-14A	Ground Water	08/07/19 15:40	08/09/19 09:10	
310-162164-9	MW-15A	Ground Water	08/07/19 14:25	08/09/19 09:10	
310-162164-10	MW-21	Ground Water	08/07/19 09:10	08/09/19 09:10	
310-162164-11	MW-24	Ground Water	08/06/19 12:00	08/09/19 09:10	
310-162164-12	MW-25	Ground Water	08/06/19 15:20	08/09/19 09:10	
310-162164-13	DUP-1	Ground Water	08/06/19 12:00	08/09/19 09:10	

Detection Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-08

Lab Sample ID: 310-162164-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	17.1		5.00		mg/L	5		9056A	Total/NA
Fluoride	0.643		0.500		mg/L	5		9056A	Total/NA
Sulfate	276		10.0		mg/L	10		9056A	Total/NA
Barium	0.0733		0.00200		mg/L	1		6020A	Total/NA
Boron	0.205		0.200		mg/L	1		6020A	Total/NA
Calcium	132		0.500		mg/L	1		6020A	Total/NA
Cobalt	0.00558		0.000500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	702		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.2	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-10

Lab Sample ID: 310-162164-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.596		0.500		mg/L	5		9056A	Total/NA
Sulfate	28.8		5.00		mg/L	5		9056A	Total/NA
Arsenic	0.00784		0.00200		mg/L	1		6020A	Total/NA
Barium	0.215		0.00200		mg/L	1		6020A	Total/NA
Calcium	78.9		0.500		mg/L	1		6020A	Total/NA
Cobalt	0.000572		0.000500		mg/L	1		6020A	Total/NA
Molybdenum	0.00219		0.00200		mg/L	1		6020A	Total/NA
Total Dissolved Solids	320		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.7	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-22

Lab Sample ID: 310-162164-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	26.9		5.00		mg/L	5		9056A	Total/NA
Fluoride	0.507		0.500		mg/L	5		9056A	Total/NA
Sulfate	139		5.00		mg/L	5		9056A	Total/NA
Barium	0.215		0.00200		mg/L	1		6020A	Total/NA
Calcium	83.8		0.500		mg/L	1		6020A	Total/NA
Molybdenum	0.00574		0.00200		mg/L	1		6020A	Total/NA
Total Dissolved Solids	428		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.6	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-23

Lab Sample ID: 310-162164-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	13.8		5.00		mg/L	5		9056A	Total/NA
Sulfate	29.7		5.00		mg/L	5		9056A	Total/NA
Barium	0.0635		0.00200		mg/L	1		6020A	Total/NA
Calcium	59.5		0.500		mg/L	1		6020A	Total/NA
Lead	0.000663		0.000500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	336		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.4	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-4A

Lab Sample ID: 310-162164-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	15.6		5.00		mg/L	5		9056A	Total/NA
Fluoride	0.525		0.500		mg/L	5		9056A	Total/NA
Sulfate	47.0		5.00		mg/L	5		9056A	Total/NA
Barium	0.147		0.00200		mg/L	1		6020A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Cedar Falls

Detection Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-4A (Continued)

Lab Sample ID: 310-162164-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	93.8		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	422		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.6	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-5B

Lab Sample ID: 310-162164-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	64.1		5.00		mg/L	5		9056A	Total/NA
Sulfate	112		5.00		mg/L	5		9056A	Total/NA
Barium	0.301		0.00200		mg/L	1		6020A	Total/NA
Calcium	139		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	596		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.3	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-6A

Lab Sample ID: 310-162164-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.535		0.500		mg/L	5		9056A	Total/NA
Barium	0.211		0.00200		mg/L	1		6020A	Total/NA
Calcium	80.9		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	308		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.4	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-14A

Lab Sample ID: 310-162164-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	22.1		5.00		mg/L	5		9056A	Total/NA
Sulfate	837		50.0		mg/L	50		9056A	Total/NA
Barium	0.0398		0.00800		mg/L	4		6020A	Total/NA
Boron	17.6		1.40		mg/L	7		6020A	Total/NA
Calcium	255		2.00		mg/L	4		6020A	Total/NA
Total Dissolved Solids	1510		60.0		mg/L	1		SM 2540C	Total/NA
pH	7.3	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-15A

Lab Sample ID: 310-162164-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	9.91		5.00		mg/L	5		9056A	Total/NA
Fluoride	0.625		0.500		mg/L	5		9056A	Total/NA
Sulfate	327		50.0		mg/L	50		9056A	Total/NA
Barium	0.0470		0.00200		mg/L	1		6020A	Total/NA
Boron	7.56		0.800		mg/L	4		6020A	Total/NA
Calcium	111		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	786		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.4	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-21

Lab Sample ID: 310-162164-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	14.0		5.00		mg/L	5		9056A	Total/NA
Sulfate	529		20.0		mg/L	20		9056A	Total/NA
Barium	0.0624		0.00200		mg/L	1		6020A	Total/NA
Boron	8.46		0.800		mg/L	4		6020A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Cedar Falls

Detection Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-21 (Continued)

Lab Sample ID: 310-162164-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	145		0.500		mg/L	1		6020A	Total/NA
Chromium	0.00637		0.00500		mg/L	1		6020A	Total/NA
Lithium	0.0279		0.0100		mg/L	1		6020A	Total/NA
Selenium	0.0108		0.00500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	960		30.0		mg/L	1		SM 2540C	Total/NA
pH	6.7	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-24

Lab Sample ID: 310-162164-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	22.4		5.00		mg/L	5		9056A	Total/NA
Sulfate	169		5.00		mg/L	5		9056A	Total/NA
Barium	0.128		0.00200		mg/L	1		6020A	Total/NA
Calcium	103		0.500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	542		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.7	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-25

Lab Sample ID: 310-162164-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	11.6		5.00		mg/L	5		9056A	Total/NA
Sulfate	325		20.0		mg/L	20		9056A	Total/NA
Barium	0.0448		0.00800		mg/L	4		6020A	Total/NA
Boron	11.5		0.800		mg/L	4		6020A	Total/NA
Calcium	160		2.00		mg/L	4		6020A	Total/NA
Total Dissolved Solids	768		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.4	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: DUP-1

Lab Sample ID: 310-162164-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	17.4		5.00		mg/L	5		9056A	Total/NA
Fluoride	0.628		0.500		mg/L	5		9056A	Total/NA
Sulfate	282		10.0		mg/L	10		9056A	Total/NA
Barium	0.0736		0.00200		mg/L	1		6020A	Total/NA
Boron	0.267		0.200		mg/L	1		6020A	Total/NA
Calcium	135		0.500		mg/L	1		6020A	Total/NA
Cobalt	0.00582		0.000500		mg/L	1		6020A	Total/NA
Total Dissolved Solids	690		30.0		mg/L	1		SM 2540C	Total/NA
pH	7.3	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Cedar Falls

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-08

Lab Sample ID: 310-162164-1

Date Collected: 08/06/19 10:40

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	17.1		5.00		mg/L			08/13/19 17:48	5
Fluoride	0.643		0.500		mg/L			08/13/19 17:48	5
Sulfate	276		10.0		mg/L			08/14/19 09:11	10

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:17	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:17	1
Barium	0.0733		0.00200		mg/L		08/13/19 07:59	08/16/19 17:17	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:17	1
Boron	0.205		0.200		mg/L		08/13/19 07:59	08/16/19 17:17	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:17	1
Calcium	132		0.500		mg/L		08/13/19 07:59	08/16/19 17:17	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:17	1
Cobalt	0.00558		0.000500		mg/L		08/13/19 07:59	08/16/19 17:17	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:17	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:17	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:17	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:17	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:17	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	702		30.0		mg/L			08/12/19 14:10	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.2	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-10

Lab Sample ID: 310-162164-2

Date Collected: 08/07/19 10:25

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			08/13/19 18:37	5
Fluoride	0.596		0.500		mg/L			08/13/19 18:37	5
Sulfate	28.8		5.00		mg/L			08/13/19 18:37	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:37	1
Arsenic	0.00784		0.00200		mg/L		08/13/19 07:59	08/16/19 17:37	1
Barium	0.215		0.00200		mg/L		08/13/19 07:59	08/16/19 17:37	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:37	1
Boron	<0.200	^	0.200		mg/L		08/13/19 07:59	08/16/19 17:37	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:37	1
Calcium	78.9		0.500		mg/L		08/13/19 07:59	08/16/19 17:37	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:37	1
Cobalt	0.000572		0.000500		mg/L		08/13/19 07:59	08/16/19 17:37	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:37	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:37	1
Molybdenum	0.00219		0.00200		mg/L		08/13/19 07:59	08/16/19 17:37	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:37	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:37	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	320		30.0		mg/L			08/12/19 14:10	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.7	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-22

Lab Sample ID: 310-162164-3

Date Collected: 08/06/19 13:25

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	26.9		5.00		mg/L			08/13/19 18:53	5
Fluoride	0.507		0.500		mg/L			08/13/19 18:53	5
Sulfate	139		5.00		mg/L			08/13/19 18:53	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:41	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:41	1
Barium	0.215		0.00200		mg/L		08/13/19 07:59	08/16/19 17:41	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:41	1
Boron	<0.200	^	0.200		mg/L		08/13/19 07:59	08/16/19 17:41	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:41	1
Calcium	83.8		0.500		mg/L		08/13/19 07:59	08/16/19 17:41	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:41	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:41	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:41	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:41	1
Molybdenum	0.00574		0.00200		mg/L		08/13/19 07:59	08/16/19 17:41	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:41	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:41	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	428		30.0		mg/L			08/12/19 14:58	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.6	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-23

Lab Sample ID: 310-162164-4

Date Collected: 08/06/19 14:30

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	13.8		5.00		mg/L			08/13/19 19:09	5
Fluoride	<0.500		0.500		mg/L			08/13/19 19:09	5
Sulfate	29.7		5.00		mg/L			08/13/19 19:09	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:44	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:44	1
Barium	0.0635		0.00200		mg/L		08/13/19 07:59	08/16/19 17:44	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:44	1
Boron	<0.200	^	0.200		mg/L		08/13/19 07:59	08/16/19 17:44	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:44	1
Calcium	59.5		0.500		mg/L		08/13/19 07:59	08/16/19 17:44	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:44	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:44	1
Lead	0.000663		0.000500		mg/L		08/13/19 07:59	08/16/19 17:44	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:44	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:44	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:44	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:44	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	336		30.0		mg/L			08/12/19 14:58	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.4	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-4A

Lab Sample ID: 310-162164-5

Date Collected: 08/07/19 11:30

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	15.6		5.00		mg/L			08/13/19 19:25	5
Fluoride	0.525		0.500		mg/L			08/13/19 19:25	5
Sulfate	47.0		5.00		mg/L			08/13/19 19:25	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:47	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:47	1
Barium	0.147		0.00200		mg/L		08/13/19 07:59	08/16/19 17:47	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:47	1
Boron	<0.200	^	0.200		mg/L		08/13/19 07:59	08/16/19 17:47	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:47	1
Calcium	93.8		0.500		mg/L		08/13/19 07:59	08/16/19 17:47	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:47	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:47	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:47	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:47	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:47	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:47	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:47	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	422		30.0		mg/L			08/12/19 14:58	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.6	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-5B

Lab Sample ID: 310-162164-6

Date Collected: 08/07/19 13:30

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	64.1		5.00		mg/L			08/13/19 19:41	5
Fluoride	<0.500		0.500		mg/L			08/13/19 19:41	5
Sulfate	112		5.00		mg/L			08/13/19 19:41	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:51	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:51	1
Barium	0.301		0.00200		mg/L		08/13/19 07:59	08/16/19 17:51	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:51	1
Boron	<0.200	^	0.200		mg/L		08/13/19 07:59	08/16/19 17:51	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:51	1
Calcium	139		0.500		mg/L		08/13/19 07:59	08/16/19 17:51	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:51	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:51	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:51	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:51	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:51	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:51	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:51	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:17	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	596		30.0		mg/L			08/12/19 14:58	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-6A

Date Collected: 08/07/19 12:50

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-7

Matrix: Ground Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			08/13/19 20:29	5
Fluoride	0.535		0.500		mg/L			08/13/19 20:29	5
Sulfate	<5.00		5.00		mg/L			08/13/19 20:29	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:54	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:54	1
Barium	0.211		0.00200		mg/L		08/13/19 07:59	08/16/19 17:54	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:54	1
Boron	<0.200	^	0.200		mg/L		08/13/19 07:59	08/16/19 17:54	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:54	1
Calcium	80.9		0.500		mg/L		08/13/19 07:59	08/16/19 17:54	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:54	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:54	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:54	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:54	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:54	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:54	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:54	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	308		30.0		mg/L			08/12/19 15:30	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.4	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-14A

Lab Sample ID: 310-162164-8

Date Collected: 08/07/19 15:40

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	22.1		5.00		mg/L			08/13/19 20:45	5
Fluoride	<0.500		0.500		mg/L			08/13/19 20:45	5
Sulfate	837		50.0		mg/L			08/13/19 21:01	50

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400		0.00400		mg/L		08/13/19 07:59	08/16/19 17:58	4
Arsenic	<0.00800		0.00800		mg/L		08/13/19 07:59	08/16/19 17:58	4
Barium	0.0398		0.00800		mg/L		08/13/19 07:59	08/16/19 17:58	4
Beryllium	<0.00400		0.00400		mg/L		08/13/19 07:59	08/16/19 17:58	4
Boron	17.6		1.40		mg/L		08/13/19 07:59	08/19/19 16:52	7
Cadmium	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:58	4
Calcium	255		2.00		mg/L		08/13/19 07:59	08/16/19 17:58	4
Chromium	<0.0200		0.0200		mg/L		08/13/19 07:59	08/16/19 17:58	4
Cobalt	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:58	4
Lead	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:58	4
Lithium	<0.0400		0.0400		mg/L		08/13/19 07:59	08/16/19 17:58	4
Molybdenum	<0.00800		0.00800		mg/L		08/13/19 07:59	08/16/19 17:58	4
Selenium	<0.0200		0.0200		mg/L		08/13/19 07:59	08/16/19 17:58	4
Thallium	<0.00400		0.00400		mg/L		08/13/19 07:59	08/16/19 17:58	4

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:21	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1510		60.0		mg/L			08/12/19 15:30	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-15A

Lab Sample ID: 310-162164-9

Date Collected: 08/07/19 14:25

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.91		5.00		mg/L			08/13/19 21:18	5
Fluoride	0.625		0.500		mg/L			08/13/19 21:18	5
Sulfate	327		50.0		mg/L			08/13/19 21:34	50

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:01	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:01	1
Barium	0.0470		0.00200		mg/L		08/13/19 07:59	08/16/19 18:01	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:01	1
Boron	7.56		0.800		mg/L		08/13/19 07:59	08/19/19 16:55	4
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:01	1
Calcium	111		0.500		mg/L		08/13/19 07:59	08/16/19 18:01	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 18:01	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:01	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:01	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 18:01	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:01	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 18:01	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:01	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:24	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	786		30.0		mg/L			08/12/19 15:30	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.4	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-21

Lab Sample ID: 310-162164-10

Date Collected: 08/07/19 09:10

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	14.0		5.00		mg/L			08/13/19 21:50	5
Fluoride	<0.500		0.500		mg/L			08/13/19 21:50	5
Sulfate	529		20.0		mg/L			08/13/19 22:06	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:04	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:04	1
Barium	0.0624		0.00200		mg/L		08/13/19 07:59	08/16/19 18:04	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:04	1
Boron	8.46		0.800		mg/L		08/13/19 07:59	08/19/19 16:59	4
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:04	1
Calcium	145		0.500		mg/L		08/13/19 07:59	08/16/19 18:04	1
Chromium	0.00637		0.00500		mg/L		08/13/19 07:59	08/16/19 18:04	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:04	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:04	1
Lithium	0.0279		0.0100		mg/L		08/13/19 07:59	08/16/19 18:04	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:04	1
Selenium	0.0108		0.00500		mg/L		08/13/19 07:59	08/16/19 18:04	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:04	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:26	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	960		30.0		mg/L			08/12/19 15:30	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.7	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-24

Lab Sample ID: 310-162164-11

Date Collected: 08/06/19 12:00

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	22.4		5.00		mg/L			08/13/19 22:22	5
Fluoride	<0.500		0.500		mg/L			08/13/19 22:22	5
Sulfate	169		5.00		mg/L			08/13/19 22:22	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:08	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:08	1
Barium	0.128		0.00200		mg/L		08/13/19 07:59	08/16/19 18:08	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:08	1
Boron	<0.200	^	0.200		mg/L		08/13/19 07:59	08/16/19 18:08	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:08	1
Calcium	103		0.500		mg/L		08/13/19 07:59	08/16/19 18:08	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 18:08	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:08	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:08	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 18:08	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:08	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 18:08	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:08	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 12:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	542		30.0		mg/L			08/12/19 15:30	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.7	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-25

Lab Sample ID: 310-162164-12

Date Collected: 08/06/19 15:20

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	11.6		5.00		mg/L			08/13/19 22:38	5
Fluoride	<0.500		0.500		mg/L			08/13/19 22:38	5
Sulfate	325		20.0		mg/L			08/13/19 22:54	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400		0.00400		mg/L		08/13/19 07:59	08/16/19 18:25	4
Arsenic	<0.00800		0.00800		mg/L		08/13/19 07:59	08/16/19 18:25	4
Barium	0.0448		0.00800		mg/L		08/13/19 07:59	08/16/19 18:25	4
Beryllium	<0.00400		0.00400		mg/L		08/13/19 07:59	08/16/19 18:25	4
Boron	11.5		0.800		mg/L		08/13/19 07:59	08/19/19 17:02	4
Cadmium	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:25	4
Calcium	160		2.00		mg/L		08/13/19 07:59	08/16/19 18:25	4
Chromium	<0.0200		0.0200		mg/L		08/13/19 07:59	08/16/19 18:25	4
Cobalt	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:25	4
Lead	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:25	4
Lithium	<0.0400		0.0400		mg/L		08/13/19 07:59	08/16/19 18:25	4
Molybdenum	<0.00800		0.00800		mg/L		08/13/19 07:59	08/16/19 18:25	4
Selenium	<0.0200		0.0200		mg/L		08/13/19 07:59	08/16/19 18:25	4
Thallium	<0.00400		0.00400		mg/L		08/13/19 07:59	08/16/19 18:25	4

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:54	08/14/19 12:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	768		30.0		mg/L			08/12/19 15:30	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.4	HF	0.1		SU			08/10/19 14:14	1

Client Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: DUP-1

Lab Sample ID: 310-162164-13

Date Collected: 08/06/19 12:00

Matrix: Ground Water

Date Received: 08/09/19 09:10

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	17.4		5.00		mg/L			08/13/19 23:42	5
Fluoride	0.628		0.500		mg/L			08/13/19 23:42	5
Sulfate	282		10.0		mg/L			08/14/19 10:00	10

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:28	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:28	1
Barium	0.0736		0.00200		mg/L		08/13/19 07:59	08/16/19 18:28	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:28	1
Boron	0.267		0.200		mg/L		08/13/19 07:59	08/19/19 17:06	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:28	1
Calcium	135		0.500		mg/L		08/13/19 07:59	08/16/19 18:28	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 18:28	1
Cobalt	0.00582		0.000500		mg/L		08/13/19 07:59	08/16/19 18:28	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 18:28	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 18:28	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 18:28	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 18:28	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 18:28	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:54	08/14/19 12:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	690		30.0		mg/L			08/12/19 15:30	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1		SU			08/10/19 14:14	1

Definitions/Glossary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

Metals

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

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

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-249348/3
Matrix: Water
Analysis Batch: 249348

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			08/13/19 17:16	1
Fluoride	<0.100		0.100		mg/L			08/13/19 17:16	1
Sulfate	<1.00		1.00		mg/L			08/13/19 17:16	1

Lab Sample ID: LCS 310-249348/4
Matrix: Water
Analysis Batch: 249348

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	10.40		mg/L		104	90 - 110
Fluoride	2.00	2.014		mg/L		101	90 - 110
Sulfate	10.0	10.45		mg/L		105	90 - 110

Lab Sample ID: 310-162164-1 MS
Matrix: Ground Water
Analysis Batch: 249348

Client Sample ID: MW-08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	17.1		50.0	68.53		mg/L		103	80 - 120
Fluoride	0.643		10.0	10.35		mg/L		97	80 - 120

Lab Sample ID: 310-162164-1 MS
Matrix: Ground Water
Analysis Batch: 249348

Client Sample ID: MW-08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	276		50.0	321.8	4	mg/L		91	80 - 120

Lab Sample ID: 310-162164-1 MSD
Matrix: Ground Water
Analysis Batch: 249348

Client Sample ID: MW-08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	17.1		50.0	68.42		mg/L		103	80 - 120	0	15
Fluoride	0.643		10.0	10.33		mg/L		97	80 - 120	0	15

Lab Sample ID: 310-162164-1 MSD
Matrix: Ground Water
Analysis Batch: 249348

Client Sample ID: MW-08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	276		50.0	318.6	4	mg/L		85	80 - 120	1	15

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 310-249019/1-A
Matrix: Water
Analysis Batch: 249700

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 249019

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Antimony	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:10	1
Arsenic	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:10	1
Barium	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:10	1
Beryllium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:10	1
Boron	<0.200		0.200		mg/L		08/13/19 07:59	08/16/19 17:10	1
Cadmium	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:10	1
Calcium	<0.500		0.500		mg/L		08/13/19 07:59	08/16/19 17:10	1
Chromium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:10	1
Cobalt	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:10	1
Lead	<0.000500		0.000500		mg/L		08/13/19 07:59	08/16/19 17:10	1
Lithium	<0.0100		0.0100		mg/L		08/13/19 07:59	08/16/19 17:10	1
Molybdenum	<0.00200		0.00200		mg/L		08/13/19 07:59	08/16/19 17:10	1
Selenium	<0.00500		0.00500		mg/L		08/13/19 07:59	08/16/19 17:10	1
Thallium	<0.00100		0.00100		mg/L		08/13/19 07:59	08/16/19 17:10	1

Lab Sample ID: LCS 310-249019/2-A
Matrix: Water
Analysis Batch: 249700

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 249019

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	Limits
		Result	Qualifier				
Antimony	0.0200	0.02036		mg/L		102	80 - 120
Arsenic	0.0400	0.03918		mg/L		98	80 - 120
Barium	0.0400	0.04214		mg/L		105	80 - 120
Beryllium	0.0200	0.01984		mg/L		99	80 - 120
Boron	0.880	0.8453		mg/L		96	80 - 120
Cadmium	0.0200	0.02070		mg/L		103	80 - 120
Calcium	2.00	2.183		mg/L		109	80 - 120
Chromium	0.0400	0.04006		mg/L		100	80 - 120
Cobalt	0.0200	0.01956		mg/L		98	80 - 120
Lead	0.0200	0.02001		mg/L		100	80 - 120
Lithium	0.100	0.09715		mg/L		97	80 - 120
Molybdenum	0.0400	0.04048		mg/L		101	80 - 120
Selenium	0.0400	0.03919		mg/L		98	80 - 120
Thallium	0.0160	0.01628		mg/L		102	80 - 120

Lab Sample ID: 310-162164-1 MS
Matrix: Ground Water
Analysis Batch: 249700

Client Sample ID: MW-08
Prep Type: Total/NA
Prep Batch: 249019

Analyte	Sample	Sample	Spike Added	MS	MS	Unit	D	%Rec	Limits
	Result	Qualifier		Result	Qualifier				
Antimony	<0.00100		0.0200	0.02116		mg/L		106	75 - 125
Arsenic	<0.00200		0.0400	0.04299		mg/L		105	75 - 125
Barium	0.0733		0.0400	0.1158		mg/L		106	75 - 125
Beryllium	<0.00100		0.0200	0.02168		mg/L		108	75 - 125
Boron	0.205		0.880	1.064		mg/L		98	75 - 125
Cadmium	<0.000500		0.0200	0.02147		mg/L		107	75 - 125
Calcium	132		2.00	133.7	4	mg/L		84	75 - 125
Chromium	<0.00500		0.0400	0.04307		mg/L		108	75 - 125
Cobalt	0.00558		0.0200	0.02585		mg/L		101	75 - 125

Eurofins TestAmerica, Cedar Falls

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

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

Lab Sample ID: 310-162164-1 MS
Matrix: Ground Water
Analysis Batch: 249700

Client Sample ID: MW-08
Prep Type: Total/NA
Prep Batch: 249019
%Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Lead	<0.000500		0.0200	0.02074		mg/L		104	75 - 125
Lithium	<0.0100		0.100	0.1075		mg/L		104	75 - 125
Molybdenum	<0.00200		0.0400	0.04273		mg/L		103	75 - 125
Selenium	<0.00500		0.0400	0.04276		mg/L		107	75 - 125
Thallium	<0.00100		0.0160	0.01727		mg/L		108	75 - 125

Lab Sample ID: 310-162164-1 MSD
Matrix: Ground Water
Analysis Batch: 249700

Client Sample ID: MW-08
Prep Type: Total/NA
Prep Batch: 249019
%Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	<0.00100		0.0200	0.02024		mg/L		101	75 - 125	4	20
Arsenic	<0.00200		0.0400	0.04116		mg/L		101	75 - 125	4	20
Barium	0.0733		0.0400	0.1112		mg/L		95	75 - 125	4	20
Beryllium	<0.00100		0.0200	0.02087		mg/L		104	75 - 125	4	20
Boron	0.205		0.880	1.049		mg/L		96	75 - 125	1	20
Cadmium	<0.000500		0.0200	0.02096		mg/L		105	75 - 125	2	20
Calcium	132		2.00	130.6	4	mg/L		-71	75 - 125	2	20
Chromium	<0.00500		0.0400	0.04078		mg/L		102	75 - 125	5	20
Cobalt	0.00558		0.0200	0.02486		mg/L		96	75 - 125	4	20
Lead	<0.000500		0.0200	0.01986		mg/L		99	75 - 125	4	20
Lithium	<0.0100		0.100	0.1057		mg/L		102	75 - 125	2	20
Molybdenum	<0.00200		0.0400	0.04048		mg/L		98	75 - 125	5	20
Selenium	<0.00500		0.0400	0.04086		mg/L		102	75 - 125	5	20
Thallium	<0.00100		0.0160	0.01651		mg/L		103	75 - 125	5	20

Lab Sample ID: 310-162164-11 DU
Matrix: Ground Water
Analysis Batch: 249700

Client Sample ID: MW-24
Prep Type: Total/NA
Prep Batch: 249019
RPD

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Antimony	<0.00100		<0.00100		mg/L		NC	20
Arsenic	<0.00200		<0.00200		mg/L		NC	20
Barium	0.128		0.1322		mg/L		3	20
Beryllium	<0.00100		<0.00100		mg/L		NC	20
Boron	<0.200	^	<0.200	^	mg/L		NC	20
Cadmium	<0.000500		<0.000500		mg/L		NC	20
Calcium	103		105.0		mg/L		2	20
Chromium	<0.00500		<0.00500		mg/L		NC	20
Cobalt	<0.000500		<0.000500		mg/L		NC	20
Lead	<0.000500		0.0005060		mg/L		NC	20
Lithium	<0.0100		<0.0100		mg/L		NC	20
Molybdenum	<0.00200		<0.00200		mg/L		NC	20
Selenium	<0.00500		<0.00500		mg/L		NC	20
Thallium	<0.00100		<0.00100		mg/L		NC	20

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 310-249128/1-A
 Matrix: Water
 Analysis Batch: 249331

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 249128

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:50	08/14/19 11:34	1

Lab Sample ID: LCS 310-249128/2-A
 Matrix: Water
 Analysis Batch: 249331

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 249128
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.00167	0.001656		mg/L		99	80 - 120

Lab Sample ID: MB 310-249129/1-A
 Matrix: Water
 Analysis Batch: 249331

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 249129

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		08/13/19 12:54	08/14/19 12:34	1

Lab Sample ID: LCS 310-249129/2-A
 Matrix: Water
 Analysis Batch: 249331

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 249129
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.00167	0.001695		mg/L		102	80 - 120

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

Lab Sample ID: MB 310-248961/1
 Matrix: Water
 Analysis Batch: 248961

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<30.0		30.0		mg/L			08/12/19 14:10	1

Lab Sample ID: LCS 310-248961/2
 Matrix: Water
 Analysis Batch: 248961

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Total Dissolved Solids	1000	960.0		mg/L		96	90 - 110

Lab Sample ID: MB 310-248984/1
 Matrix: Water
 Analysis Batch: 248984

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<30.0		30.0		mg/L			08/12/19 15:30	1

QC Sample Results

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

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

Lab Sample ID: LCS 310-248984/2
 Matrix: Water
 Analysis Batch: 248984

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	976.0		mg/L		98	90 - 110

Lab Sample ID: 310-162164-7 DU
 Matrix: Ground Water
 Analysis Batch: 248984

Client Sample ID: MW-6A
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	308		340.0		mg/L		10	24

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-248814/1
 Matrix: Water
 Analysis Batch: 248814

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	98 - 102

Lab Sample ID: 310-162164-3 DU
 Matrix: Ground Water
 Analysis Batch: 248814

Client Sample ID: MW-22
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.6	HF	7.5		SU		1	20

Lab Sample ID: 310-162164-5 DU
 Matrix: Ground Water
 Analysis Batch: 248814

Client Sample ID: MW-4A
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.6	HF	7.7		SU		1	20

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

HPLC/IC

Analysis Batch: 249348

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-1	MW-08	Total/NA	Ground Water	9056A	
310-162164-1	MW-08	Total/NA	Ground Water	9056A	
310-162164-2	MW-10	Total/NA	Ground Water	9056A	
310-162164-3	MW-22	Total/NA	Ground Water	9056A	
310-162164-4	MW-23	Total/NA	Ground Water	9056A	
310-162164-5	MW-4A	Total/NA	Ground Water	9056A	
310-162164-6	MW-5B	Total/NA	Ground Water	9056A	
310-162164-7	MW-6A	Total/NA	Ground Water	9056A	
310-162164-8	MW-14A	Total/NA	Ground Water	9056A	
310-162164-8	MW-14A	Total/NA	Ground Water	9056A	
310-162164-9	MW-15A	Total/NA	Ground Water	9056A	
310-162164-9	MW-15A	Total/NA	Ground Water	9056A	
310-162164-10	MW-21	Total/NA	Ground Water	9056A	
310-162164-10	MW-21	Total/NA	Ground Water	9056A	
310-162164-11	MW-24	Total/NA	Ground Water	9056A	
310-162164-12	MW-25	Total/NA	Ground Water	9056A	
310-162164-12	MW-25	Total/NA	Ground Water	9056A	
310-162164-13	DUP-1	Total/NA	Ground Water	9056A	
310-162164-13	DUP-1	Total/NA	Ground Water	9056A	
MB 310-249348/3	Method Blank	Total/NA	Water	9056A	
LCS 310-249348/4	Lab Control Sample	Total/NA	Water	9056A	
310-162164-1 MS	MW-08	Total/NA	Ground Water	9056A	
310-162164-1 MS	MW-08	Total/NA	Ground Water	9056A	
310-162164-1 MSD	MW-08	Total/NA	Ground Water	9056A	
310-162164-1 MSD	MW-08	Total/NA	Ground Water	9056A	

Metals

Prep Batch: 249019

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-1	MW-08	Total/NA	Ground Water	3010A	
310-162164-2	MW-10	Total/NA	Ground Water	3010A	
310-162164-3	MW-22	Total/NA	Ground Water	3010A	
310-162164-4	MW-23	Total/NA	Ground Water	3010A	
310-162164-5	MW-4A	Total/NA	Ground Water	3010A	
310-162164-6	MW-5B	Total/NA	Ground Water	3010A	
310-162164-7	MW-6A	Total/NA	Ground Water	3010A	
310-162164-8	MW-14A	Total/NA	Ground Water	3010A	
310-162164-9	MW-15A	Total/NA	Ground Water	3010A	
310-162164-10	MW-21	Total/NA	Ground Water	3010A	
310-162164-11	MW-24	Total/NA	Ground Water	3010A	
310-162164-12	MW-25	Total/NA	Ground Water	3010A	
310-162164-13	DUP-1	Total/NA	Ground Water	3010A	
MB 310-249019/1-A	Method Blank	Total/NA	Water	3010A	
LCS 310-249019/2-A	Lab Control Sample	Total/NA	Water	3010A	
310-162164-1 MS	MW-08	Total/NA	Ground Water	3010A	
310-162164-1 MSD	MW-08	Total/NA	Ground Water	3010A	
310-162164-11 DU	MW-24	Total/NA	Ground Water	3010A	

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Metals

Prep Batch: 249128

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-1	MW-08	Total/NA	Ground Water	7470A	
310-162164-2	MW-10	Total/NA	Ground Water	7470A	
310-162164-3	MW-22	Total/NA	Ground Water	7470A	
310-162164-4	MW-23	Total/NA	Ground Water	7470A	
310-162164-5	MW-4A	Total/NA	Ground Water	7470A	
310-162164-6	MW-5B	Total/NA	Ground Water	7470A	
310-162164-7	MW-6A	Total/NA	Ground Water	7470A	
310-162164-8	MW-14A	Total/NA	Ground Water	7470A	
310-162164-9	MW-15A	Total/NA	Ground Water	7470A	
310-162164-10	MW-21	Total/NA	Ground Water	7470A	
310-162164-11	MW-24	Total/NA	Ground Water	7470A	
MB 310-249128/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-249128/2-A	Lab Control Sample	Total/NA	Water	7470A	

Prep Batch: 249129

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-12	MW-25	Total/NA	Ground Water	7470A	
310-162164-13	DUP-1	Total/NA	Ground Water	7470A	
MB 310-249129/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-249129/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 249331

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-1	MW-08	Total/NA	Ground Water	7470A	249128
310-162164-2	MW-10	Total/NA	Ground Water	7470A	249128
310-162164-3	MW-22	Total/NA	Ground Water	7470A	249128
310-162164-4	MW-23	Total/NA	Ground Water	7470A	249128
310-162164-5	MW-4A	Total/NA	Ground Water	7470A	249128
310-162164-6	MW-5B	Total/NA	Ground Water	7470A	249128
310-162164-7	MW-6A	Total/NA	Ground Water	7470A	249128
310-162164-8	MW-14A	Total/NA	Ground Water	7470A	249128
310-162164-9	MW-15A	Total/NA	Ground Water	7470A	249128
310-162164-10	MW-21	Total/NA	Ground Water	7470A	249128
310-162164-11	MW-24	Total/NA	Ground Water	7470A	249128
310-162164-12	MW-25	Total/NA	Ground Water	7470A	249129
310-162164-13	DUP-1	Total/NA	Ground Water	7470A	249129
MB 310-249128/1-A	Method Blank	Total/NA	Water	7470A	249128
MB 310-249129/1-A	Method Blank	Total/NA	Water	7470A	249129
LCS 310-249128/2-A	Lab Control Sample	Total/NA	Water	7470A	249128
LCS 310-249129/2-A	Lab Control Sample	Total/NA	Water	7470A	249129

Analysis Batch: 249700

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-1	MW-08	Total/NA	Ground Water	6020A	249019
310-162164-2	MW-10	Total/NA	Ground Water	6020A	249019
310-162164-3	MW-22	Total/NA	Ground Water	6020A	249019
310-162164-4	MW-23	Total/NA	Ground Water	6020A	249019
310-162164-5	MW-4A	Total/NA	Ground Water	6020A	249019
310-162164-6	MW-5B	Total/NA	Ground Water	6020A	249019
310-162164-7	MW-6A	Total/NA	Ground Water	6020A	249019
310-162164-8	MW-14A	Total/NA	Ground Water	6020A	249019

Eurofins TestAmerica, Cedar Falls

QC Association Summary

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Metals (Continued)

Analysis Batch: 249700 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-9	MW-15A	Total/NA	Ground Water	6020A	249019
310-162164-10	MW-21	Total/NA	Ground Water	6020A	249019
310-162164-11	MW-24	Total/NA	Ground Water	6020A	249019
310-162164-12	MW-25	Total/NA	Ground Water	6020A	249019
310-162164-13	DUP-1	Total/NA	Ground Water	6020A	249019
MB 310-249019/1-A	Method Blank	Total/NA	Water	6020A	249019
LCS 310-249019/2-A	Lab Control Sample	Total/NA	Water	6020A	249019
310-162164-1 MS	MW-08	Total/NA	Ground Water	6020A	249019
310-162164-1 MSD	MW-08	Total/NA	Ground Water	6020A	249019
310-162164-11 DU	MW-24	Total/NA	Ground Water	6020A	249019

Analysis Batch: 249868

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-8	MW-14A	Total/NA	Ground Water	6020A	249019
310-162164-9	MW-15A	Total/NA	Ground Water	6020A	249019
310-162164-10	MW-21	Total/NA	Ground Water	6020A	249019
310-162164-12	MW-25	Total/NA	Ground Water	6020A	249019
310-162164-13	DUP-1	Total/NA	Ground Water	6020A	249019

General Chemistry

Analysis Batch: 248814

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-1	MW-08	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-2	MW-10	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-3	MW-22	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-4	MW-23	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-5	MW-4A	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-6	MW-5B	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-7	MW-6A	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-8	MW-14A	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-9	MW-15A	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-10	MW-21	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-11	MW-24	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-12	MW-25	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-13	DUP-1	Total/NA	Ground Water	SM 4500 H+ B	
LCS 310-248814/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
310-162164-3 DU	MW-22	Total/NA	Ground Water	SM 4500 H+ B	
310-162164-5 DU	MW-4A	Total/NA	Ground Water	SM 4500 H+ B	

Analysis Batch: 248961

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-1	MW-08	Total/NA	Ground Water	SM 2540C	
310-162164-2	MW-10	Total/NA	Ground Water	SM 2540C	
310-162164-3	MW-22	Total/NA	Ground Water	SM 2540C	
310-162164-4	MW-23	Total/NA	Ground Water	SM 2540C	
310-162164-5	MW-4A	Total/NA	Ground Water	SM 2540C	
310-162164-6	MW-5B	Total/NA	Ground Water	SM 2540C	
MB 310-248961/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-248961/2	Lab Control Sample	Total/NA	Water	SM 2540C	

QC Association Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

General Chemistry

Analysis Batch: 248984

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-162164-7	MW-6A	Total/NA	Ground Water	SM 2540C	
310-162164-8	MW-14A	Total/NA	Ground Water	SM 2540C	
310-162164-9	MW-15A	Total/NA	Ground Water	SM 2540C	
310-162164-10	MW-21	Total/NA	Ground Water	SM 2540C	
310-162164-11	MW-24	Total/NA	Ground Water	SM 2540C	
310-162164-12	MW-25	Total/NA	Ground Water	SM 2540C	
310-162164-13	DUP-1	Total/NA	Ground Water	SM 2540C	
MB 310-248984/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-248984/2	Lab Control Sample	Total/NA	Water	SM 2540C	
310-162164-7 DU	MW-6A	Total/NA	Ground Water	SM 2540C	

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-08

Lab Sample ID: 310-162164-1

Date Collected: 08/06/19 10:40

Matrix: Ground Water

Date Received: 08/09/19 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 17:48	SAD	TAL CF
Total/NA	Analysis	9056A		10	249348	08/14/19 09:11	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 17:17	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:02	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248961	08/12/19 14:10	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-10

Lab Sample ID: 310-162164-2

Date Collected: 08/07/19 10:25

Matrix: Ground Water

Date Received: 08/09/19 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 18:37	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 17:37	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:04	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248961	08/12/19 14:10	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-22

Lab Sample ID: 310-162164-3

Date Collected: 08/06/19 13:25

Matrix: Ground Water

Date Received: 08/09/19 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 18:53	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 17:41	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:07	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248961	08/12/19 14:58	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-23

Lab Sample ID: 310-162164-4

Date Collected: 08/06/19 14:30

Matrix: Ground Water

Date Received: 08/09/19 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 19:09	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 17:44	SAD	TAL CF

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-23

Date Collected: 08/06/19 14:30

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-4

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:09	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248961	08/12/19 14:58	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-4A

Date Collected: 08/07/19 11:30

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-5

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 19:25	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 17:47	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:15	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248961	08/12/19 14:58	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-5B

Date Collected: 08/07/19 13:30

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-6

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 19:41	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 17:51	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:17	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248961	08/12/19 14:58	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-6A

Date Collected: 08/07/19 12:50

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-7

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 20:29	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 17:54	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:19	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248984	08/12/19 15:30	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-14A

Lab Sample ID: 310-162164-8

Date Collected: 08/07/19 15:40

Matrix: Ground Water

Date Received: 08/09/19 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 20:45	SAD	TAL CF
Total/NA	Analysis	9056A		50	249348	08/13/19 21:01	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		4	249700	08/16/19 17:58	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		7	249868	08/19/19 16:52	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:21	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248984	08/12/19 15:30	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-15A

Lab Sample ID: 310-162164-9

Date Collected: 08/07/19 14:25

Matrix: Ground Water

Date Received: 08/09/19 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 21:18	SAD	TAL CF
Total/NA	Analysis	9056A		50	249348	08/13/19 21:34	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 18:01	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		4	249868	08/19/19 16:55	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:24	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248984	08/12/19 15:30	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-21

Lab Sample ID: 310-162164-10

Date Collected: 08/07/19 09:10

Matrix: Ground Water

Date Received: 08/09/19 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 21:50	SAD	TAL CF
Total/NA	Analysis	9056A		20	249348	08/13/19 22:06	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 18:04	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		4	249868	08/19/19 16:59	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:26	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248984	08/12/19 15:30	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Lab Chronicle

Client: Muscatine Power & Water
 Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Client Sample ID: MW-24

Date Collected: 08/06/19 12:00

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-11

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 22:22	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 18:08	SAD	TAL CF
Total/NA	Prep	7470A			249128	08/13/19 12:50	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:28	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248984	08/12/19 15:30	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: MW-25

Date Collected: 08/06/19 15:20

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-12

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 22:38	SAD	TAL CF
Total/NA	Analysis	9056A		20	249348	08/13/19 22:54	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		4	249700	08/16/19 18:25	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		4	249868	08/19/19 17:02	SAD	TAL CF
Total/NA	Prep	7470A			249129	08/13/19 12:54	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:43	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248984	08/12/19 15:30	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Client Sample ID: DUP-1

Date Collected: 08/06/19 12:00

Date Received: 08/09/19 09:10

Lab Sample ID: 310-162164-13

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	249348	08/13/19 23:42	SAD	TAL CF
Total/NA	Analysis	9056A		10	249348	08/14/19 10:00	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249700	08/16/19 18:28	SAD	TAL CF
Total/NA	Prep	3010A			249019	08/13/19 07:59	HED	TAL CF
Total/NA	Analysis	6020A		1	249868	08/19/19 17:06	SAD	TAL CF
Total/NA	Prep	7470A			249129	08/13/19 12:54	ACJ	TAL CF
Total/NA	Analysis	7470A		1	249331	08/14/19 12:45	ACJ	TAL CF
Total/NA	Analysis	SM 2540C		1	248984	08/12/19 15:30	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	248814	08/10/19 14:14	JMR	TAL CF

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Laboratory: Eurofins TestAmerica, Cedar Falls

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

Authority	Program	Identification Number	Expiration Date
AIHA-LAP, LLC	IHLAP	101044	11-01-20
Georgia	State	IA100001 (OR)	09-29-19
Georgia	State Program	IA100001 (OR)	09-29-19
Illinois	NELAP	200024	11-29-19
Illinois	NELAP	200024	11-29-19
Iowa	State Program	007	12-01-19
Kansas	NELAP	E-10341	01-31-20
Kansas	NELAP	E-10341	01-31-20
Minnesota	NELAP	019-999-319	12-31-19
Minnesota	NELAP	019-999-319	12-31-19
Minnesota (Petrofund)	State Program	3349	08-22-21
North Dakota	State Program	R-186	09-29-19
Oregon	NELAP	IA100001	09-29-19
Oregon	NELAP	IA100001	09-29-19
USDA	Federal	P330-19-00003	01-02-22
USDA	US Federal Programs	P330-19-00003	01-02-22

Method Summary

Client: Muscatine Power & Water
Project/Site: Muscatine Power & Water CCR

Job ID: 310-162164-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF
6020A	Metals (ICP/MS)	SW846	TAL CF
7470A	Mercury (CVAA)	SW846	TAL CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CF
SM 4500 H+ B	pH	SM	TAL CF
3010A	Preparation, Total Metals	SW846	TAL CF
7470A	Preparation, Mercury	SW846	TAL CF

Protocol References:

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

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

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401



Environment Testing
TestAmerica



310-162164 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information		
Client: <u>Muscatine Power + Water</u>		
City/State: <u>Muscatine IA</u>	STATE: <u>IA</u>	Project: <u>Muscatine Power + Water CER Landfill</u>
Receipt Information		
Date/Time Received: <u>8/19/19</u> <u>0910</u>	DATE	TIME
Received By: <u>JR</u>		
Delivery Type: <input checked="" type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____		
Condition of Cooler/Containers		
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: <u>7106</u>
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # _____ of _____
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓
Temperature Record		
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE		
Thermometer ID: <u>M</u>	Correction Factor (°C): <u>-0.1</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature		
Uncorrected Temp (°C): <u>0.1</u>	Corrected Temp (°C): <u>0.0</u>	
• Sample Container Temperature		
Container(s) used:	CONTAINER 1	CONTAINER 2
Uncorrected Temp (°C):		
Corrected Temp (°C):		
Exceptions Noted		
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No		
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No		
NOTE: If yes, contact PM before proceeding. If no, proceed with login		
Additional Comments		

Chain of Custody Record

TestAmerica

Client Information
 Company: *Sam Bennett*
 Address: *563-262-3583*
 Contact: *Sam Bennett*
 Email: *sbennett@mpw.org*
 Project Name: *Muscataine Power & Water CCR Landfill*
 State: *Iowa*

TestAmerica Project #: 31007856
Federal List:
 State: *Iowa*

Analysis Requested
 Durr Date Requested: _____
 TAT Requested (days): _____

Field Filtered Sample (Yes or No): Yes No
Perform MSM/SD (Yes or No): Yes No
 6020A CCR Lbl, 7470A Mercury: Yes No
 2400C TDS, 5M4500, H+ pH: Yes No
 9056A Chloride, Fluoride, Sulfate: Yes No

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Preservation Code	Field Filtered Sample (Yes or No)	Perform MSM/SD (Yes or No)	6020A CCR Lbl, 7470A Mercury	2400C TDS, 5M4500, H+ pH	9056A Chloride, Fluoride, Sulfate	Analysis Requested	Special Instructions/Note
MW-08	8-6-19	1040	G	GW	X	X	X	X	X		
MW-10	8-7-19	1025	G	GW	X	X	X	X	X		
MW-22	8-6-19	1325	G	GW	X	X	X	X	X		
MW-23	8-6-19	1430	G	GW	X	X	X	X	X		
MW-4A	8-7-19	1130	G	GW	X	X	X	X	X		
MW-5B	8-7-19	1330	G	GW	X	X	X	X	X		
MW-5A	8-7-19	1250	G	GW	X	X	X	X	X		
MW-14A	8-7-19	1540	G	GW	X	X	X	X	X		
MW-15A	8-7-19	1425	G	GW	X	X	X	X	X		
MW-18A				GW	X	X	X	X	X		

Matrix (Water, Spinal, Dewatered, BTX, etc.):
 MW-08: GW, MW-10: GW, MW-22: GW, MW-23: GW, MW-4A: GW, MW-5B: GW, MW-5A: GW, MW-14A: GW, MW-15A: GW, MW-18A: GW

Preservation Codes:
 A - Ice, B - Volatile, C - Zn Acetate, D - Na2OAS, E - Nitrate, F - Volatile, G - Ammonia, H - 25C4, I - 50°C, J - Di Wafer, K - EDTA, L - EDTA, M - Other (specify)
 N - Ascorbic, O - Ascorbic, P - Ascorbic, Q - Na2OAS, R - Na2SO3, S - 25C4, T - 50°C, U - Ascorbic, V - Ascorbic, W - VCAA, X - On 4-5, Y - Other (specify)

Total Number of containers: _____

Special Instructions/Note: _____

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return To Client Disposal By Lab Archive For _____ Months

Special Instructions/QC Requirements: _____



Chain of Custody Record

Client Information

Sam Bennett
563-262-3583

11/14/2018
Saw rays@testamericainc.com

Page #
APP #

Company: Muscatine Power & Water
Address: 1700 Dick Drive Hwy
City: Muscatine
State: IA 52761
Phone: 563-262-3583
Email: sbennett@mpw.org and ramundson@hrgreen.com
Project Name: Muscatine Power & Water CCR Landfill
Site: Iowa

Due Date Requested:
TAT Requested (days):
FC # 194370
WC #
TestAmerica Project #: 31007856
Event: Federal List

Analysis Requested

Perform MSMSD (Yes or No)	X	D	N	N
Field Filtered Sample (Yes or No)	X	D	N	N
602A CCR List, 7479A Mercury	X	X	X	X
2540C TDS, 5M4500_H+PH	X	X	X	X
9056A Chloride, Fluoride, Sulfate	X	X	X	X

Preservation Codes:
A - HCl
B - NaOH
C - Zn Acetate
D - Ni/Co/AEC
E - NaHCO3
F - NaOH
G - Ammonium
H - Ascorbic Acid
I - 30% H2O2
J - 30% H2O2
K - EDTA
L - EDA
Other:
M - 10% H2O2
N - 10% H2O2
O - 10% H2O2
P - 10% H2O2
Q - 10% H2O2
R - 10% H2O2
S - 10% H2O2
T - 10% H2O2
U - 10% H2O2
V - 10% H2O2
W - 10% H2O2
X - 10% H2O2
Y - 10% H2O2
Z - 10% H2O2

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, B=bi-tissue, A=air)	Preservation Code	Special Instructions/Note:
MW-21	8-7-19	0910	G	GW		
MW-24	8-6-19	1200	G	GW		
MW-25	8-6-19	1520	G	GW		
DUP-1	8-6-19	1700	G	GW		

Possible Hazard Identification
 Non-Hazard Flammable Skin Irritant Poison B Unknown Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Empty Kit Relinquished by: Sam Bennett Date: 8-8-19 0820

Received by: MAW Date/Time: 08/01/19 0910 Company: CAID

Received by: _____ Date/Time: _____ Company: _____

Received by: _____ Date/Time: _____ Company: _____

Cooler Temperature(s): _____

Special Instructions/OC Requirements: _____

Return To Client Disposal By Lab Archive For _____ Months

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)



Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container pH</u>	<u>Preservative Added (mls)</u>	<u>Lot #</u>
MW-08	310-162164-A-1	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-10	310-162164-A-2	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-22	310-162164-A-3	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-23	310-162164-A-4	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-4A	310-162164-A-5	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-5B	310-162164-A-6	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-6A	310-162164-A-7	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-14A	310-162164-A-8	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-15A	310-162164-A-9	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-21	310-162164-A-10	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-24	310-162164-A-11	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-25	310-162164-A-12	Plastic 250ml - with Nitric Acid	<2	_____	_____
DUP-1	310-162164-A-13	Plastic 250ml - with Nitric Acid	<2	_____	_____



Login Sample Receipt Checklist

Client: Muscatine Power & Water

Job Number: 310-162164-1

Login Number: 162164

List Source: Eurofins TestAmerica, Cedar Falls

List Number: 1

Creator: Spoerre, Autumn R

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-4A	
Upgradient	Downgradient ^X
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 713.45	Ground Elevation 711.18		
Depth of Well 24.55	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/7/2019 11:00	5.88	707.57
*After Purging	8/7/2019 11:30	6.92	706.53
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.79	
No. of Well Volumes (based on current water level) 0.26	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Clear, 73DF, NW wind @ 2-5mph

Field Measurements (after stabilization):

Temperature 16.60 **Units** C

Equipment Used Horiba U-50

pH 7.22

Equipment Used Horiba U-50

Specific Conductance 0.693 **Units** mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature *SB*

Date 8-16-19

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-5B	
Upgradient	Downgradient ^X
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 709.10	Ground Elevation 706.73		
Depth of Well 25.30	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/7/2019 13:10	2.85	706.25
*After Purging	8/7/2019 13:30	3.71	705.39
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.53	
No. of Well Volumes (based on current water level) 0.14	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Light snow, 33.8oF, WNW 8-10mph wind , 29.74" rising

Field Measurements (after stabilization):

Temperature 21.38	Units C
--------------------------	----------------

Equipment Used Horiba U-50

pH 7.02

Equipment Used Horiba U-50

Specific Conductance 0.966	Units mS/m
-----------------------------------	-------------------

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature 

Date 8-16-19

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-22	
Upgradient ^X	Downgradient
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (\pm 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 744.27	Ground Elevation 741.00		
Depth of Well 44.27	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (\pm 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/6/18 12:30	15.15	729.12
*After Purging	8/6/18 13:35	23.51	720.76
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 1.72	
No. of Well Volumes (based on current water level) 0.36	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Partly Cloudy, 75DF, NW wind @ 2-5 mph

Field Measurements (after stabilization):

Temperature 23.13

Units C

Equipment Used Horiba U-50

pH 7.12

Equipment Used Horiba U-50

Specific Conductance 0.660

Units mS/m

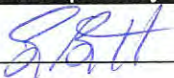
Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature



Date

8-16-19

Telephone

563-262-3583

Fax

Email

sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-21	
Upgradient	Downgradient X
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 725.75	Ground Elevation 722.81		
Depth of Well 22.20	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/7/19 8:40	9.83	715.92
*After Purging	8/7/19 9:10	10.18	715.57
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.79	
No. of Well Volumes (based on current water level) 0.39	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Clear, 68oF, W wind @ 2 mph

Field Measurements (after stabilization):

Temperature 18.60 **Units** C

Equipment Used Horiba U-50

pH 6.33

Equipment Used Horiba U-50

Specific Conductance 1.26 **Units** mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature 

Date 8-16-19

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-15A	
Upgradient	Downgradient ^X
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 729.99	Ground Elevation 727.12		
Depth of Well 20.50	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/7/2019 13:55	9.85	720.14
*After Purging	8/7/2019 14:25	11.57	718.42
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.79	
No. of Well Volumes (based on current water level) 0.46	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Sunny 80DF, W wind 5 mph

Field Measurements (after stabilization):

Temperature 22.05	Units C
--------------------------	----------------

Equipment Used Horiba U-50

pH 7.11

Equipment Used Horiba U-50

Specific Conductance 1.14	Units mS/m
----------------------------------	-------------------

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature 

Date 8-16-19

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-14A	
Upgradient	Downgradient ^X
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 729.00	Ground Elevation 726.19		
Depth of Well 20.50	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/7/2019 14:50	10.61	718.39
*After Purging	8/7/2019 15:40	13.83	715.17
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 1.32	
No. of Well Volumes (based on current water level) 0.82	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Clear, 80DF, W wind 5-8 mph	
Field Measurements (after stabilization):	
Temperature 21.89	Units C
Equipment Used Horiba U-50	
pH 7.09	
Equipment Used Horiba U-50	
Specific Conductance 1.72	Units mS/m
Equipment Used Horiba U-50	

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature <i>SBH</i>	Date <i>8-16-19</i>
Telephone 563-262-3583	Fax
	Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-10	
Upgradient ^X	Downgradient
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 718.51	Ground Elevation 716.32		
Depth of Well 20.32	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/7/2019 9:55	4.55	713.96
*After Purging	8/7/2019 10:25	4.64	713.87
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.79	
No. of Well Volumes (based on current water level) 0.31	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Clear, 72DF, Calm

Field Measurements (after stabilization):

Temperature 16.27 **Units** C

Equipment Used Horiba U-50

pH 7.07

Equipment Used Horiba U-50

Specific Conductance 0.626 **Units** mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature 

Date 8-16-19

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-08	
Upgradient <input checked="" type="checkbox"/>	Downgradient <input type="checkbox"/>
Name of person sampling Sam Bennett	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 747.36	Ground Elevation 744.37		
Depth of Well 42.95	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/6/2019 9:35	14.45	732.91
*After Purging	8/6/2019 10:40	20.67	726.69
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 1.72	
No. of Well Volumes (based on current water level) 0.37	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Clear, 68DF, Calm

Field Measurements (after stabilization):

Temperature 14.34 **Units** C

Equipment Used Horiba U-50

pH 6.64

Equipment Used Horiba U-50

Specific Conductance 0.999 **Units** mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature *SBH*

Date 8-16-19

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

Site Name Muscatine Power and Water	Permit No. 70-SDP-6_82P
Monitoring Well/Piezometer No. MW-6A	
Upgradient	Downgradient ^X
Name of person sampling Neil Hoskins	

A. MONITORING WELL/PIEZOMETER CONDITIONS	
Well/Piezometer Properly Capped? (please check)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
If no, explain	
Standing Water or Litter? (please check)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
If yes, explain	

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)			
Elevation:			
Top of inner well casing 708.92	Ground Elevation 706.49		
Depth of Well 25.35	Inside Casing Diameter (in inches) 2"		
Equipment Used Slope Indicator Co. Water level indicator Model 51453			
Groundwater Level (± 0.01 foot below top of inner casing, MSL):			
	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	8/7/2019 12:30	3.52	705.4
*After Purging	8/7/2019 12:50	3.91	705.01
*Before Purging			

*C. WELL PURGING	
Quantity of Water Removed from Well (gallons) 0.66	
No. of Well Volumes (based on current water level) 0.19	
Was well pumped/bailed dry? No	
Equipment used:	
Bailer type	Dedicated Bailer?
Pump type Peristaltic	Dedicated Pump? Yes
If not dedicated, method of cleaning	

***D. FIELD MEASUREMENT**

Weather Conditions Clear, 82DF, Calm

Field Measurements (after stabilization):

Temperature 20.88 **Units** C

Equipment Used Horiba U-50

pH 7.12

Equipment Used Horiba U-50

Specific Conductance 0.545 **Units** mS/m

Equipment Used Horiba U-50

Comments

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature *SBH*

Date 8-16-19

Telephone 563-262-3583

Fax

Email sbennett@mpw.org

NOTE: Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095		June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	mg/L	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	0.205
Calcium	mg/L	152	117	118	109	89.9	96.5	113	91.3	77	74.7	74.7	115	83.6	97.6	132
Chloride	mg/L	19.8	17.8	16.2	17.2	15.4	17.1	14.1	14.1	14.4	14.5	14.5	14.9	15.6	16.1	17.1
Fluoride	mg/L	<.5	<.5	<.5	0.72	<.5	1.69	<.5	<.5	<.5	<.5	<.5	0.826	<.5	<.5	0.643
pH	SU	8.26	6.82	7.03	7.03	7.03	7.05	7.59	6.77	7.24	7.24	7.3	7.56	7.2	7.08	6.64
Sulfate	mg/L	366	187	187	149	145	145	190	119	106	87.3	87.3	136	94.7	223	276
Total Dissolved Solids	mg/L	836	664	708	634	578	624	656	488	470	376	376	502	414	612	702

Appendix III Parameters:

Antimony	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Arsenic	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Barium	mg/L	0.0861	0.0671	0.0706	0.0645	0.0594	0.0636	0.076	0.0596	0.0636	0.0617	0.0617	0.0761	0.0649	0.0751	0.0733
Beryllium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Cadmium	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Cobalt	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	0.000601	0.00051	<.0005	<.0005	<.0005	<.0005	<.0005	0.00177	0.00558
Fluoride	mg/L	<.5	<.5	<.5	0.72	<.5	1.69	<.5	<.5	<.5	<.5	<.5	0.826	<.5	<.5	0.643
Lead	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Lithium	mg/L	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury	mg/L	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Selenium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Thallium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Radium-226	mg/L	0.152	0.4086	0.0139	0.234	0.0604	0.0229	0.0596	0.087	0.022	0.022	0.022			<0.0229	
Radium-228	mg/L	0.224	0.0663	0.336	0.102	0.161	0.104	0.144	0.249	0.646	0.646	0.646			<0.194	
Combined Radium 226 + 228	mg/L	0.375	0.115	0.35	0.336	0.221	0.126	0.204	0.336	0.668	0.668	0.668			<0.217	

Appendix IV Parameters:

Antimony	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Arsenic	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Barium	mg/L	0.0861	0.0671	0.0706	0.0645	0.0594	0.0636	0.076	0.0596	0.0636	0.0617	0.0617	0.0761	0.0649	0.0751	0.0733
Beryllium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Cadmium	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Cobalt	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	0.000601	0.00051	<.0005	<.0005	<.0005	<.0005	<.0005	0.00177	0.00558
Fluoride	mg/L	<.5	<.5	<.5	0.72	<.5	1.69	<.5	<.5	<.5	<.5	<.5	0.826	<.5	<.5	0.643
Lead	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Lithium	mg/L	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury	mg/L	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Selenium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Thallium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Radium-226	mg/L	0.152	0.4086	0.0139	0.234	0.0604	0.0229	0.0596	0.087	0.022	0.022	0.022			<0.0229	
Radium-228	mg/L	0.224	0.0663	0.336	0.102	0.161	0.104	0.144	0.249	0.646	0.646	0.646			<0.194	
Combined Radium 226 + 228	mg/L	0.375	0.115	0.35	0.336	0.221	0.126	0.204	0.336	0.668	0.668	0.668			<0.217	

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095															
MW-10 Upgradient															
	June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2
Calcium	89.3	80.7	83.3	86.5	81.2	79.2	83.6	85.5	83.3		77.3	88.5	85.4	76.3	78.9
Chloride	6.22	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5
Fluoride	0.731	< .5	< .5	< .5	< .5	0.774	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.596
pH	8.68	7.12	7.27	7.18	7.51	7.18	7.45	6.34	7.18	7.45	7.04	7.72	7.23	7.1	7.07
Sulfate	42.1	7.3	36.4	38.4	47.3	38.3	35.4	39	46.9	35.4	51.4	37.3	34.3	42.8	28.8
Total Dissolved Solids	468	412	444	428	498	538	524	458	414		314	396	392	326	320

Appendix III Parameters:

Boron	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2
Calcium	89.3	80.7	83.3	86.5	81.2	79.2	83.6	85.5	83.3		77.3	88.5	85.4	76.3	78.9
Chloride	6.22	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5
Fluoride	0.731	< .5	< .5	< .5	< .5	0.774	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.596
pH	8.68	7.12	7.27	7.18	7.51	7.18	7.45	6.34	7.18	7.45	7.04	7.72	7.23	7.1	7.07
Sulfate	42.1	7.3	36.4	38.4	47.3	38.3	35.4	39	46.9	35.4	51.4	37.3	34.3	42.8	28.8
Total Dissolved Solids	468	412	444	428	498	538	524	458	414		314	396	392	326	320

Appendix IV Parameters:

Antimony	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Arsenic	0.00298	0.00369	0.00328	0.00312	0.00298	< .002	0.00262	0.00317			< .002	0.00211	0.0036	0.0056	0.00784
Barium	0.168	0.161	0.163	0.15	0.151	0.138	0.154	0.157	0.138	0.154	0.129	0.162	0.216	0.185	0.215
Beryllium	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Cadmium	89.3	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Cobalt	0.000555	< .0005	0.000523	0.000638	0.000663	0.000779	0.000621	0.000695			0.000627	0.00107	0.00088	0.000783	0.000572
Fluoride	0.731	< .5	< .5	< .5	< .5	0.774	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.596
Lead	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Mercury	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	0.00341	0.00219
Selenium	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Thallium	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Radium-226	0.19	0.413	0.119	0.422	0.199	0.139	0.206	0.273			0.188			0.153	
Radium-228	0.0326	0.255	0.575	0.377	0.314	0.332	-0.00196	0.558			0.0884			< .178	
Combined Radium 226 + 228	0.223	0.668	0.694	0.799	0.513	0.47	0.204	0.831			0.276			< .331	

Muscataine Power & Water CCR Landfill Federal Parameters Job # 10100095															
MW-4A Downgradient															
	June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	mg/L	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	0.66	< .2	< .2	< .2	< .2
Calcium	mg/L	98.1	88.8	89.3	94.5	86.8	88.7	89.7	85.3		95.8	91.4	91.3	99.7	93.8
Chloride	mg/L	12.6	13.2	13.6	13.5	15.1	13.2	13.2	14.7		8.81	15.3	19.4	16	15.6
Fluoride	mg/L	< .5	< .5	< .5	< .5	0.664	< .5	< .5	< .5		< .5	< .5	< .5	0.771	0.525
pH	SU	8.9	7.3	7.38	7.42	7.42	8.16	6.53	7.49		7.36	7.53	7.44	7.26	7.22
Sulfate	mg/L	32.2	28.4	27.2	32.7	36	33	35.3	45.4		162	51.3	52.2	48	47
Total Dissolved Solids	mg/L	507	426	450	450	460	452	420	466		586	440	420	398	422

Appendix III Parameters:

Antimony	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001		< .001	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002		< .002	< .0002	< .002	< .002	< .002
Barium	mg/L	0.15	0.128	0.131	0.139	0.143	0.133	0.133	0.111		0.117	0.144	0.149	0.161	0.147
Beryllium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001		< .001	< .001	< .001	< .001	< .001
Cadmium	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005		< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005		< .005	< .005	< .005	< .005	< .005
Cobalt	mg/L	< .000681	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005		< .0005	< .0005	< .0005	< .0005	< .0005
Fluoride	mg/L	< .5	< .5	< .5	< .5	0.664	< .5	< .5	< .5		< .5	< .5	< .5	0.771	0.525
Lead	mg/L	< .00147	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005		< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	mg/L	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05		< .01	< .01	< .01	< .01	< .01
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002		< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	< .002	< .002	M .002	< .002	< .002	< .002	< .002	< .002		< .002	< .002	< .002	< .002	< .002
Selenium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005		< .005	< .005	< .005	< .005	< .005
Thallium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001		< .001	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.54	0.326	0.285	0.585	0.215	0.177	0.255	0.111		0.111			0.218	
Radium-228	mg/L	0.171	0.612	0.388	0.0872	0.313	0.192	0.188	0.339		0.339			< .218	
Combined Radium 226 + 228	mg/L	0.711	0.938	0.674	0.672	0.528	0.368	0.443	0.45		0.45			0.436	

Appendix IV Parameters:

Antimony	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001		< .001	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002		< .002	< .0002	< .002	< .002	< .002
Barium	mg/L	0.15	0.128	0.131	0.139	0.143	0.133	0.133	0.111		0.117	0.144	0.149	0.161	0.147
Beryllium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001		< .001	< .001	< .001	< .001	< .001
Cadmium	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005		< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005		< .005	< .005	< .005	< .005	< .005
Cobalt	mg/L	< .000681	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005		< .0005	< .0005	< .0005	< .0005	< .0005
Fluoride	mg/L	< .5	< .5	< .5	< .5	0.664	< .5	< .5	< .5		< .5	< .5	< .5	0.771	0.525
Lead	mg/L	< .00147	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005		< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	mg/L	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05		< .01	< .01	< .01	< .01	< .01
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002		< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	< .002	< .002	M .002	< .002	< .002	< .002	< .002	< .002		< .002	< .002	< .002	< .002	< .002
Selenium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005		< .005	< .005	< .005	< .005	< .005
Thallium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001		< .001	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.54	0.326	0.285	0.585	0.215	0.177	0.255	0.111		0.111			0.218	
Radium-228	mg/L	0.171	0.612	0.388	0.0872	0.313	0.192	0.188	0.339		0.339			< .218	
Combined Radium 226 + 228	mg/L	0.711	0.938	0.674	0.672	0.528	0.368	0.443	0.45		0.45			0.436	

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095															
MW-5B Downgradient															
	June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19

Appendix III Parameters:															
Boron	mg/L	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Calcium	mg/L	147	<.0005	140	147	126	130	140	139	136	134	147	146	134	139
Chloride	mg/L	67	65.9	66	67	70.4	62.1	63.4	64	73	68.2	65	70.8	55	64.1
Fluoride	mg/L	<.5	<.5	<.5	1.88	2.14	0.627	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
pH	SU	8.49	7.08	7.1	6.05	7	7	6.95	7.08	7	7.23	7.3	7.14	7.05	7.02
Sulfate	mg/L	109	109	105	109	111	108	114	135	135	122	119	120	85	112
Total Dissolved Solids	mg/L	920	672	646	636	684	680	734	688	688	620	828	622	562	596

Appendix IV Parameters:															
Antimony	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Arsenic	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Barium	mg/L	0.331	0.295	0.304	0.315	0.316	0.296	0.300	0.300	0.31	0.341	0.336	0.357	0.326	0.301
Beryllium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Cadmium	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Cobalt	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Fluoride	mg/L	<.5	<.5	<.5	1.88	2.14	0.627	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Lead	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Lithium	mg/L	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury	mg/L	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	0.00212	<.002
Selenium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Thallium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Radium-226	mg/L	0.365	0.449	0.598	0.509	0.464	0.357	0.213	0.433	0.349	0.349	0.349	0.349	0.196	0.196
Radium-228	mg/L	0.3	0.405	-0.169	0.541	0.386	0.664	0.294	0.54	0.61	0.61	0.61	0.61	0.372	0.372
Combined Radium 226 + 228	mg/L	0.665	0.854	0.428	1.05	0.85	1.02	0.507	0.973	0.959	0.959	0.959	0.959	0.568	0.568

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095		June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	mg/L	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2	< .2
Calcium	mg/L	81.4	75.4	75.7	85.6	68.8	56.3	72.9	71.2	71.9		74.1	80.1	73.3	73.2	80.9
Chloride	mg/L	5.97	< .5	< .5	9.08	9.93	< .5	< .5	< .5	< .5	< .5	5.33	< .5	< .5	< .5	< .5
Fluoride	mg/L	< .5	< .5	< .5	2.02	1.89	0.814	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.535
pH	SU	8.71	6.79	7.21	7.2	7.2	7.14	7.7	6.73	7.58	7.7	7.4	7.58	7.18	7.15	7.12
Sulfate	mg/L	< .5	< .5	< .5	< .5	5.94	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5
Total Dissolved Solids	mg/L	440	340	370	368	336	402	486	364	424		292	368	298	320	308

Appendix III Parameters:

Antimony	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Barium	mg/L	0.209	0.199	0.196	0.216	0.197	0.152	0.197	0.19	0.152		0.206	0.222	0.206	0.2	0.211
Beryllium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Cadmium	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Cobalt	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Fluoride	mg/L	< .5	< .5	< .5	2.02	1.89	0.814	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.535
Lead	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	mg/L	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Selenium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Thallium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.226	0.278	0.202	0.462	0.166	0.116	0.21	0.136	0.21		0.179			0.22	
Radium-228	mg/L	0.178	0.599	0.311	0.432	0.148	0.182	0.23	0.197			0.439			< .26	
Combined Radium 226 + 228	mg/L	0.405	0.876	0.512	0.894	0.314	0.298	0.44	0.333			0.618			0.481	

Appendix IV Parameters:

Antimony	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Barium	mg/L	0.209	0.199	0.196	0.216	0.197	0.152	0.197	0.19	0.152		0.206	0.222	0.206	0.2	0.211
Beryllium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Cadmium	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Cobalt	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Fluoride	mg/L	< .5	< .5	< .5	2.02	1.89	0.814	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.535
Lead	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	mg/L	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Selenium	mg/L	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Thallium	mg/L	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.226	0.278	0.202	0.462	0.166	0.116	0.21	0.136	0.21		0.179			0.22	
Radium-228	mg/L	0.178	0.599	0.311	0.432	0.148	0.182	0.23	0.197			0.439			< .26	
Combined Radium 226 + 228	mg/L	0.405	0.876	0.512	0.894	0.314	0.298	0.44	0.333			0.618			0.481	

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095															
MW-13 Downgradient															
	June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	47.2	13.3	74.8	7.03	4.35	5.93	2.77	2.72	50	2.92	21.7	1.34	1.45		
Calcium	218	112	276	105	87.6	97.5	92.8	95.4	208	93.2	149	89.5	93.1		
Chloride	22.9	17.1	29.8	12.7	14.8	12.8	9.17	9.62	15.2		19.9	5.84	7.24		
Fluoride	<.5	1.21	3.25	<.5	<.5	0.997	<.5	<.5	<.5		2.08	0.528	<.5		
pH	7.82	7.3	7.1	7.2	7.72	7.31	7.76	7.08	7.14	7.04	7.72	8.03	7.37		
Sulfate	975	197	1170	117	110	174	86.7	99.4	931	102	506	62.1	72.7		
Total Dissolved Solids	1970	694	2740	616	554	574	502	536	2150	562	1120	472	384		

Appendix III Parameters:

Antimony	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Arsenic	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Barium	0.0302	0.0616	477	0.0945	0.0872	0.0559	0.0783	0.0857	0.132	0.132	0.132	0.118	0.122		
Beryllium	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Cadmium	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	0.0191	<.005	<.005	<.005	<.005	<.005	<.005	0.00658	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Cobalt	0.00172	0.000637	0.00179	0.000717	0.000727	0.000695	0.000682	0.000686	0.000682	0.000682	0.000682	<.0005	<.0005	<.0005	<.0005
Fluoride	<.5	1.21	3.25	<.5	<.5	0.997	<.5	<.5	<.5	<.5	2.08	0.528	<.5	<.5	<.5
Lead	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Lithium	<.100	<.05	<.150	<.05	<.05	<.05	<.05	<.05	<.05	<.05	0.0122	<.01	<.01	<.01	<.01
Mercury	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	0.0227	0.00867	0.0176	0.00676	0.00416	0.00443	0.00346	0.00329	0.00443	0.00346	0.00732	0.00296	0.00278	0.00278	0.00278
Selenium	<.005	<.005	0.0364	<.005	<.005	<.005	<.005	<.005	<.005	<.005	0.0195	<.005	<.005	<.005	<.005
Thallium	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Radium-226	0.0909	0.142	0.312	0.0896	0.11	0.103	0.179	0.164	0.12	0.12	0.12				
Radium-228	0.114	0.0795	0.832	0.173	0.241	0.262	0.0132	0.359	0.665	0.665	0.665				
Combined Radium 226 + 228	0.205	0.222	1.14	0.262	0.35	0.365	0.192	0.523	0.785	0.785	0.785				

Appendix IV Parameters:

Antimony	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Arsenic	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Barium	0.0302	0.0616	477	0.0945	0.0872	0.0559	0.0783	0.0857	0.132	0.132	0.132	0.118	0.122		
Beryllium	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Cadmium	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	0.0191	<.005	<.005	<.005	<.005	<.005	<.005	0.00658	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Cobalt	0.00172	0.000637	0.00179	0.000717	0.000727	0.000695	0.000682	0.000686	0.000682	0.000682	0.000682	<.0005	<.0005	<.0005	<.0005
Fluoride	<.5	1.21	3.25	<.5	<.5	0.997	<.5	<.5	<.5	<.5	2.08	0.528	<.5	<.5	<.5
Lead	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Lithium	<.100	<.05	<.150	<.05	<.05	<.05	<.05	<.05	<.05	<.05	0.0122	<.01	<.01	<.01	<.01
Mercury	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	0.0227	0.00867	0.0176	0.00676	0.00416	0.00443	0.00346	0.00329	0.00443	0.00346	0.00732	0.00296	0.00278	0.00278	0.00278
Selenium	<.005	<.005	0.0364	<.005	<.005	<.005	<.005	<.005	<.005	<.005	0.0195	<.005	<.005	<.005	<.005
Thallium	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Radium-226	0.0909	0.142	0.312	0.0896	0.11	0.103	0.179	0.164	0.12	0.12	0.12				
Radium-228	0.114	0.0795	0.832	0.173	0.241	0.262	0.0132	0.359	0.665	0.665	0.665				
Combined Radium 226 + 228	0.205	0.222	1.14	0.262	0.35	0.365	0.192	0.523	0.785	0.785	0.785				

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095	June-16	15.8	17.9	19.3	14.7	13.1	11.3	16.3	13	16	13.7	11	15	14	15.5	17.6		
		281	311	308	333	288	310	307	296	296	310	301	278	297	309	290	255	
		28.7	28.7	37	31.9	33.5	39.4	29.7	32.9	32.9	35.4	33.2	37.4	29	33.1	25.8	22.1	
		<.5	<.5	0.867	<.5	<.5	1.93	<.5	<.5	<.5	<.5	<.5	<.5	0.884	<.5	<.5	<.5	
		7.88	7.1	7.15	7.52	7.25	7.25	7.57	6.85	6.68	6.68	7	7.35	7.26	7.09	6.97	7.09	
		1050	1040	1010	1140	1190	1200	1020	1110	1210	1210	1140	1110	1090	1070	1050	837	
		2000	1980	2500	2080	1010	2260	2250	2170	2080	2080	2650	1820	1800	1900	1690	1510	

Appendix III Parameters:

Boron	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Calcium	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Chloride	mg/L	0.0443	0.0402	0.0391	0.0383	0.0306	0.0341	0.0338	0.031	0.031	0.0338	0.0285	0.0314	0.0344	0.0328	0.0398
Beryllium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Cadmium	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Cobalt	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Fluoride	mg/L	<.5	<.5	0.867	<.5	<.5	1.93	<.5	<.5	<.5	<.5	<.5	0.684	<.5	<.5	<.5
Lead	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Lithium	mg/L	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury	mg/L	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Selenium	mg/L	0.0071	0.00811	0.00821	0.00834	0.00752	0.00823	0.00829	0.00759	0.00759	0.00827	<.001	0.00739	0.00827	0.00569	<.001
Thallium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Radium-226	mg/L	0.0496	0.095	0.0604	0.137	0.0624	0.0561	0.0545	0.0506	0.0506	0.0545	0.0335	0.0588	<.001	<.001	<.001
Radium-228	mg/L	0.0956	0.107	0.462	0.122	0.23	0.424	-0.0414	0.406	0.406	-0.0414	0.224	<.001	<.001	<.001	<.001
Combined Radium 226 + 228	mg/L	0.145	0.202	0.523	0.26	0.293	0.48	0.0131	0.456	0.456	0.0131	0.288	<.001	<.001	<.001	<.001

Appendix IV Parameters:

Antimony	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Arsenic	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Barium	mg/L	0.0443	0.0402	0.0391	0.0383	0.0306	0.0341	0.0338	0.031	0.031	0.0338	0.0285	0.0314	0.0344	0.0328	0.0398
Beryllium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Cadmium	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	mg/L	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Cobalt	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Fluoride	mg/L	<.5	<.5	0.867	<.5	<.5	1.93	<.5	<.5	<.5	<.5	<.5	0.684	<.5	<.5	<.5
Lead	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
Lithium	mg/L	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury	mg/L	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Selenium	mg/L	0.0071	0.00811	0.00821	0.00834	0.00752	0.00823	0.00829	0.00759	0.00759	0.00827	<.001	0.00739	0.00827	0.00569	<.001
Thallium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Radium-226	mg/L	0.0496	0.095	0.0604	0.137	0.0624	0.0561	0.0545	0.0506	0.0506	0.0545	0.0335	0.0588	<.001	<.001	<.001
Radium-228	mg/L	0.0956	0.107	0.462	0.122	0.23	0.424	-0.0414	0.406	0.406	-0.0414	0.224	<.001	<.001	<.001	<.001
Combined Radium 226 + 228	mg/L	0.145	0.202	0.523	0.26	0.293	0.48	0.0131	0.456	0.456	0.0131	0.288	<.001	<.001	<.001	<.001

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095		June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	mg/L	16.8	20.6	17.9	18.4	14.9	14.7	16.4	14.7	19.2	12.9	11	10.5	14.6	8.35	7.56
Calcium	mg/L	206	199	203	244	233	226	186	206	218	217	278	102	155	118	111
Chloride	mg/L	17.1	17.2	17.6	19	21.5	47.4	12.8	15.4	20.5	20.7	37.4	< 5	10.1	8.54	9.91
Fluoride	mg/L	< .5	0.549	< .5	< .5	< .5	6.7	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.523	0.625
pH	SU	7.97	7.16	7.27	7.32	7.2	7.31	7.84	6.96	6.94	7	7.35	7.5	7.25	7.76	7.11
Sulfate	mg/L	827	605	607	732	849	853	537	664	835	779	1110	210	400	351	327
Total Dissolved Solids	mg/L	1620	1270	1500	1600	1470	1780	1280	1390	1520	1670	1820	676	948	724	786

Appendix III Parameters:

Antimony	mg/L	< .05	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .1	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Barium	mg/L	2.13	0.044	0.0426	0.0406	0.0402	0.0364	0.0327	0.0338	0.0364	0.0327	0.0285	>0.338	0.0335	0.037	0.047
Beryllium	mg/L	< .05	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Cadmium	mg/L	< .025	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .250	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Cobalt	mg/L	< .025	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Fluoride	mg/L	< .5	0.549	< .5	< .5	< .5	6.7	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.625
Lead	mg/L	< .025	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	mg/L	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	< .1	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Selenium	mg/L	< .25	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Thallium	mg/L	< .05	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.0942	0.0703	0.164	0.106	0.0814	0.0124	0.100	0.047	0.0124	0.100	0.0518	< .001	< .001	< .001	< .001
Radium-228	mg/L	0.216	0.18	0.123	0.145	0.0218	0.0842	0.121	0.197	0.0842	0.121	0.0715	< .001	< .001	< .001	< .001
Combined Radium 226 + 228	mg/L	0.31	0.251	0.286	0.251	0.103	0.0966	0.221	0.244	0.0966	0.221	0.123	< .001	< .001	< .001	< .001

Appendix IV Parameters:

Antimony	mg/L	< .05	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .1	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Barium	mg/L	2.13	0.044	0.0426	0.0406	0.0402	0.0364	0.0327	0.0338	0.0364	0.0327	0.0285	>0.338	0.0335	0.037	0.047
Beryllium	mg/L	< .05	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Cadmium	mg/L	< .025	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .250	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Cobalt	mg/L	< .025	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Fluoride	mg/L	< .5	0.549	< .5	< .5	< .5	6.7	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	0.625
Lead	mg/L	< .025	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	mg/L	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	< .1	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002	< .002
Selenium	mg/L	< .25	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005	< .005
Thallium	mg/L	< .05	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.0942	0.0703	0.164	0.106	0.0814	0.0124	0.100	0.047	0.0124	0.100	0.0518	< .001	< .001	< .001	< .001
Radium-228	mg/L	0.216	0.18	0.123	0.145	0.0218	0.0842	0.121	0.197	0.0842	0.121	0.0715	< .001	< .001	< .001	< .001
Combined Radium 226 + 228	mg/L	0.31	0.251	0.286	0.251	0.103	0.0966	0.221	0.244	0.0966	0.221	0.123	< .001	< .001	< .001	< .001

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095															
MW-18A Downgradient															
	June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	13.7	15.1	14.2	11.8	12.7	10.5	11.5	10.8	13.1	10.7	8.81	13.3	10.5		
Calcium	294	294	280	291	266	237	255	258	239	232	191	264	223		
Chloride	30.4	27.6	35.3	29.2	28.1	44.2	27.2	27	29.3	27.4	27.1	25.6	26.9		
Fluoride	<.5	<.5	0.791	<.5	<.5	3.16	<.5	<.5	<.5	<.5	<.5	<.5	<.5		
pH	7.88	7.1	7.2	7.18	7.18	7.05	7.38	6.96	6.34	7	7.28	7.19	7.12		
Sulfate	1100	874	855	886	917	863	796	801	808	737	624	709	675		
Total Dissolved Solids	1750	1720	1850	2320	1800	4160	1970	1530	1420	1430	1150	1890	1330		

Appendix III Parameters:

Antimony	<.05	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	0.00195	<.001	<.001		
Arsenic	<.1	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	0.00265	<.002	<.002		
Barium	<.1	0.0391	0.0381	0.0394	0.0403	0.0297	0.0313	0.0329	0.0313	0.0313	0.0281	0.0352	0.036		
Beryllium	<.05	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		
Cadmium	<.025	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		
Chromium	<.250	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005		
Cobalt	<.025	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		
Fluoride	<.5	<.5	0.791	<.5	<.5	3.16	<.5	<.5	<.5	<.5	<.5	<.5	<.5		
Lead	<.025	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		
Lithium	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.0005	<.01	<.01		
Mercury	0.000245	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002		
Molybdenum	<.1	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002		
Selenium	<.25	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005		
Thallium	<.05	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		
Radium-226	0.0607	-0.00906	0.106	0.226	0.0909	0.0175	-0.000744	0.0546			0.0456				
Radium-228	0.344	0.228	0.605	0.407	0.195	0.387	0.185	0.23			0.339				
Combined Radium 226 + 228	0.405	0.218	0.711	0.633	0.286	0.405	0.184	0.284			0.364				

Appendix IV Parameters:

Antimony	<.05	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	0.00195	<.001	<.001		
Arsenic	<.1	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	0.00265	<.002	<.002		
Barium	<.1	0.0391	0.0381	0.0394	0.0403	0.0297	0.0313	0.0329	0.0313	0.0313	0.0281	0.0352	0.036		
Beryllium	<.05	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		
Cadmium	<.025	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		
Chromium	<.250	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005		
Cobalt	<.025	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		
Fluoride	<.5	<.5	0.791	<.5	<.5	3.16	<.5	<.5	<.5	<.5	<.5	<.5	<.5		
Lead	<.025	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		
Lithium	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.0005	<.01	<.01		
Mercury	0.000245	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002		
Molybdenum	<.1	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002		
Selenium	<.25	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005		
Thallium	<.05	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		
Radium-226	0.0607	-0.00906	0.106	0.226	0.0909	0.0175	-0.000744	0.0546			0.0456				
Radium-228	0.344	0.228	0.605	0.407	0.195	0.387	0.185	0.23			0.339				
Combined Radium 226 + 228	0.405	0.218	0.711	0.633	0.286	0.405	0.184	0.284			0.364				

Muscatine Power & Water CCR Landfill Federal Parameters Job # 10100095		June-16	August-16	October-16	December-16	February-17	April-17	June-17	August-17	October-17	November-17	March-18	June-18	August-18	March-19	August-19
Boron	mg/L	<2	7.23	8.45	6.93	4.87	4.49	7.36	7.05	3.33	2.24	8.81	6.84	1.36	6.95	8.46
Calcium	mg/L	37.2	146	185	178	118	110	149	163	62.3		191	159	78.7	142	145
Chloride	mg/L	27.7	16.6	24.4	19.2	14.2	15.6	15.1	16.1	5.09		27.1	10.9	<5	8.3	14
Fluoride	mg/L	<.5	<.5	<.5	<.5	0.993	0.768	<.5	<.5	<.5		<.5	<.5	<.5	<.5	<.5
pH	SU	7.56	6.56	6.66	6.45	5.9	6.6	7.34	6.77	6.76	6.87	7.28	7.25	7.07	6.41	6.33
Sulfate	mg/L	713	520	603	645	415	461	541	590	206		624	489	96.6	442	529
Total Dissolved Solids	mg/L	1440	1110	1420	1240	1010	1060	1140	1220	514		1150	952	416	872	960

Appendix III Parameters:

Antimony	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		0.00195	<.001	<.001	<.001	<.001
Arsenic	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002		0.00265	<.002	<.002	<.002	<.002
Barium	mg/L	0.0573	0.0482	0.0606	0.056	0.0735	0.0356	0.0461	0.0499	0.0356		0.0281	0.0515	0.0622	0.0511	0.0624
Beryllium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
Cadmium	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	mg/L	0.00694	0.00538	0.00582	0.00561	<.005	<.005	0.00586	0.00572	<.005		<.005	0.00726	<.005	0.00647	0.00637
Cobalt	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		<.0005	<.0005	<.0005	<.0005	<.0005
Fluoride	mg/L	<.5	<.5	<.5	<.5	0.993	0.768	<.5	<.5	<.5		<.5	<.5	<.5	<.5	<.5
Lead	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		<.0005	0.000633	<.0005	<.0005	<.0005
Lithium	mg/L	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05		<.01	0.0189	<.01	0.0277	0.0279
Mercury	mg/L	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002		<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002		<.002	0.00383	<.002	<.002	<.002
Selenium	mg/L	0.0165	0.0103	0.0137	0.0119	0.0074	0.00674	0.0106	0.0109	0.00674		<.005	0.00939	<.005	0.102	0.0108
Thallium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
Radium-226	mg/L	0.299	0.148	0.427	0.128	0.0502	-0.00511	0.0379	0.209	0.0141		0.0141			0.117	
Radium-228	mg/L	-0.0462	0.0116	0.391	0.178	-0.0507	0.1	0.507	0.605	0.344		0.344			<.17	
Combined Radium 226 + 228	mg/L	0.253	0.159	0.817	0.306	-0.000573	0.0953	0.545	0.814	0.358		0.358			<.287	

Appendix IV Parameters:

Antimony	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		0.00195	<.001	<.001	<.001	<.001
Arsenic	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002		0.00265	<.002	<.002	<.002	<.002
Barium	mg/L	0.0573	0.0482	0.0606	0.056	0.0735	0.0356	0.0461	0.0499	0.0356		0.0281	0.0515	0.0622	0.0511	0.0624
Beryllium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
Cadmium	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		<.0005	<.0005	<.0005	<.0005	<.0005
Chromium	mg/L	0.00694	0.00538	0.00582	0.00561	<.005	<.005	0.00586	0.00572	<.005		<.005	0.00726	<.005	0.00647	0.00637
Cobalt	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		<.0005	<.0005	<.0005	<.0005	<.0005
Fluoride	mg/L	<.5	<.5	<.5	<.5	0.993	0.768	<.5	<.5	<.5		<.5	<.5	<.5	<.5	<.5
Lead	mg/L	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005		<.0005	0.000633	<.0005	<.0005	<.0005
Lithium	mg/L	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05		<.01	0.0189	<.01	0.0277	0.0279
Mercury	mg/L	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002		<.0002	<.0002	<.0002	<.0002	<.0002
Molybdenum	mg/L	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002		<.002	0.00383	<.002	<.002	<.002
Selenium	mg/L	0.0165	0.0103	0.0137	0.0119	0.0074	0.00674	0.0106	0.0109	0.00674		<.005	0.00939	<.005	0.102	0.0108
Thallium	mg/L	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
Radium-226	mg/L	0.299	0.148	0.427	0.128	0.0502	-0.00511	0.0379	0.209	0.0141		0.0141			0.117	
Radium-228	mg/L	-0.0462	0.0116	0.391	0.178	-0.0507	0.1	0.507	0.605	0.344		0.344			<.17	
Combined Radium 226 + 228	mg/L	0.253	0.159	0.817	0.306	-0.000573	0.0953	0.545	0.814	0.358		0.358			<.287	

**Muscatine Power & Water CCR Landfill
Federal Parameters
Job # 10100095**

**MW-22
Downgradient**

	March-18	June-18	August-18	March-19	August-19
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Appendix III Parameters:

Boron	mg/L	< .2	< .2	< .2	0.299	< .2
Calcium	mg/L	69.8	91.5	80.7	91.6	83.8
Chloride	mg/L	30	27.2	29.8	27.6	26.9
Fluoride	mg/L	< .5	< .5	< .5	< .5	0.507
pH	SU	7.36	7.9	7.42	7.21	7.12
Sulfate	mg/L	123	134	125	134	139
Total Dissolved Solids	mg/L	424	434	420	456	428

Appendix IV Parameters:

Anitmony	mg/L	< .001	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .002	0.00245	0.00261	< .002	< .002
Barium	mg/L	0.15	0.184	0.181	0.209	0.215
Beryllium	mg/L	< .001	< .001	< .001	< .001	< .001
Cadmium	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .005	< .005	< .005	< .005	< .005
Cobalt	mg/L	0.00142	0.00129	0.00149	< .0005	< .0005
Fluoride	mg/L	< .5	< .5	< .5	< .5	0.507
Lead	mg/L	< .0005	< .0005	< .0005	< .0005	< .0005
Lithium	mg/L	< .01	< .01	< .01	< .01	< .01
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	0.00568	0.00423	0.00424	0.00263	0.00574
Selenium	mg/L	< .005	< .005	< .005	< .005	< .005
Thallium	mg/L	< .001	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.122	0.284		0.116	
Radium-228	mg/L	0.135	0.128		< .226	
Combined Radium 226 + 228	mg/L	0.257	0.412		< .343	

Muscataine Power & Water CCR Landfill Federal Parameters Job # 10100095					
MW-23 Downgradient		June-18	August-18	March-19	August-19

Appendix III Parameters:

Boron	mg/L	< .2	< .2	< .2	< .2
Calcium	mg/L	70.5	63.9	59.7	59.5
Chloride	mg/L	15.9	14.2	10.5	13.8
Fluoride	mg/L	< .5	< .5	< .5	< .5
pH	SU	7.69	7.55	7.24	6.75
Sulfate	mg/L	38.4	31.7	26.2	29.7
Total Dissolved Solids	mg/L	384	340	296	336

Appendix IV Parameters:

Ainitomy	mg/L	< .001	< .001	< .001	< .001
Arsenic	mg/L	< .002	< .002	< .002	< .002
Barium	mg/L	0.106	0.0779	0.0922	0.0635
Beryllium	mg/L	< .001	< .001	<0.001	<0.001
Cadmium	mg/L	< .0005	< .0005	< .0005	< .0005
Chromium	mg/L	< .005	< .005	< .005	< .005
Cobalt	mg/L	0.00161	0.00066	0.00176	< .0005
Fluoride	mg/L	< .5	< .5	< .5	< .5
Lead	mg/L	0.00151	0.000626	0.00204	0.000663
Lithium	mg/L	< .01	< .01	< .01	< .01
Mercury	mg/L	< .0002	< .0002	< .0002	< .0002
Molybdenum	mg/L	0.00822	0.00617	< .002	< .002
Selenium	mg/L	< .005	< .005	< .005	< .005
Thallium	mg/L	< .001	< .001	< .001	< .001
Radium-226	mg/L	0.161		0.215	
Radium-228	mg/L	-0.419		0.785	
Combined Radium 226 + 228	mg/L	0.0129		1.00	

Muscataine Power & Water CCR Landfill
Federal Parameters
Job # 10100095

MW-24
Downgradient

	June-18	August-18	March-19	August-19
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Appendix III Parameters:

	mg/L	< .2	< .2	< .2
Boron	mg/L	< .2	< .2	< .2
Calcium	mg/L	88	72.8	75
Chloride	mg/L	19.9	18.1	17.3
Fluoride	mg/L	0.653	< .5	< .5
pH	SU	7.47	7.39	7.16
Sulfate	mg/L	101	70	90.8
Total Dissolved Solids	mg/L	474	368	NC

Appendix IV Parameters:

Arsenic	mg/L	< .001	< .001	< .001
Barium	mg/L	< .002	< .002	< .002
Beryllium	mg/L	0.0695	0.0776	0.0889
Cadmium	mg/L	< .001	< .001	< .001
Chromium	mg/L	< .0005	< .0005	< .0005
Cobalt	mg/L	< .005	< .005	< .005
Fluoride	mg/L	< .0005	< .0005	< .0005
Lead	mg/L	0.653	< .5	< .5
Lithium	mg/L	< .0005	< .0005	< .0005
Mercury	mg/L	< .01	< .01	< .01
Molybdenum	mg/L	< .0002	< .0002	< .0002
Selenium	mg/L	0.00447	< .002	< .002
Thallium	mg/L	< .005	< .005	< .005
Radium-226	mg/L	< .001	< .001	< .001
Radium-228	mg/L	-0.0261		
Combined Radium 226 + 228	mg/L	0.19		
	mg/L	0.164		

Muscataine Power & Water CCR Landfill
Federal Parameters
Job # 10100095

MW-25
Downgradient

	June-18	August-18	March-19	August-19
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Appendix III Parameters:

	mg/L	14	14.4	14.5	11.5
Boron	mg/L	14	14.4	14.5	11.5
Calcium	mg/L	171	141	157	160
Chloride	mg/L	11.4	11.4	11.4	11.6
Fluoride	mg/L	0.551	< .5	< .5	< .5
pH	SU	7.96	7.31	7.15	6.91
Sulfate	mg/L	382	343	360	325
Total Dissolved Solids	mg/L	962	NC	NC	768

Appendix IV Parameters:

Arsenic	mg/L	< .001	< .001	< .002	< .004
Barium	mg/L	< .002	< .002	< .002	< .008
Beryllium	mg/L	0.0828	0.0487	0.0342	0.0448
Cadmium	mg/L	< .001	< .001	< .004	< .004
Chromium	mg/L	< .0005	< .0005	< .0005	< .002
Cobalt	mg/L	< .005	< .005	< .005	< .02
Fluoride	mg/L	< .0005	< .0005	< .002	< .002
Lead	mg/L	0.551	< .5	< .5	< .5
Lithium	mg/L	< .0005	< .0005	< .0005	< .002
Mercury	mg/L	< .01	< .01	< .01	< .04
Molybdenum	mg/L	< .0002	< .0002	< .0002	< .0002
Selenium	mg/L	0.00279	< .002	< .002	< .008
Thallium	mg/L	< .005	< .005	< .005	< .02
Radium-226	mg/L	< .001	< .001	< .001	< .004
Radium-228	mg/L	0.0532			
Combined Radium 226 + 228	mg/L	0.635			
	mg/L	0.688			

APPENDIX D

STATISTICAL RESULTS AND METHODOLOGIES

- Annual Statistical Results Report, November 4, 2019
- Flow Charts showing statistical procedure methodologies

GROUNDWATER STATS CONSULTING



November 4, 2019

HR Green, Inc.
Attn: Ms. Rose Amundson
8710 Earhart Ln, SW
Cedar Rapids, Iowa 52404

Dear Ms. Amundson,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the statistical analysis of groundwater data for the August 2019 sample event at the Muscatine Power & Water for the Coal Combustion Residuals (CCR) program. The analysis complies with the federal rule for the Disposal of Coal Combustion Residuals from Electric Utilities (CCR Rule, 2015) as well as with the USEPA Unified Guidance (2009).

Data were sent electronically to Groundwater Stats Consulting, and the statistical analysis was reviewed by Dr. Jim Loftis, professor emeritus of Civil and Environmental Engineering at Colorado State University and consultant to Groundwater Stats Consulting.

The monitoring well network at Muscatine Power & Water consists of the following: upgradient wells MW-08 and MW-10 as well as MW-22 which was installed this year; and downgradient wells MW-4A, MW-5B, MW-6A, MW-13, MW-14A, MW-15A, MW-18A, and MW-21. Sampling began for the CCR program in June 2016 for all wells except newly installed well MW-22. Well MW-13, however, was abandoned in April 2019; and well MW-18A was not sampled due to bentonite in the well and is, reportedly, pending state approval to be abandoned. Therefore, while historical data from these wells are included in the descriptive analysis, prediction limits were not included for these wells.

The following Appendix III constituents were evaluated using prediction limits: boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids (TDS). The following Appendix IV parameters were evaluated using confidence intervals: antimony, arsenic,

barium, beryllium, cadmium, chromium, cobalt, combined radium 226 + 228, fluoride, lead, lithium, mercury, molybdenum, selenium and thallium.

Background Screening – Historical Summary

Background data were screened in October 2017 for all parameters at each well for the constituents listed above, and the results of the screening were submitted during that time. A summary of those findings is discussed below.

Outlier Screening and Trend Tests

Time series plots were used to initially screen for suspected outliers, trends, and seasonal patterns. Outliers and trends in background data result in increased variation and statistical limits that are not conservative from a regulatory perspective, if not addressed. Data from both upgradient and downgradient wells are screened for outliers, but only outliers in upgradient wells would affect interwell prediction limits.

Box plots provide visual representation of variation within individual wells and between all wells. Data were further evaluated through the Analysis of Variance test to determine whether observed variation is statistically significant, and guide the decision logic for determining an appropriate statistical limit as discussed below.

A number of possible outliers were identified and formally tested using Tukey's box plot method. When outliers were confirmed, these values were flagged in the computer database with "o" in order to deselect prior to construction of statistical limits. Flagged values appear as a disconnected, lighter symbol on the time series graphs. The outlier analysis was updated for this report, and additional outliers were flagged. A summary of all flagged values follows this letter.

No seasonal patterns were visually apparent in any of the detected data; therefore, no deseasonalizing adjustments were made to the data. When seasonal patterns are observed, data may be optionally deseasonalized so that the resulting limits will correctly account for the seasonality as a predictable pattern rather than random variation or a release.

The Sen's Slope/Mann Kendall trend test was used to evaluate all proposed background data through August 2017 to identify statistically significant increasing or decreasing trends. In the absence of suspected contamination, significant trending data are typically not included as part of the background data used for construction of prediction limits. This step serves to eliminate the trend and, thus, reduce variation in background. When

statistically significant decreasing trends are present, earlier data are evaluated to determine whether earlier concentration levels are significantly different than current reported concentrations and will be deselected as necessary. When the historical records of data are truncated for the reasons above, a summary report will be provided to show the date ranges used in construction of the statistical limits.

The results of the trend analyses were presented with the October 2017 screening and showed a statistically significant decreasing trend for chloride in upgradient well MW-08. This trend was relatively low in magnitude when compared to average concentrations; therefore, no adjustments were made to the data sets. No other statistically significant trends were identified for any of the Appendix III parameters.

Natural systems continuously evolve due to physical changes made to the environment and unrelated to the site. To accommodate these types of changes, data for all wells and constituents are re-evaluated for the purpose of updating statistical limits. Improved sample size results in statistical limits that provide better representation of the true background population. In the case of interwell prediction limits, all upgradient well data are screened through time series for any new outliers or trending data that would cause statistical limits to be artificially inflated. Any flagged data may be seen on the Outlier Summary table.

Determination of Statistical Method

The Analysis of Variance (ANOVA) was used to identify the most appropriate statistical approach for Muscatine Power & Water. Interwell tests, which compare downgradient well data to statistical limits constructed from pooled upgradient well data, are appropriate when average concentrations are similar across upgradient wells. Intrawell tests, which compare compliance data from a single well to screened historical data within the same well, are appropriate when upgradient wells exhibit spatial variation; when statistical limits constructed from upgradient wells would not be conservative from a regulatory perspective; and when downgradient water quality is unimpacted compared to upgradient water quality for the same parameters.

In cases where downgradient concentrations are elevated relative to upgradient concentrations, an independent study and hydrogeological investigation would be required to identify local geochemical conditions and expected groundwater quality for the region to justify an intrawell approach. Such an assessment is beyond the scope of services provided by Groundwater Stats Consulting.

The ANOVA noted no variation in groundwater among upgradient wells for fluoride and pH. Boron contained 100% nondetects in upgradient wells; therefore, the ANOVA test could not be performed. As a result, interwell tests are recommended for boron, fluoride and pH. The ANOVA identified spatial variation in groundwater upgradient of the site for calcium, chloride, sulfate and TDS, indicating intrawell methods should be considered for these parameters if no pre-existing contamination from the site is suspected in downgradient wells. Additional testing was conducted as described below to determine intrawell eligibility.

Intrawell limits constructed from carefully screened background data from within each well serve to provide statistical limits that are conservative (i.e. lower) from a regulatory perspective, and that will rapidly identify a change in more recent compliance data from within a given well. This statistical method removes the element of variation from across wells and eliminates the chance of mistaking natural spatial variation for a release from the facility. Prior to performing intrawell prediction limits, it is necessary to demonstrate that water at downgradient wells is not suspected to have existing impacts from the practices of the facility.

First, to establish baseline upgradient concentrations, tolerance limits (either parametric or nonparametric as appropriate) were constructed using pooled upgradient well data for each of the Appendix III parameters recommended for intrawell analyses. Parametric tolerance limits were constructed with a target of 99% confidence and 95% coverage. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. As more data are collected, the background population is better represented, and the confidence and coverage levels increase.

Next, to determine whether average downgradient concentrations are elevated relative to the upgradient well baseline concentrations established by the tolerance limits above, confidence intervals were constructed on downgradient wells for each of the Appendix III parameters exhibiting spatial variation. The results showed that at least one confidence interval exceeded its respective upgradient tolerance limit for each of the parameters tested.

When the entire confidence interval exceeds a background standard, it is an indication that downgradient concentrations are elevated above background levels. Therefore, interwell methods are recommended initially in lieu of intrawell methods until further research identifies whether the elevated downgradient concentrations are likely the result of natural geological conditions, an off-site source, or may be the result of the facility. After such a study, data would be re-evaluated to determine the most appropriate statistical Detection Monitoring method.

Prediction Limits – Appendix III Parameters March 2019

Interwell prediction limits were constructed as recommended in the CCR Rule (2015) and in the EPA Unified Guidance (2009), based on a 1-of-2 resample plan using pooled upgradient well data for all Appendix III parameters. In the event of an initial exceedance of compliance well data, a resample will be collected to determine whether the initial exceedance is confirmed, in which case a statistically significant increase (SSI) is identified. If the resample falls within the statistical limit, the initial exceedance is considered to be a false positive result and, therefore, no further action is necessary.

Parametric prediction limits were constructed when background data followed a normal or transformed-normal distribution. Non-parametric prediction limits are provided for data sets with greater than 50% nondetects, and for data sets which do not follow a normal or transformed-normal distribution. Downgradient measurements were compared to these background limits. Prediction limits results and a summary table of well/constituent pairs found to exceed their respective limits follows this letter.

The Sen's Slope/Mann Kendall trend test was performed on the exceedances noted above to determine whether concentrations are increasing, decreasing or stabilizing over time. No statistically significant increasing trends were noted. Statistically significant decreasing trends were noted for boron in well MW-15A and total dissolved solids in well MW-21.

Confidence Intervals – Appendix IV Parameters

Confidence intervals were constructed at all downgradient wells, except for well MW-13 which has been abandoned, for detected Appendix IV parameters. A minimum of 4 samples is required to construct confidence intervals; however, 8 samples are generally recommended for better representation of the true average population. Established Maximum Contaminant Levels (MCLs) are used as the Ground Water Protection Standard (GWPS) against which confidence intervals are compared, unless background limits are higher as discussed below. For parameters without MCLs (cobalt, lithium, and molybdenum), the CCR-Rule specified level was used unless background was higher. Parametric confidence intervals are constructed with 99% confidence when data follow a normal or transformed-normal distribution. For all other cases, nonparametric confidence intervals are constructed, with the confidence level based on the number of samples available.

Background limits are established for the Appendix IV parameters using upper tolerance limits constructed with 95% confidence/95% coverage using pooled upgradient well data,

for comparison against established MCLs. When background limits, or Alternate Contaminant Levels (ACLs), are higher than established MCLs or CCR-Rule specified levels, the CCR Rule recommends using these as the GWPS for the confidence interval comparisons. The GWPS is exceeded only when the entire confidence interval exceeds its respective GWPS. None of the confidence intervals exceeded their respective standard.

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Muscatine Power & Water. If you have any questions or comments, please feel free to contact me.

For Groundwater Stats Consulting,

A handwritten signature in black ink that reads "Kristina Rayner". The script is cursive and fluid.

Kristina L. Rayner
Groundwater Statistician

A handwritten signature in black ink that reads "Easton T. Rayner". The script is cursive and fluid.

Easton T. Rayner
Groundwater Analyst

MUSCATINE POWER & WATER GWPS				
Constituent Name	MCL	CCR-Rule Specified	Background Limit	GWPS
Antimony, Total (mg/L)	0.006		0.001	0.006
Arsenic, Total (mg/L)	0.01		0.0078	0.01
Barium, Total (mg/L)	2		0.22	2
Beryllium, Total (mg/L)	0.004		0.001	0.004
Cadmium, Total (mg/L)	0.005		0.0005	0.005
Chromium, Total (mg/L)	0.1		0.005	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.0056	0.006
Combined Radium, Total (pCi/L)	5		0.88	5
Fluoride, Total (mg/L)	4		0.83	4
Lead, Total (mg/L)	0.015		0.0005	0.015
Lithium, Total (mg/L)	n/a	0.04	0.01	0.04
Mercury, Total (mg/L)	0.002		0.0002	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0057	0.1
Selenium, Total (mg/L)	0.05		0.005	0.05
Thallium, Total (mg/L)	0.002		0.001	0.002

**MCL = Maximum Contaminant Level*

**GWPS = Groundwater Protection Standard*

Upper Tolerance Limits - Appendix IV

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 10/31/2019, 2:55 PM

Constituent	Well	Upper Lim.	Date	Observ.	Sig.	Bq.N	%NDs	Transform	Alpha	Method
Antimony (mg/L)	n/a	0.001	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Arsenic (mg/L)	n/a	0.00784	n/a	n/a	n/a	31	58.06	n/a	0.2039	NP Inter(normal...)
Barium (mg/L)	n/a	0.216	n/a	n/a	n/a	31	0	n/a	0.2039	NP Inter(normal...)
Beryllium (mg/L)	n/a	0.001	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Cadmium (mg/L)	n/a	0.0005	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Chromium (mg/L)	n/a	0.005	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Cobalt (mg/L)	n/a	0.00558	n/a	n/a	n/a	32	37.5	n/a	0.1937	NP Inter(normal...)
Combined Radium 226 + 228 (pCi/L)	n/a	0.8804	n/a	n/a	n/a	23	0	No	0.05	Inter
Fluoride (mg/L)	n/a	0.826	n/a	n/a	n/a	32	78.13	n/a	0.1937	NP Inter(NDs)
Lead (mg/L)	n/a	0.0005	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Lithium (mg/L)	n/a	0.01	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Mercury (mg/L)	n/a	0.0002	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Molybdenum (mg/L)	n/a	0.00574	n/a	n/a	n/a	33	66.67	n/a	0.184	NP Inter(normal...)
Selenium (mg/L)	n/a	0.005	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)
Thallium (mg/L)	n/a	0.001	n/a	n/a	n/a	31	100	n/a	0.2039	NP Inter(NDs)

Interwell Prediction Limit Summary Table - Significant Results

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 10/31/2019, 11:36 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bq N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-14A	0.299	n/a	8/7/2019	17.6	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-15A	0.299	n/a	8/7/2019	7.56	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-21	0.299	n/a	8/7/2019	8.46	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-14A	152	n/a	8/7/2019	255	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-5B	30	n/a	8/7/2019	64.1	Yes	33	39.39	n/a	0.001617	NP Inter (normality) ...
pH (SU)	MW-21	7.9	6.64	8/7/2019	6.33	Yes	33	0	n/a	0.003233	NP Inter (normality) ...
Sulfate (mg/L)	MW-14A	366	n/a	8/7/2019	837	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Sulfate (mg/L)	MW-21	366	n/a	8/7/2019	529	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Total Dissolved Solids (mg/L)	MW-14A	750.6	n/a	8/7/2019	1510	Yes	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-15A	750.6	n/a	8/7/2019	786	Yes	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-21	750.6	n/a	8/7/2019	960	Yes	33	0	No	0.000...	Param Inter 1 of 2

Trend Test Summary Table- Significant Results

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 10/31/2019, 11:55 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/L)	MW-15A	-3.573	-70	-53	Yes	15	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-21	-192.1	-49	-48	Yes	14	0	n/a	n/a	0.01	NP

Confidence Interval Summary Table - All Results (No Significant)

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 11/1/2019, 9:50 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Antimony (mg/L)	MW-14A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-15A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-21	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-4A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-5B	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-6A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-14A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-15A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-21	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-4A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-5B	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-6A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Barium (mg/L)	MW-14A	0.03872	0.03178	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-15A	0.04177	0.03437	2	No	12	0	No	0.01	Param.
Barium (mg/L)	MW-21	0.0622	0.04075	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-4A	0.1477	0.1271	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-5B	0.3319	0.3031	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-6A	0.2118	0.1897	2	No	13	0	x^3	0.01	Param.
Beryllium (mg/L)	MW-14A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-15A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-21	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-4A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-5B	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-6A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-14A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-15A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-21	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-4A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-5B	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-6A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-14A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-15A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-21	0.006369	0.004847	0.1	No	13	30.77	No	0.01	Param.
Chromium (mg/L)	MW-4A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-5B	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-6A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-14A	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-15A	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-21	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-4A	0.000681	0.0005	0.006	No	13	92.31	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-5B	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-6A	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Combined Radium 226 + 228 (pCi/L)	MW-14A	0.4256	0.1048	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-15A	0.3128	0.1425	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-21	0.6138	0.1129	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-4A	0.7245	0.3813	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-5B	0.9905	0.5843	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-6A	0.7108	0.3234	5	No	10	0	No	0.01	Param.
Fluoride (mg/L)	MW-14A	0.684	0.5	4	No	13	84.62	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-15A	0.549	0.5	4	No	13	76.92	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-21	0.768	0.5	4	No	14	85.71	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-4A	0.664	0.5	4	No	14	71.43	No	0.01	NP (normality)
Fluoride (mg/L)	MW-5B	0.627	0.5	4	No	14	78.57	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-6A	0.814	0.5	4	No	14	71.43	No	0.01	NP (normality)
Lead (mg/L)	MW-14A	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-15A	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-21	0.000633	0.0005	0.015	No	13	92.31	No	0.01	NP (NDs)
Lead (mg/L)	MW-4A	0.0005	0.0005	0.015	No	12	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-5B	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-6A	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-14A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-15A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-21	0.0277	0.01	0.04	No	13	76.92	No	0.01	NP (NDs)
Lithium (mg/L)	MW-4A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-5B	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-6A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-14A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-15A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)

Confidence Interval Summary Table - All Results (No Significant) Page 2

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 11/1/2019, 9:50 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Mercury (mg/L)	MW-21	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-4A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-5B	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-6A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-14A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-15A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-21	0.00383	0.002	0.1	No	13	92.31	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-4A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-5B	0.00212	0.002	0.1	No	13	92.31	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-6A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Selenium (mg/L)	MW-14A	0.00829	0.00569	0.05	No	13	15.38	No	0.01	NP (normality)
Selenium (mg/L)	MW-15A	0.00502	0.005	0.05	No	13	92.31	No	0.01	NP (NDs)
Selenium (mg/L)	MW-21	0.01238	0.006818	0.05	No	13	15.38	No	0.01	Param.
Selenium (mg/L)	MW-4A	0.005	0.005	0.05	No	13	100	No	0.01	NP (NDs)
Selenium (mg/L)	MW-5B	0.005	0.005	0.05	No	13	100	No	0.01	NP (NDs)
Selenium (mg/L)	MW-6A	0.005	0.005	0.05	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-14A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-15A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-21	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-4A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-5B	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-6A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)

Prediction Limits

Interwell Prediction Limit Summary Table - Significant Results

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 10/31/2019, 11:36 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bq N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-14A	0.299	n/a	8/7/2019	17.6	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-15A	0.299	n/a	8/7/2019	7.56	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-21	0.299	n/a	8/7/2019	8.46	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-14A	152	n/a	8/7/2019	255	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-5B	30	n/a	8/7/2019	64.1	Yes	33	39.39	n/a	0.001617	NP Inter (normality) ...
pH (SU)	MW-21	7.9	6.64	8/7/2019	6.33	Yes	33	0	n/a	0.003233	NP Inter (normality) ...
Sulfate (mg/L)	MW-14A	366	n/a	8/7/2019	837	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Sulfate (mg/L)	MW-21	366	n/a	8/7/2019	529	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Total Dissolved Solids (mg/L)	MW-14A	750.6	n/a	8/7/2019	1510	Yes	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-15A	750.6	n/a	8/7/2019	786	Yes	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-21	750.6	n/a	8/7/2019	960	Yes	33	0	No	0.000...	Param Inter 1 of 2

Interwell Prediction Limit Summary Table - All Results

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 10/31/2019, 11:36 PM

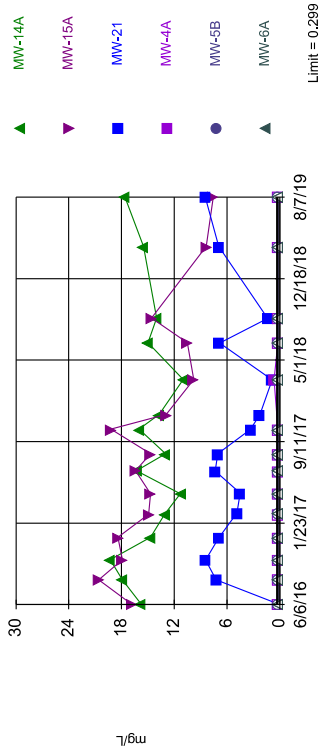
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bq N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-14A	0.299	n/a	8/7/2019	17.6	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-15A	0.299	n/a	8/7/2019	7.56	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-21	0.299	n/a	8/7/2019	8.46	Yes	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-4A	0.299	n/a	8/7/2019	0.2ND	No	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-5B	0.299	n/a	8/7/2019	0.2ND	No	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Boron (mg/L)	MW-6A	0.299	n/a	8/7/2019	0.2ND	No	33	93.94	n/a	0.001617	NP Inter (NDs) 1 of 2
Calcium (mg/L)	MW-14A	152	n/a	8/7/2019	255	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Calcium (mg/L)	MW-15A	152	n/a	8/7/2019	111	No	33	0	n/a	0.001617	NP Inter (normality) ...
Calcium (mg/L)	MW-21	152	n/a	8/7/2019	145	No	33	0	n/a	0.001617	NP Inter (normality) ...
Calcium (mg/L)	MW-4A	152	n/a	8/7/2019	93.8	No	33	0	n/a	0.001617	NP Inter (normality) ...
Calcium (mg/L)	MW-5B	152	n/a	8/7/2019	139	No	33	0	n/a	0.001617	NP Inter (normality) ...
Calcium (mg/L)	MW-6A	152	n/a	8/7/2019	80.9	No	33	0	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-14A	30	n/a	8/7/2019	22.1	No	33	39.39	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-15A	30	n/a	8/7/2019	9.91	No	33	39.39	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-21	30	n/a	8/7/2019	14	No	33	39.39	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-4A	30	n/a	8/7/2019	15.6	No	33	39.39	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-5B	30	n/a	8/7/2019	64.1	Yes	33	39.39	n/a	0.001617	NP Inter (normality) ...
Chloride (mg/L)	MW-6A	30	n/a	8/7/2019	5ND	No	33	39.39	n/a	0.001617	NP Inter (normality) ...
Fluoride (mg/L)	MW-14A	0.826	n/a	8/7/2019	0.5ND	No	32	78.13	n/a	0.001709	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-15A	0.826	n/a	8/7/2019	0.625	No	32	78.13	n/a	0.001709	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-21	0.826	n/a	8/7/2019	0.5ND	No	32	78.13	n/a	0.001709	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-4A	0.826	n/a	8/7/2019	0.525	No	32	78.13	n/a	0.001709	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-5B	0.826	n/a	8/7/2019	0.5ND	No	32	78.13	n/a	0.001709	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-6A	0.826	n/a	8/7/2019	0.535	No	32	78.13	n/a	0.001709	NP Inter (NDs) 1 of 2
pH (SU)	MW-14A	7.9	6.64	8/7/2019	7.09	No	33	0	n/a	0.003233	NP Inter (normality) ...
pH (SU)	MW-15A	7.9	6.64	8/7/2019	7.11	No	33	0	n/a	0.003233	NP Inter (normality) ...
pH (SU)	MW-21	7.9	6.64	8/7/2019	6.33	Yes	33	0	n/a	0.003233	NP Inter (normality) ...
pH (SU)	MW-4A	7.9	6.64	8/7/2019	7.22	No	33	0	n/a	0.003233	NP Inter (normality) ...
pH (SU)	MW-5B	7.9	6.64	8/7/2019	7.02	No	33	0	n/a	0.003233	NP Inter (normality) ...
pH (SU)	MW-6A	7.9	6.64	8/7/2019	7.12	No	33	0	n/a	0.003233	NP Inter (normality) ...
Sulfate (mg/L)	MW-14A	366	n/a	8/7/2019	837	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Sulfate (mg/L)	MW-15A	366	n/a	8/7/2019	327	No	33	0	n/a	0.001617	NP Inter (normality) ...
Sulfate (mg/L)	MW-21	366	n/a	8/7/2019	529	Yes	33	0	n/a	0.001617	NP Inter (normality) ...
Sulfate (mg/L)	MW-4A	366	n/a	8/7/2019	47	No	33	0	n/a	0.001617	NP Inter (normality) ...
Sulfate (mg/L)	MW-5B	366	n/a	8/7/2019	112	No	33	0	n/a	0.001617	NP Inter (normality) ...
Sulfate (mg/L)	MW-6A	366	n/a	8/7/2019	2.5ND	No	33	0	n/a	0.001617	NP Inter (normality) ...
Total Dissolved Solids (mg/L)	MW-14A	750.6	n/a	8/7/2019	1510	Yes	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-15A	750.6	n/a	8/7/2019	786	Yes	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-21	750.6	n/a	8/7/2019	960	Yes	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-4A	750.6	n/a	8/7/2019	422	No	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-5B	750.6	n/a	8/7/2019	596	No	33	0	No	0.000...	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-6A	750.6	n/a	8/7/2019	308	No	33	0	No	0.000...	Param Inter 1 of 2

Santitas™ v3.6.23_LUG
Hollow symbols indicate censored values.

Exceeds Limit: MW-14A, MW-15A, MW-21

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 33 background values. 93.94% NDs. Annual per-constituent alpha = 0.02556. Individual comparison alpha = 0.001617 (1 of 2). Comparing 6 points to limit. Assumes 2 future values.

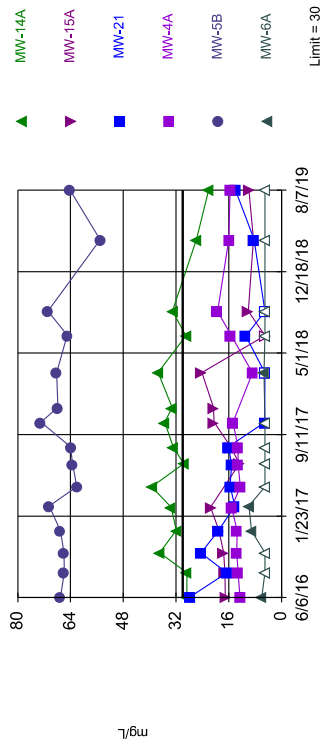
Constituent: Boron Analysis Run 10/31/2019 11:35 PM View: Prediction Limit Test
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Santitas™ v3.6.23_LUG
Hollow symbols indicate censored values.

Exceeds Limit: MW-5B

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 33 background values. 39.39% NDs. Annual per-constituent alpha = 0.02556. Individual comparison alpha = 0.001617 (1 of 2). Comparing 6 points to limit. Assumes 2 future values.

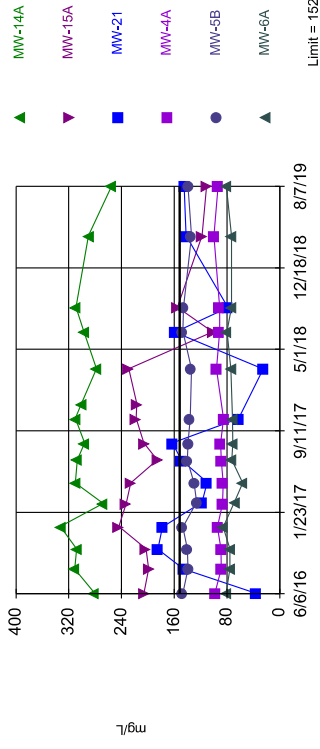
Constituent: Chloride Analysis Run 10/31/2019 11:35 PM View: Prediction Limit Test
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Santitas™ v3.6.23_LUG

Exceeds Limit: MW-14A

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 33 background values. Annual per-constituent alpha = 0.02556. Individual comparison alpha = 0.001617 (1 of 2). Comparing 6 points to limit. Assumes 2 future values.

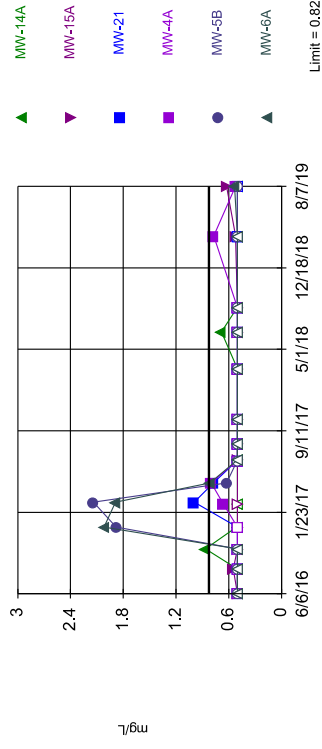
Constituent: Calcium Analysis Run 10/31/2019 11:35 PM View: Prediction Limit Test
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Santitas™ v3.6.23_LUG
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 32 background values. 78.13% NDs. Annual per-constituent alpha = 0.027. Individual comparison alpha = 0.001709 (1 of 2). Comparing 6 points to limit. Assumes 2 future values.

Constituent: Fluoride Analysis Run 10/31/2019 11:35 PM View: Prediction Limit Test
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Prediction Limit

Constituent: Boron (mg/L) Analysis Run 10/31/2019 11:36 PM View: Prediction Limit Test

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-15A	MW-10 (bg)	MW-08 (bg)	MW-6A	MW-5B	MW-4A	MW-21	MW-14A	MW-22 (bg)
6/6/2016	16.8	<0.2							
6/7/2016			<0.2	<0.2	<0.2	<0.2			
6/8/2016							<0.2	15.8	
8/15/2016	20.6	<0.2					7.23	17.9	
8/16/2016			<0.2	<0.2	<0.2	<0.2			
10/10/2016		<0.2	<0.2				8.45		
10/11/2016	17.9			<0.2	<0.2	<0.2		19.3	
12/12/2016				<0.2	<0.2	<0.2	6.93		
12/14/2016	18.4	<0.2	<0.2					14.7	
2/17/2017	14.9	<0.2				<0.2		13.1	
2/21/2017			<0.2	<0.2	<0.2		4.87		
4/17/2017	14.7	<0.2	<0.2	<0.2	<0.2	<0.2		11.3	
4/18/2017							4.49		
6/19/2017		<0.2	<0.2						
6/20/2017					<0.2	<0.2	7.36		
6/21/2017	16.4			<0.2				16.3	
8/7/2017		<0.2	<0.2			<0.2			
8/8/2017	14.7			<0.2	<0.2		7.05	13	
10/16/2017		<0.2	<0.2			<0.2	3.33		
10/17/2017	19.2			<0.2	<0.2			16	
11/28/2017	12.9 (R)						2.24 (R)	13.7 (R)	
3/5/2018		<0.2							
3/6/2018			<0.2	<0.2	<0.2	0.66	0.885		<0.2
3/7/2018	9.8							11	
6/19/2018		<0.2	<0.2				6.84		<0.2
6/20/2018	10.5							15	
6/21/2018				<0.2	<0.2	<0.2			
8/27/2018		<0.2	<0.2						<0.2
8/28/2018						<0.2	1.36		
8/29/2018	14.6			<0.2	<0.2			14	
3/18/2019			<0.2						
3/19/2019		<0.2		<0.2	<0.2	<0.2			0.299
3/20/2019	8.35						6.95	15.5	
8/6/2019			0.205						<0.2
8/7/2019	7.56	<0.2		<0.2	<0.2	<0.2	8.46	17.6	

Prediction Limit

Constituent: Calcium (mg/L) Analysis Run 10/31/2019 11:36 PM View: Prediction Limit Test

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-15A	MW-10 (bg)	MW-08 (bg)	MW-6A	MW-5B	MW-4A	MW-21	MW-14A	MW-22 (bg)
6/6/2016	206	89.3							
6/7/2016			152	81.4	147	98.2			
6/8/2016							37.2	281	
8/15/2016	199	80.7					146	311	
8/16/2016			117	75.4	139	88.8			
10/10/2016		83.3	118				185		
10/11/2016	203			75.7	140	89.3		308	
12/12/2016				85.6	147	94.5	178		
12/14/2016	244	86.5	109						333
2/17/2017	233	81.2				86.8			268
2/21/2017			89.9	68.8	126		118		
4/17/2017	226	79.2	96.5	56.3	130	85.9		310	
4/18/2017							110		
6/19/2017		83.6	113						
6/20/2017					140	88.7	149		
6/21/2017	186			72.9					307
8/7/2017		85.5	91.3			89.7			
8/8/2017	206			71.2	139		163	296	
10/16/2017		83.3	77			85.3	62.3		
10/17/2017	218			71.9	136			310	
11/28/2017	217 (R)							301 (R)	
3/5/2018		77.3							
3/6/2018			74.7	74.1	134	95.8	25.1		69.8
3/7/2018	229							278	
6/19/2018		88.5	115				159		91.5
6/20/2018	102							297	
6/21/2018				80.1	147	91.4			
8/27/2018		85.4	83.6						80.7
8/28/2018						91.3	78.7		
8/29/2018	155			73.3	146			309	
3/18/2019			97.6						
3/19/2019		76.3		73.2	134	99.7			91.6
3/20/2019	118						142	290	
8/6/2019			132						83.8
8/7/2019	111	78.9		80.9	139	93.8	145	255	

Prediction Limit

Constituent: Chloride (mg/L) Analysis Run 10/31/2019 11:36 PM View: Prediction Limit Test

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-15A	MW-10 (bg)	MW-08 (bg)	MW-6A	MW-5B	MW-4A	MW-21	MW-14A	MW-22 (bg)
6/6/2016	17.1	6.22							
6/7/2016			19.8	5.97	67	12.6			
6/8/2016							27.7	28.7	
8/15/2016	17.2	<5					16.6	28.7	
8/16/2016			17.8	<5	65.9	13.2			
10/10/2016		<5	16.2				24.4		
10/11/2016	17.6			<5	66	13.6		37	
12/12/2016				9.08	67	13.5	19.2		
12/14/2016	19	<5	17.2					31.9	
2/17/2017	21.5	<5				15.1		33.5	
2/21/2017			15.4	9.93	70.4		14.2		
4/17/2017	47.4 (o)	<5	17.1	<5	62.1	12.5		39.4	
4/18/2017							15.6		
6/19/2017		<5	14.1						
6/20/2017					63.4	13.2	15.1		
6/21/2017	12.8			<5				29.7	
8/7/2017		<5	14			13.2			
8/8/2017	15.4			<5	64		16.1	32.9	
10/16/2017		<5	14.4			14.7	5.09		
10/17/2017	20.5			<5	73			35.4	
11/28/2017	20.7 (R)				67.8 (R)			33.2 (R)	
3/5/2018		<5							
3/6/2018			14.5	5.33	68.2	8.81	<5		30
3/7/2018	24.2							37.4	
6/19/2018		<5	14.9				10.9		27.2
6/20/2018	<5							29	
6/21/2018				<5	65	15.3			
8/27/2018		<5	15.6						29.8
8/28/2018						19.4	<5		
8/29/2018	10.1			<5	70.8			33.1	
3/18/2019			16.1						
3/19/2019		<5		<5	55	16			27.6
3/20/2019	8.54						8.3	25.8	
8/6/2019			17.1						26.9
8/7/2019	9.91	<5		<5	64.1	15.6	14	22.1	

Prediction Limit

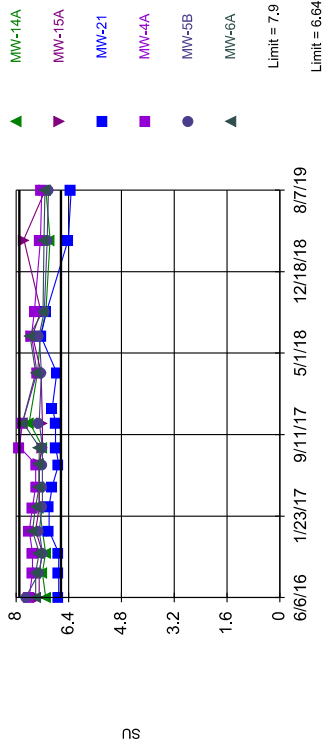
Constituent: Fluoride (mg/L) Analysis Run 10/31/2019 11:36 PM View: Prediction Limit Test

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-10 (bg)	MW-15A	MW-4A	MW-5B	MW-6A	MW-08 (bg)	MW-14A	MW-21	MW-22 (bg)
6/6/2016	0.731	<0.5							
6/7/2016			<0.5	<0.5	<0.5	<0.5			
6/8/2016							<0.5	<0.5	
8/15/2016	<0.5	0.549					<0.5	<0.5	
8/16/2016			<0.5	<0.5	<0.5	<0.5			
10/10/2016	<0.5					<0.5		<0.5	
10/11/2016		<0.5	<0.5	<0.5	<0.5		0.867		
12/12/2016			<0.5	1.88	2.02			<0.5	
12/14/2016	<0.5	<0.5				0.72	<0.5		
2/17/2017	<0.5	<0.5	0.664				<0.5		
2/21/2017				2.14	1.89	<0.5		0.993	
4/17/2017	0.774	6.7 (o)	0.801	0.627	0.814	1.69 (Fo)	1.93 (o)		
4/18/2017								0.768	
6/19/2017	<0.5					<0.5			
6/20/2017			<0.5	<0.5				<0.5	
6/21/2017		<0.5			<0.5		<0.5		
8/7/2017	<0.5		<0.5			<0.5			
8/8/2017		<0.5		<0.5	<0.5		<0.5	<0.5	
10/16/2017	<0.5		<0.5			<0.5		<0.5	
10/17/2017		<0.5		<0.5	<0.5		<0.5		
3/5/2018	<0.5								
3/6/2018			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5
3/7/2018		<0.5					<0.5		
6/19/2018	<0.5					0.826		<0.5	<0.5
6/20/2018		<0.5					0.684		
6/21/2018			<0.5	<0.5	<0.5				
8/27/2018	<0.5					<0.5			<0.5
8/28/2018			<0.5					<0.5	
8/29/2018		<0.5		<0.5	<0.5		<0.5		
3/18/2019						<0.5			
3/19/2019	<0.5		0.771	<0.5	<0.5				<0.5
3/20/2019		0.523					<0.5	<0.5	
8/6/2019						0.643			0.507
8/7/2019	0.596	0.625	0.525	<0.5	0.535		<0.5	<0.5	

Exceeds Limits: MW-21

Prediction Limit
Interwell Non-parametric

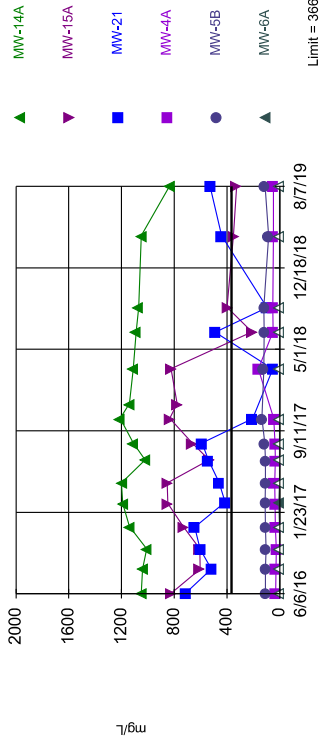


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 33 background values. Annual per-constituent alpha = 0.05111. Individual comparison alpha = 0.003233 (1 of 2). Comparing 6 points to limit. Assumes 2 future values.

Constituent: pH Analysis Run 10/31/2019 11:35 PM View: Prediction Limit Test
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Hollow symbols indicate censored values.
Exceeds Limit: MW-14A, MW-21

Prediction Limit
Interwell Non-parametric

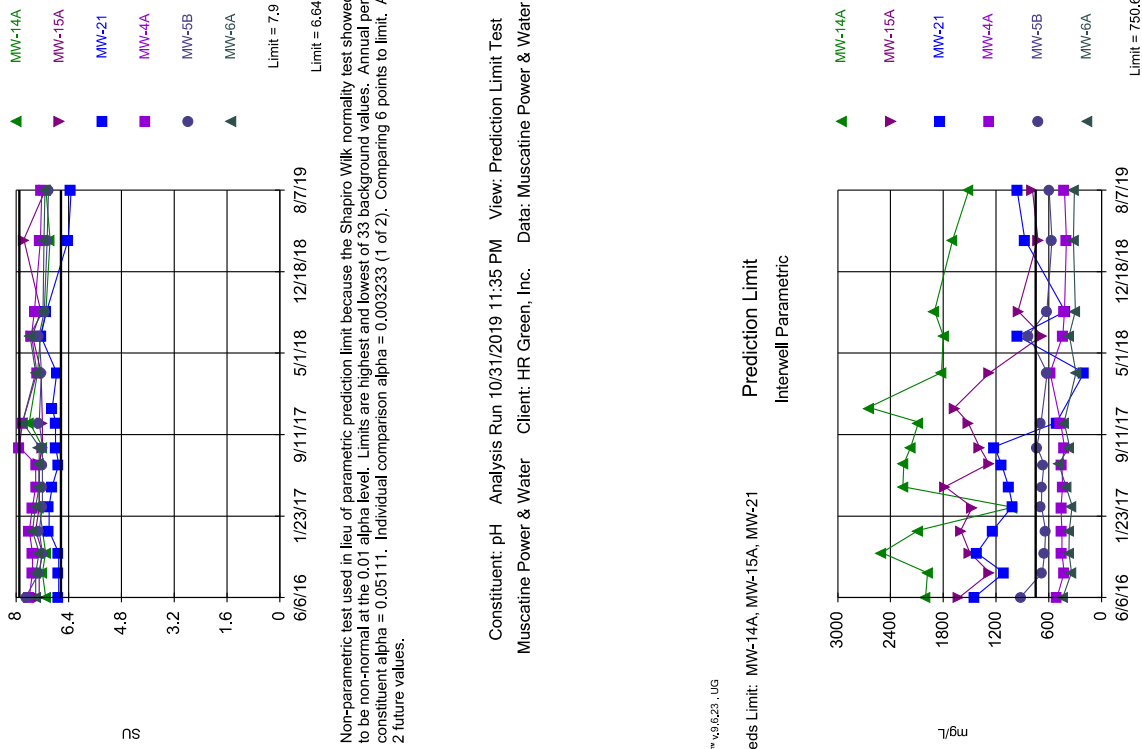


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 33 background values. Annual per-constituent alpha = 0.02556. Individual comparison alpha = 0.001617 (1 of 2). Comparing 6 points to limit. Assumes 2 future values.

Constituent: Sulfate Analysis Run 10/31/2019 11:35 PM View: Prediction Limit Test
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Exceeds Limit: MW-14A, MW-15A, MW-21

Prediction Limit
Interwell Parametric



Background Data Summary: Mean=495.7, Std. Dev.=124.4, n=33. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9264, critical = 0.906. Kappa = 2.05 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 6 points to limit. Assumes 2 future values.

Constituent: Total Dissolved Solids Analysis Run 10/31/2019 11:35 PM View: Prediction Limit Test
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Prediction Limit

Constituent: pH (SU) Analysis Run 10/31/2019 11:36 PM View: Prediction Limit Test

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-15A	MW-10 (bg)	MW-08 (bg)	MW-6A	MW-5B	MW-4A	MW-21	MW-14A	MW-22 (bg)
6/6/2016	7.3	7.4							
6/7/2016			7.2	7.4	7.7	7.6			
6/8/2016							6.7	7.1	
8/15/2016	7.3	7.3					6.7	7.2	
8/16/2016			7.3	7.4	7.3	7.5			
10/10/2016		7.2	7.1				6.7		
10/11/2016	7.2			7.3	7.2	7.5		7.1	
12/12/2016				7.5	7.3	7.6	7		
12/14/2016	7.4	7.3	7.3					7.2	
2/17/2017	7.3	7.2				7.5		7.3	
2/21/2017			7.3	7.4	7.2		7		
4/17/2017	7.3	7.3	7.1	7.3	7.2	7.4		7.3	
4/18/2017							6.9		
6/19/2017		7.2	7.1						
6/20/2017					7.2	7.4	6.7		
6/21/2017	7.3			7.3				7.3	
8/7/2017		7.9	7.3			7.9			
8/8/2017	7.2			7.3	7.2		6.8	7.2	
10/16/2017		7.3	7.4			7.8	6.8		
10/17/2017	7.2			7.8	7.3			7.6	
11/28/2017							6.9 (R)		
3/5/2018		7.04							
3/6/2018			7.3	7.4	7.23	7.36	6.76		7.36
3/7/2018	7.24							7.35	
6/19/2018		7.72	7.56				7.25		7.9
6/20/2018	7.5							7.26	
6/21/2018				7.58	7.3	7.53			
8/27/2018		7.23	7.2						7.42
8/28/2018						7.44	7.07		
8/29/2018	7.25			7.18	7.14			7.09	
3/19/2019		7.1	7.08	7.15	7.05	7.26			7.21
3/20/2019	7.76						6.41	6.97	
8/6/2019			6.64						7.12
8/7/2019	7.11	7.07		7.12	7.02	7.22	6.33	7.09	

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 10/31/2019 11:36 PM View: Prediction Limit Test

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-15A	MW-10 (bg)	MW-08 (bg)	MW-6A	MW-5B	MW-4A	MW-21	MW-14A	MW-22 (bg)
6/6/2016	827	42.1							
6/7/2016			366	<5	109	32.2			
6/8/2016							713	1050	
8/15/2016	605	33.8					520	1040	
8/16/2016			187	<5	109	28.4			
10/10/2016		36.4	187				603		
10/11/2016	607			<5	105	27.2		1010	
12/12/2016				<5	109	32.7	645		
12/14/2016	732	38.4	149					1140	
2/17/2017	849	47.3				36		1190	
2/21/2017			145	5.94	111		415		
4/17/2017	853	38.3	145	<5	108	39.5		1200	
4/18/2017							461		
6/19/2017		35.4	190						
6/20/2017					108	33	541		
6/21/2017	537			<5				1020	
8/7/2017		39	119			35.3			
8/8/2017	664			<5	114		590	1110	
10/16/2017		46.9	106			45.4	206		
10/17/2017	835			<5	135			1210	
11/28/2017	779 (R)							1140 (R)	
3/5/2018		51.4							
3/6/2018			87.3	<5	122	162	53.7		123
3/7/2018	824							1110	
6/19/2018		37.3	136				489		134
6/20/2018	210							1090	
6/21/2018				<5	119	51.3			
8/27/2018		34.3	94.7						125
8/28/2018						52.2	96.6		
8/29/2018	400			<5	120			1070	
3/18/2019			223						
3/19/2019		42.8		<5	85	48			134
3/20/2019	351						442	1050	
8/6/2019			276						139
8/7/2019	327	28.8		<5	112	47	529	837	

Prediction Limit

Constituent: Total Dissolved Solids (mg/L) Analysis Run 10/31/2019 11:36 PM View: Prediction Limit Test

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-15A	MW-10 (bg)	MW-08 (bg)	MW-6A	MW-5B	MW-4A	MW-21	MW-14A	MW-22 (bg)
6/6/2016	1620	468							
6/7/2016			836	440	920	507			
6/8/2016							1440	2000	
8/15/2016	1270	412					1110	1980	
8/16/2016			664	340	672	426			
10/10/2016		444	708				1420		
10/11/2016	1500			370	646	450		2500	
12/12/2016				368	636	450	1240		
12/14/2016	1600	428	634						2080
2/17/2017	1470	498				460			1010
2/21/2017			578	336	684		1010		
4/17/2017	1780	538	624	402	680	442		2260	
4/18/2017							1060		
6/19/2017		524	656						
6/20/2017					656	452	1140		
6/21/2017	1280			486					2250
8/7/2017		458	488			420			
8/8/2017	1390			364	734		1220	2170	
10/16/2017		414	470			466	514		
10/17/2017	1520			424	688				2080
11/28/2017	1670 (R)								2650 (R)
3/5/2018		314							
3/6/2018			376	292	620	586	200		424
3/7/2018	1270							1820	
6/19/2018		396	502				952		434
6/20/2018	676							1800	
6/21/2018				368	828	440			
8/27/2018		392	414						420
8/28/2018						420	416		
8/29/2018	948			298	622			1900	
3/18/2019			612						
3/19/2019		326		320	562	398			456
3/20/2019	724						872	1690	
8/6/2019			702						428
8/7/2019	786	320		308	596	422	960	1510	

Trend Tests

Trend Test Summary Table- Significant Results

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 10/31/2019, 11:55 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/L)	MW-15A	-3.573	-70	-53	Yes	15	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-21	-192.1	-49	-48	Yes	14	0	n/a	n/a	0.01	NP

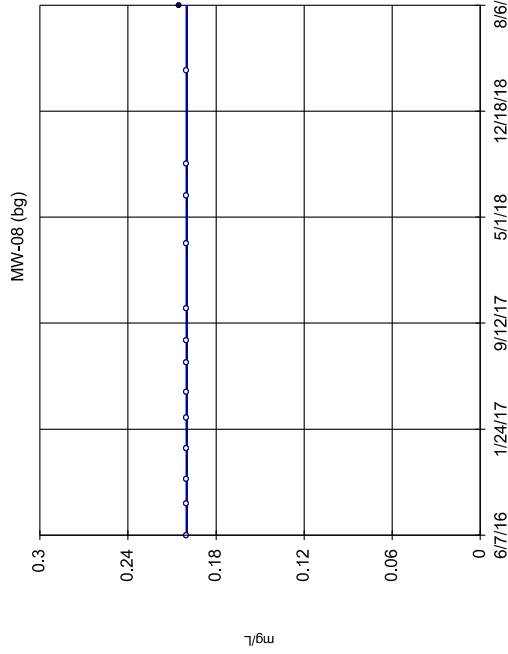
Trend Test Summary Table- All Results

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 10/31/2019, 11:55 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/L)	MW-08 (bg)	0	13	48	No	14	92.86	n/a	n/a	0.01	NP
Boron (mg/L)	MW-10 (bg)	0	0	48	No	14	100	n/a	n/a	0.01	NP
Boron (mg/L)	MW-14A	-0.3935	-11	-53	No	15	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-15A	-3.573	-70	-53	Yes	15	0	n/a	n/a	0.01	NP
Boron (mg/L)	MW-21	-0.2346	-11	-53	No	15	6.667	n/a	n/a	0.01	NP
Boron (mg/L)	MW-22 (bg)	0	2	12	No	5	80	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-08 (bg)	-9.474	-25	-48	No	14	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-10 (bg)	-1.558	-22	-48	No	14	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-14A	-7.766	-32	-53	No	15	0	n/a	n/a	0.01	NP
Calcium (mg/L)	MW-22 (bg)	6.577	4	12	No	5	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-08 (bg)	-0.769	-22	-48	No	14	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-10 (bg)	0	-13	-48	No	14	92.86	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-22 (bg)	-2.005	-6	-12	No	5	0	n/a	n/a	0.01	NP
Chloride (mg/L)	MW-5B	-0.4874	-2	-53	No	15	0	n/a	n/a	0.01	NP
pH (SU)	MW-08 (bg)	0	-9	-48	No	14	0	n/a	n/a	0.01	NP
pH (SU)	MW-10 (bg)	-0.06091	-26	-48	No	14	0	n/a	n/a	0.01	NP
pH (SU)	MW-21	0	2	53	No	15	0	n/a	n/a	0.01	NP
pH (SU)	MW-22 (bg)	-0.2765	-6	-12	No	5	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-08 (bg)	-33.26	-25	-48	No	14	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-10 (bg)	-0.6058	-3	-48	No	14	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-14A	-33	-12	-53	No	15	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-21	-89.49	-35	-48	No	14	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	MW-22 (bg)	10.95	7	12	No	5	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-08 (bg)	-104	-39	-48	No	14	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-10 (bg)	-46.69	-43	-48	No	14	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-14A	-172.3	-34	-53	No	15	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-15A	-277.1	-46	-53	No	15	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-21	-192.1	-49	-48	Yes	14	0	n/a	n/a	0.01	NP
Total Dissolved Solids (mg/L)	MW-22 (bg)	5.653	2	12	No	5	0	n/a	n/a	0.01	NP

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Hollow symbols indicate censored values.

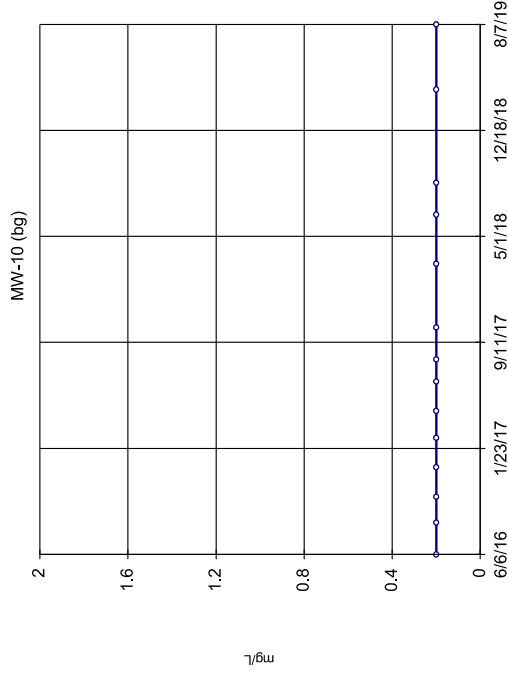
Sen's Slope Estimator



Constituent: Boron Analysis Run 10/31/2019 11:53 PM View: Trend Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

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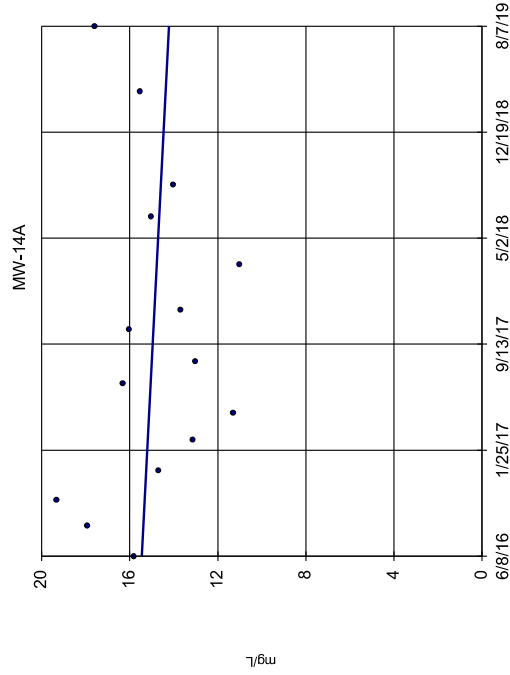
Sen's Slope Estimator



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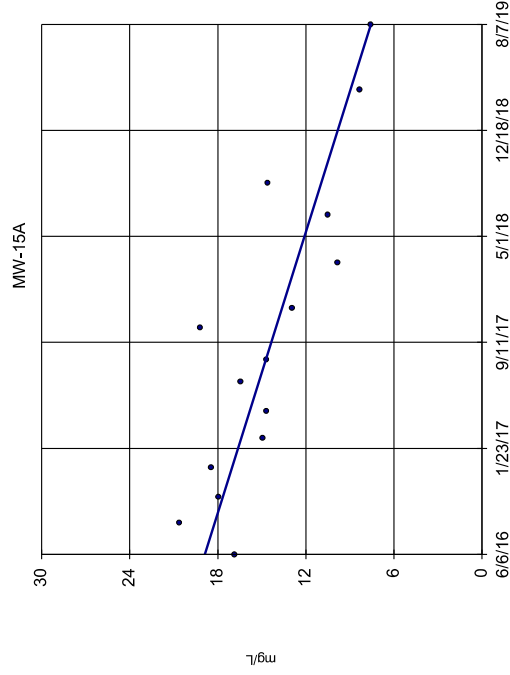
Sen's Slope Estimator



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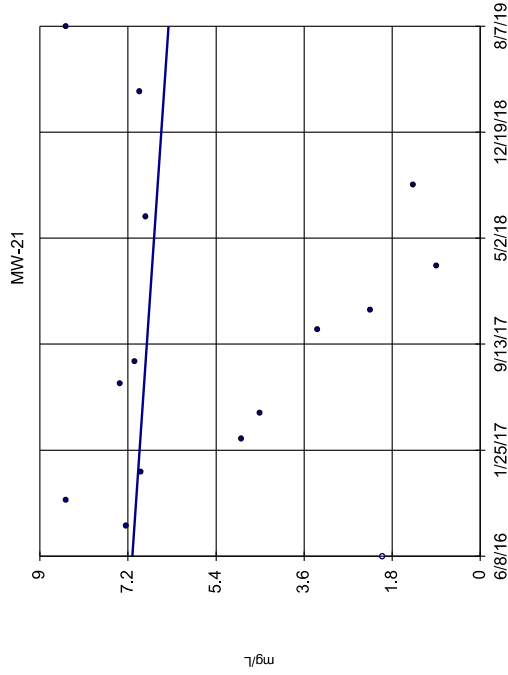
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Sen's Slope Estimator



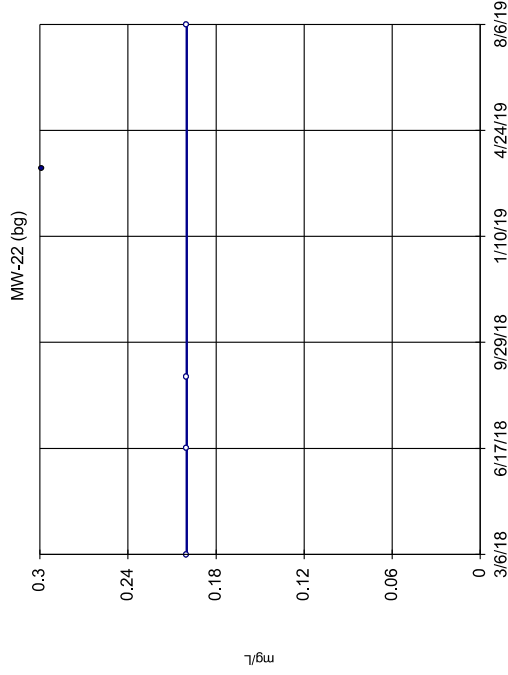
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Sen's Slope Estimator



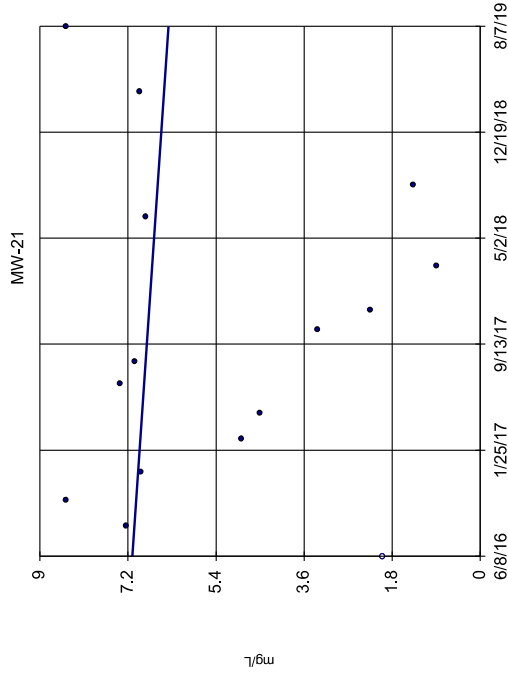
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Sen's Slope Estimator



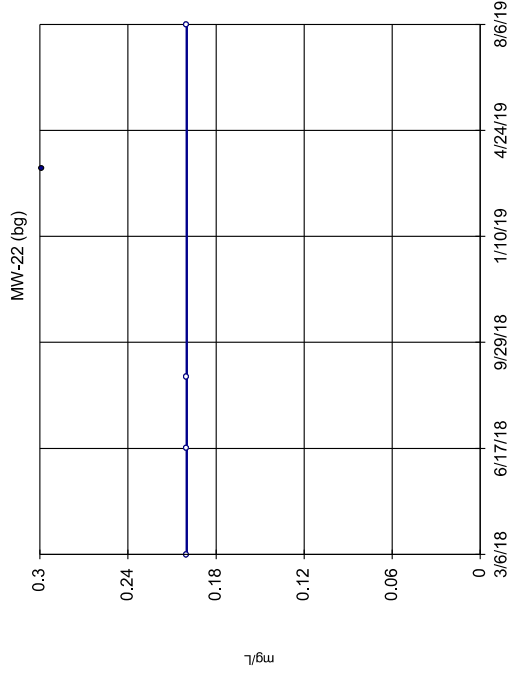
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



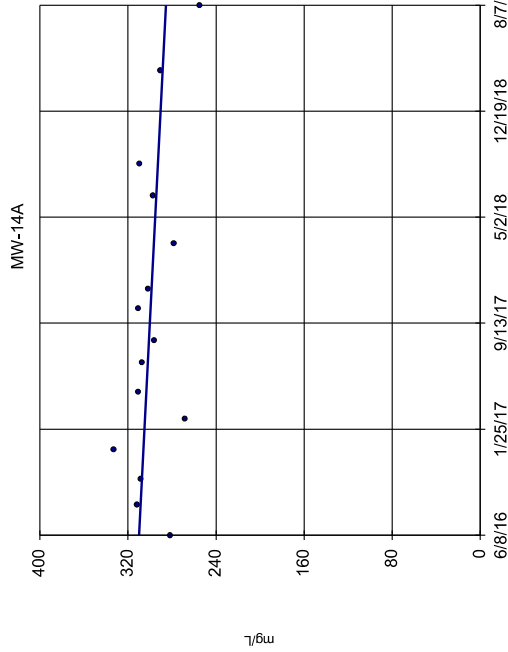
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



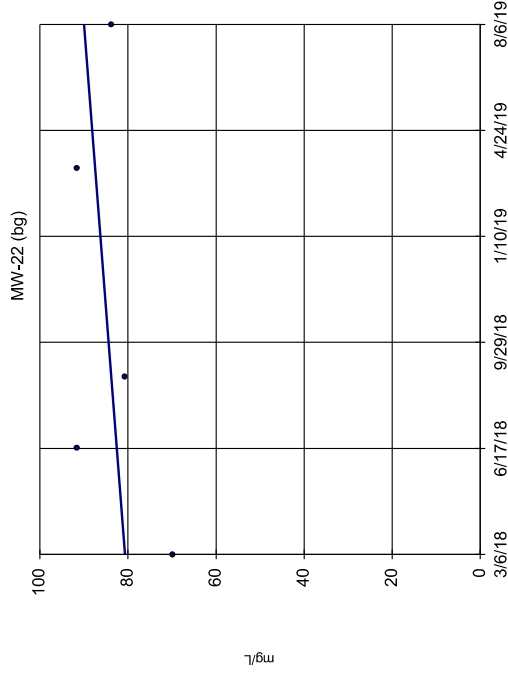
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Sen's Slope Estimator



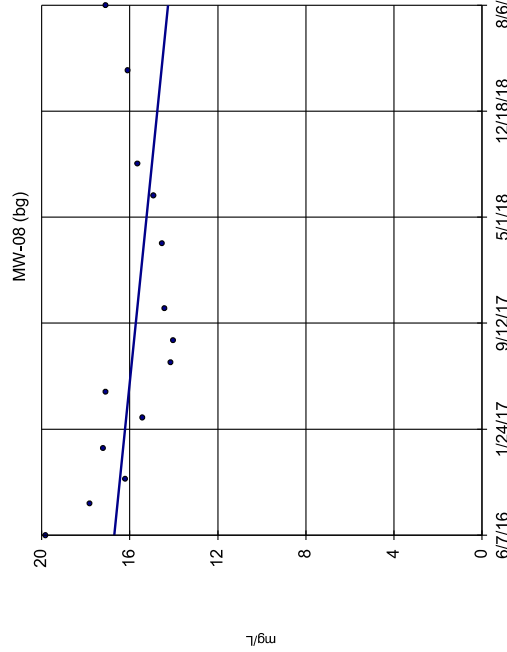
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Sen's Slope Estimator



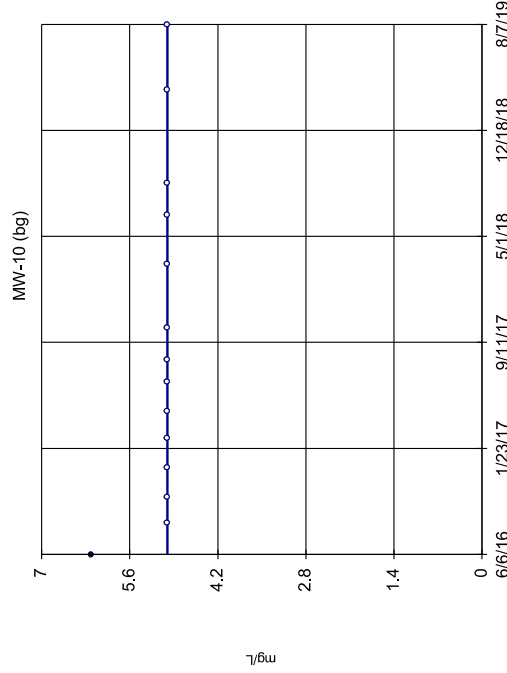
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



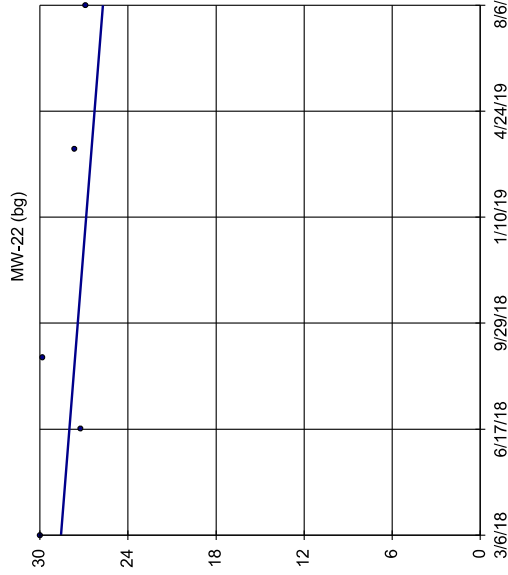
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



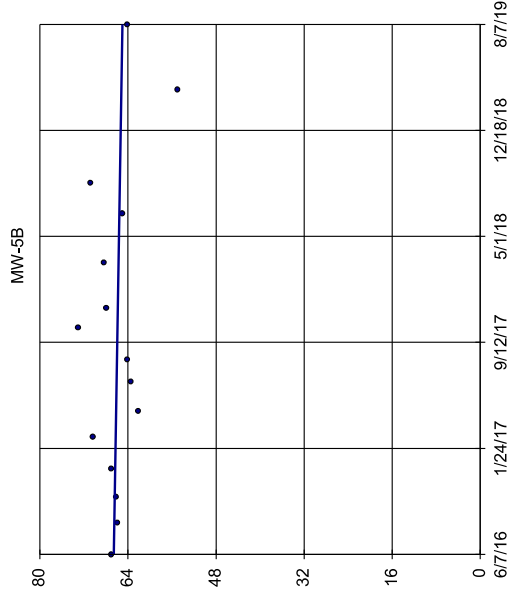
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



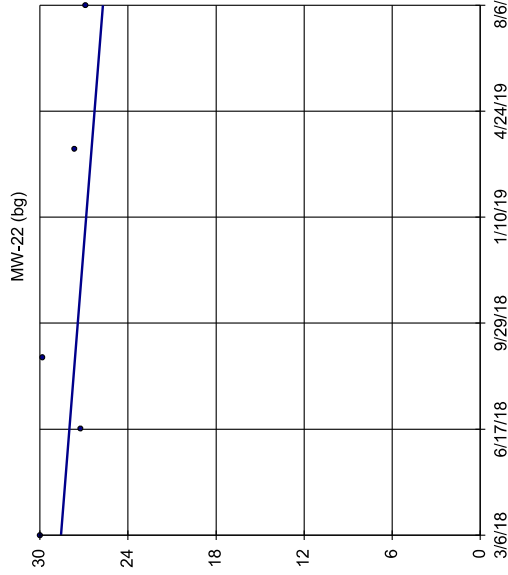
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Sen's Slope Estimator



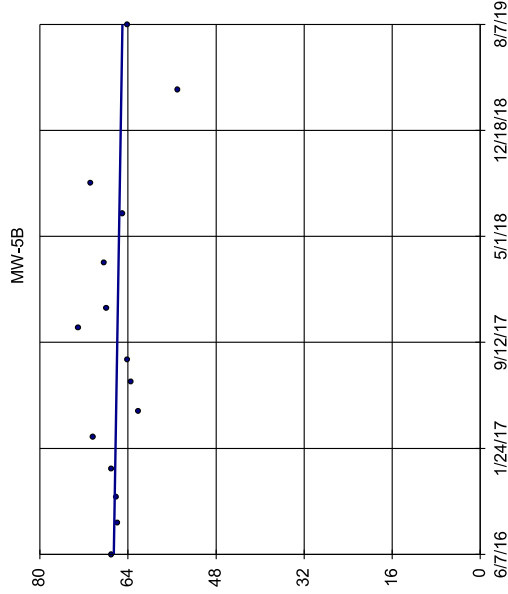
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Sen's Slope Estimator



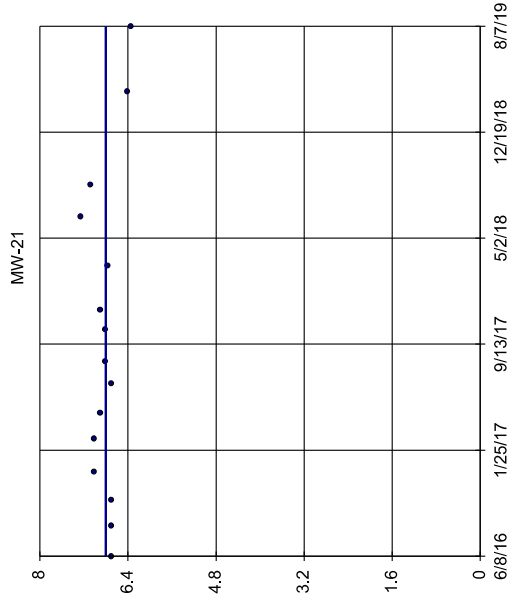
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 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



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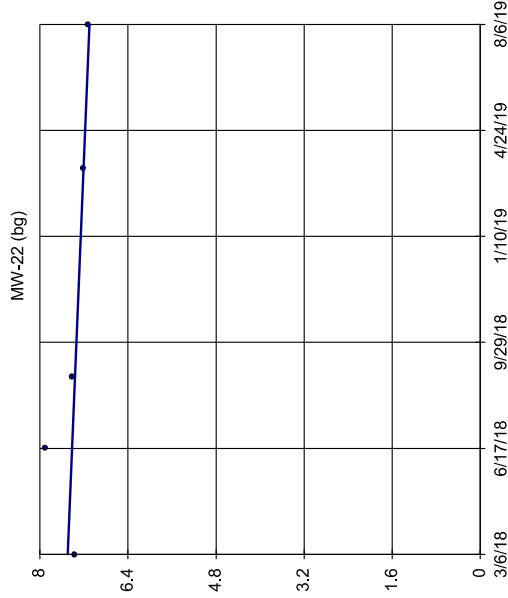
Sen's Slope Estimator



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 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

ns

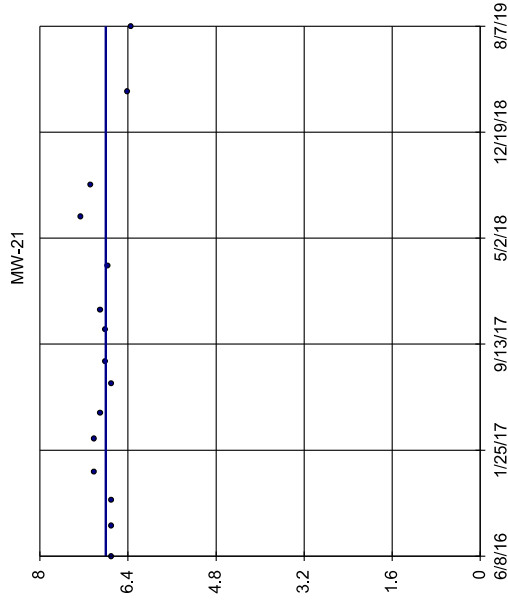
Sen's Slope Estimator



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 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

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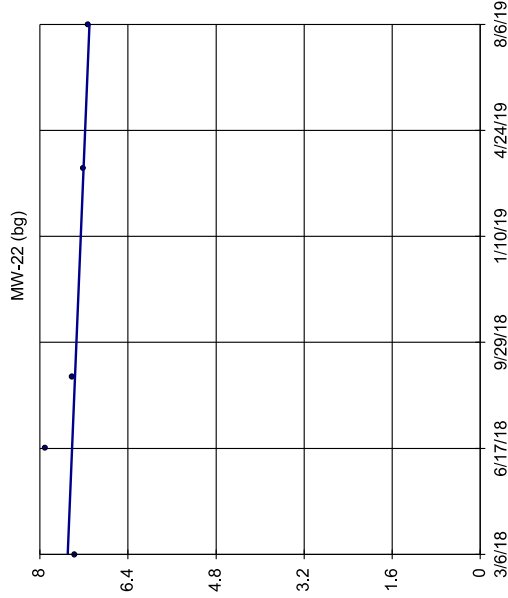
Sen's Slope Estimator



Constituent: Sulfate Analysis Run 10/31/2019 11:53 PM View: Trend Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

mg/L

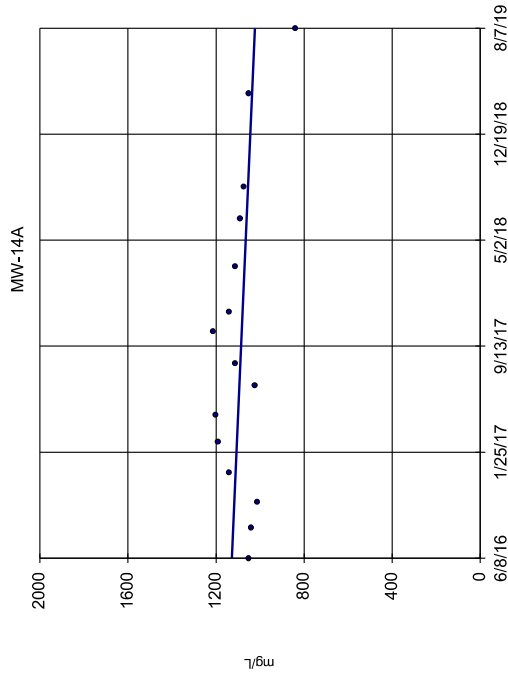
Sen's Slope Estimator



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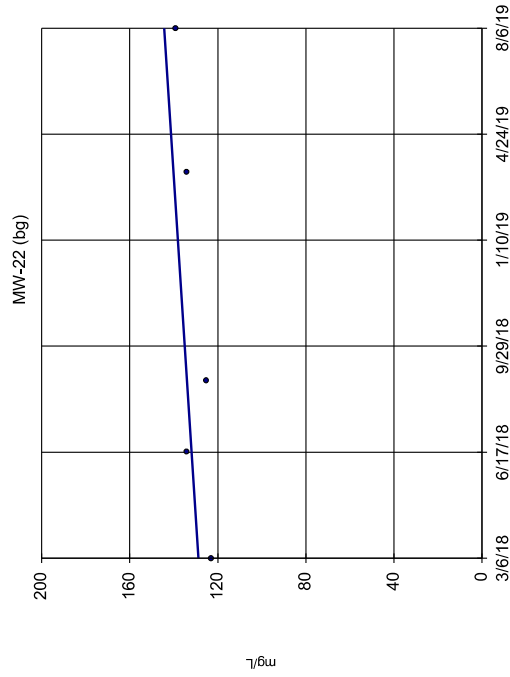
mg/L

Sen's Slope Estimator



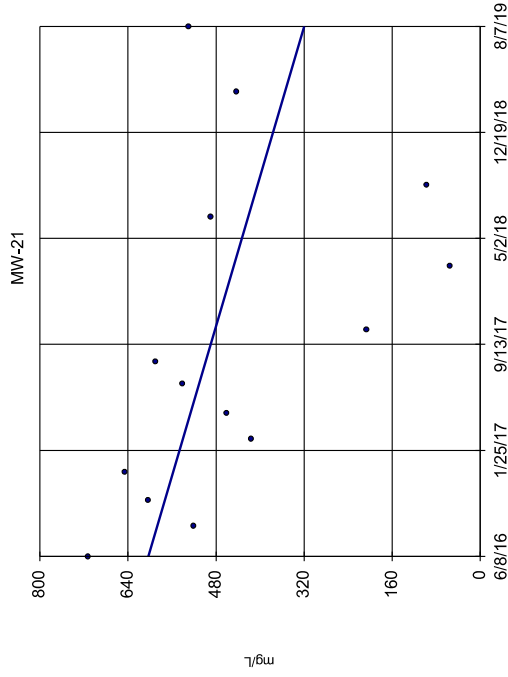
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Sen's Slope Estimator



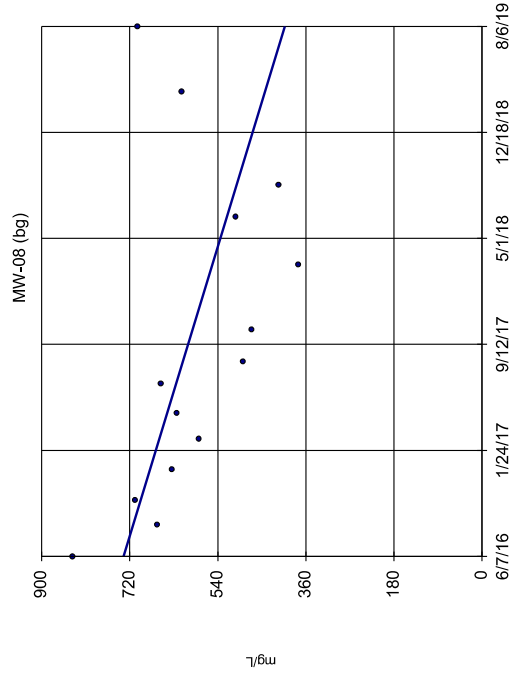
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Sen's Slope Estimator



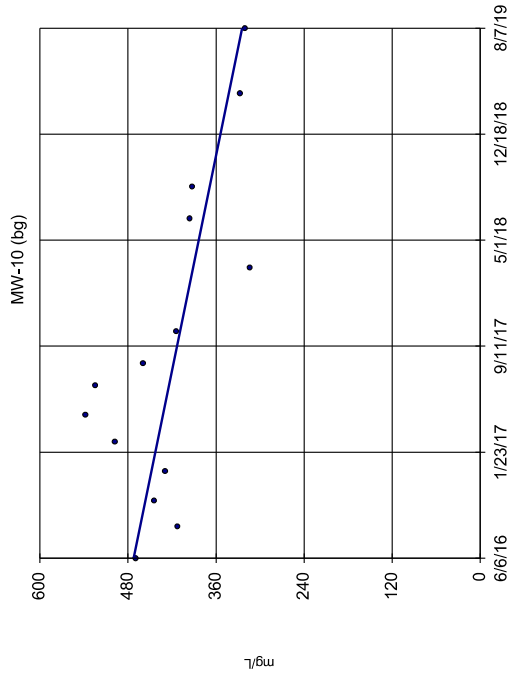
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



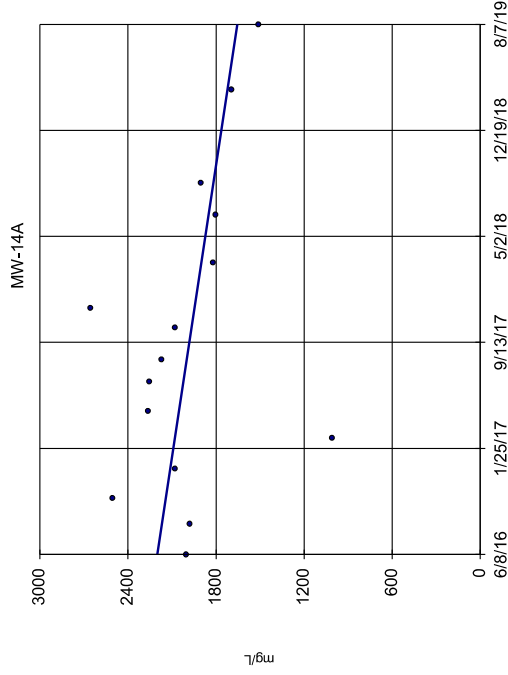
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



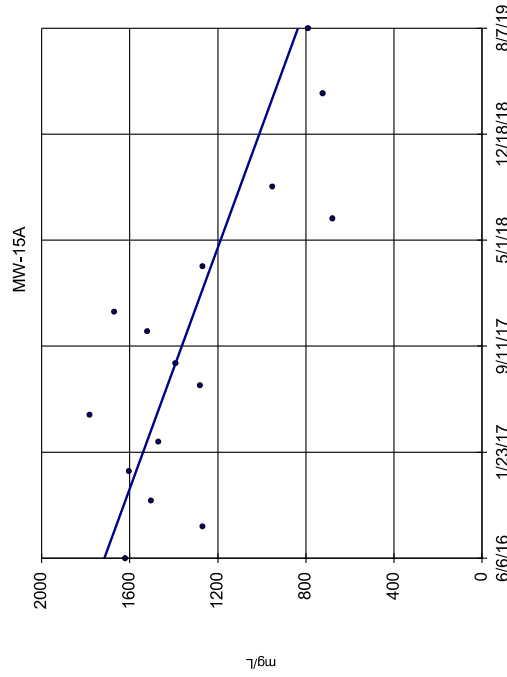
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



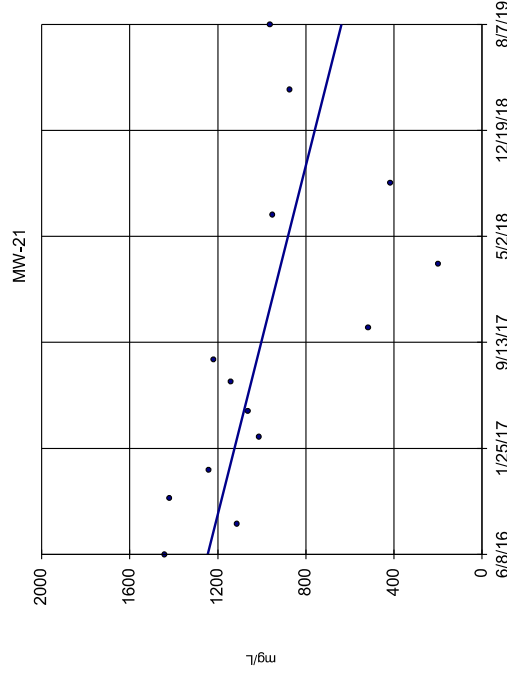
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



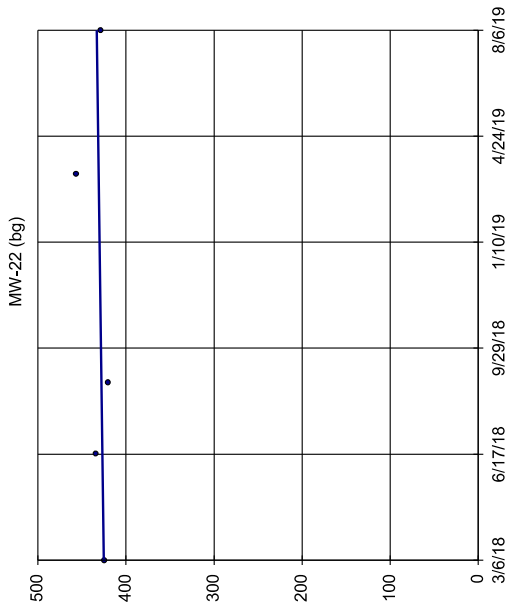
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Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sen's Slope Estimator



Constituent: Total Dissolved Solids Analysis Run 10/31/2019 11:53 PM View: Trend Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Sent's Slope Estimator



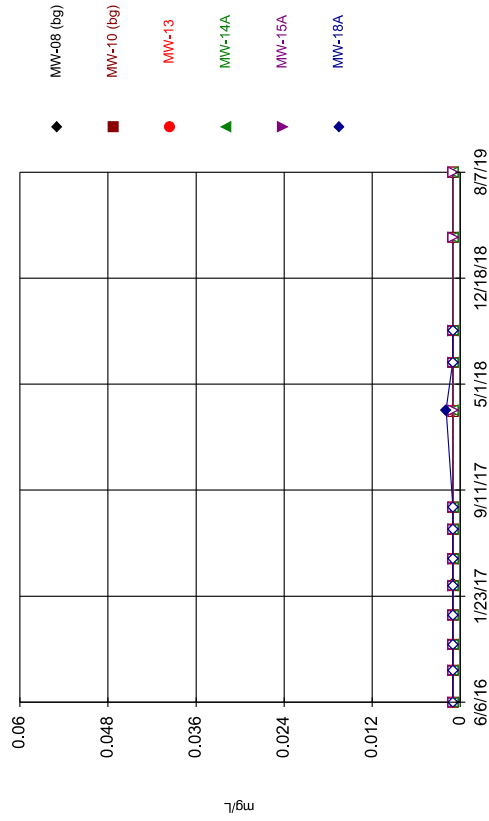
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Slope = -5.653
units per year.
Mann-Kendall
statistic = 2
critical = 12
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Total Dissolved Solids Analysis Run 10/31/2019 11:53 PM View: Trend Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

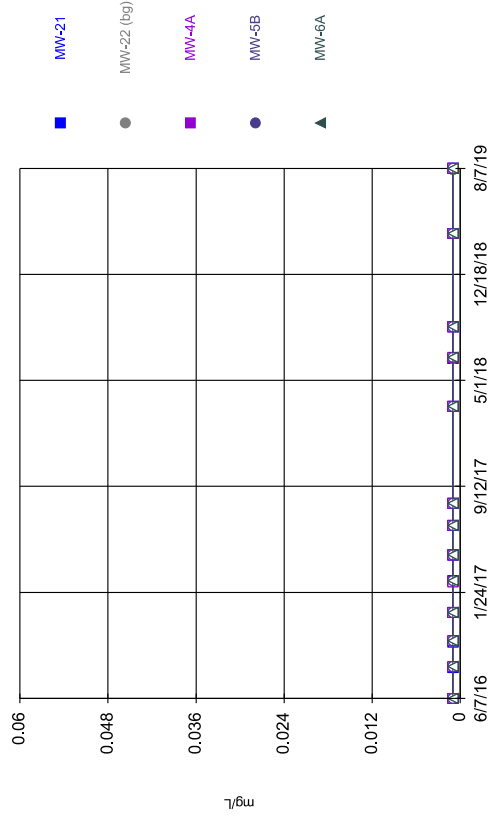
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Time Series



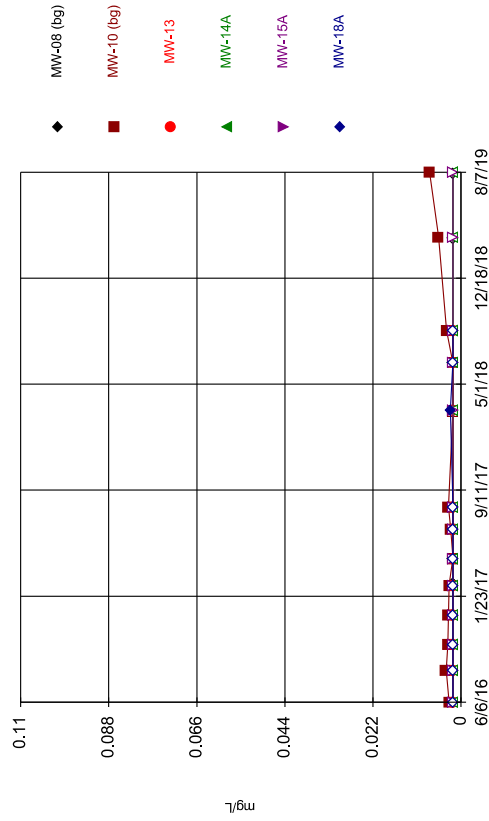
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Time Series



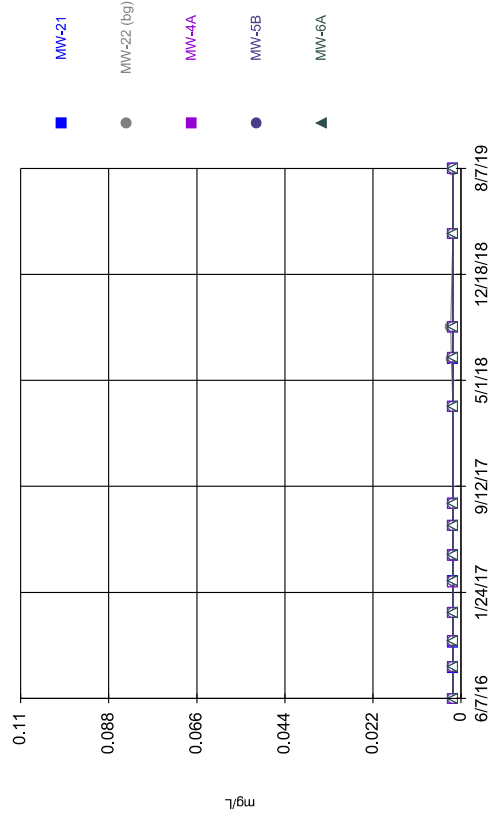
Sanitas™ v3.6.23_LG
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Time Series



Sanitas™ v3.6.23_LG
Hollow symbols indicate censored values.

Time Series



Time Series

Constituent: Antimony (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.001			<0.001	<0.001
6/7/2016	<0.001					
6/8/2016			<0.001	<0.001		
8/15/2016		<0.001	<0.001	<0.001	<0.001	<0.001
8/16/2016	<0.001					
10/10/2016	<0.001	<0.001	<0.001			
10/11/2016				<0.001	<0.001	<0.001
12/14/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2/17/2017		<0.001	<0.001	<0.001	<0.001	<0.001
2/21/2017	<0.001					
4/17/2017	<0.001	<0.001	<0.001	<0.001	<0.001	
4/18/2017						<0.001
6/19/2017	<0.001	<0.001				
6/20/2017			<0.001			
6/21/2017				<0.001	<0.001	<0.001
8/7/2017	<0.001	<0.001				
8/8/2017			<0.001	<0.001	<0.001	<0.001
3/5/2018		<0.001				
3/6/2018	<0.001		<0.001			
3/7/2018				<0.001	<0.001	0.00195
6/19/2018	<0.001	<0.001				
6/20/2018			<0.001	<0.001	<0.001	<0.001
8/27/2018	<0.001	<0.001				
8/28/2018			<0.001			
8/29/2018				<0.001	<0.001	<0.001
3/18/2019	<0.001					
3/19/2019		<0.001				
3/20/2019				<0.001	<0.001	
8/6/2019	<0.001					
8/7/2019		<0.001		<0.001	<0.001	

Time Series

Constituent: Antimony (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.001	<0.001	<0.001
6/8/2016	<0.001				
8/15/2016	<0.001				
8/16/2016			<0.001	<0.001	<0.001
10/10/2016	<0.001				
10/11/2016			<0.001	<0.001	<0.001
12/12/2016	<0.001		<0.001	<0.001	<0.001
2/17/2017			<0.001		
2/21/2017	<0.001			<0.001	<0.001
4/17/2017			<0.001	<0.001	<0.001
4/18/2017	<0.001				
6/20/2017	<0.001		<0.001	<0.001	
6/21/2017					<0.001
8/7/2017			<0.001		
8/8/2017	<0.001			<0.001	<0.001
3/6/2018	<0.001	<0.001	<0.001	<0.001	<0.001
6/19/2018	<0.001	<0.001			
6/21/2018			<0.001	<0.001	<0.001
8/27/2018		<0.001			
8/28/2018	<0.001		<0.001		
8/29/2018				<0.001	<0.001
3/19/2019		<0.001	<0.001	<0.001	<0.001
3/20/2019	<0.001				
8/6/2019		<0.001			
8/7/2019	<0.001		<0.001	<0.001	<0.001

Time Series

Constituent: Arsenic (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		0.00298			<0.002	<0.002
6/7/2016	<0.002					
6/8/2016			<0.002	<0.002		
8/15/2016		0.00369	<0.002	<0.002	<0.002	<0.002
8/16/2016	<0.002					
10/10/2016	<0.002	0.00328	<0.002			
10/11/2016				<0.002	<0.002	<0.002
12/14/2016	<0.002	0.00312	<0.002	<0.002	<0.002	<0.002
2/17/2017		0.00298	<0.002	<0.002	<0.002	<0.002
2/21/2017	<0.002					
4/17/2017	<0.002	<0.002	<0.002	<0.002	<0.002	
4/18/2017						<0.002
6/19/2017	<0.002	0.00262				
6/20/2017			<0.002			
6/21/2017				<0.002	<0.002	<0.002
8/7/2017	<0.002	0.00317				
8/8/2017			<0.002	<0.002	<0.002	<0.002
3/5/2018		<0.002				
3/6/2018	<0.002		<0.002			
3/7/2018				<0.002	<0.002	0.00265
6/19/2018	<0.002	0.00211				
6/20/2018			<0.002	<0.002	<0.002	<0.002
8/27/2018	<0.002	0.0036				
8/28/2018			<0.002			
8/29/2018				<0.002	<0.002	<0.002
3/18/2019	<0.002					
3/19/2019		0.0056				
3/20/2019				<0.002	<0.002	
8/6/2019	<0.002					
8/7/2019		0.00784		<0.002	<0.002	

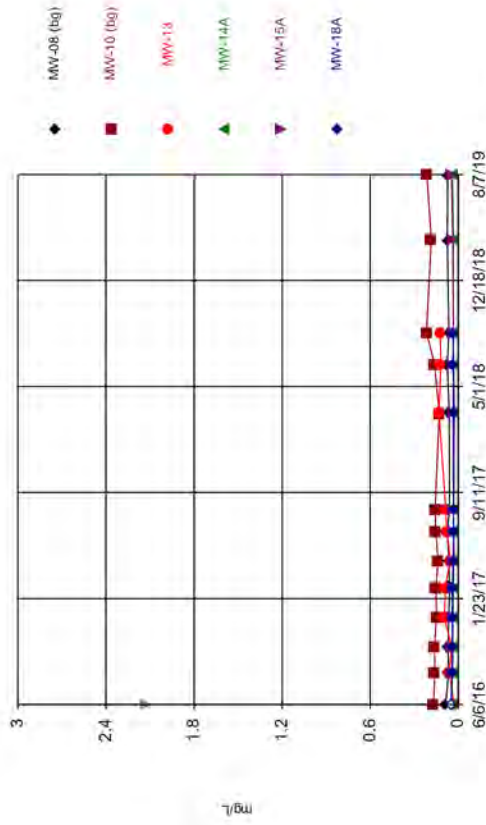
Time Series

Constituent: Arsenic (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.002	<0.002	<0.002
6/8/2016	<0.002				
8/15/2016	<0.002				
8/16/2016			<0.002	<0.002	<0.002
10/10/2016	<0.002				
10/11/2016			<0.002	<0.002	<0.002
12/12/2016	<0.002		<0.002	<0.002	<0.002
2/17/2017			<0.002		
2/21/2017	<0.002			<0.002	<0.002
4/17/2017			<0.002	<0.002	<0.002
4/18/2017	<0.002				
6/20/2017	<0.002		<0.002	<0.002	
6/21/2017					<0.002
8/7/2017			<0.002		
8/8/2017	<0.002			<0.002	<0.002
3/6/2018	<0.002	<0.002	<0.002	<0.002	<0.002
6/19/2018	<0.002	0.00245			
6/21/2018			<0.002	<0.002	<0.002
8/27/2018		0.00261			
8/28/2018	<0.002		<0.002		
8/29/2018				<0.002	<0.002
3/19/2019		<0.002	<0.002	<0.002	<0.002
3/20/2019	<0.002				
8/6/2019		<0.002			
8/7/2019	<0.002		<0.002	<0.002	<0.002

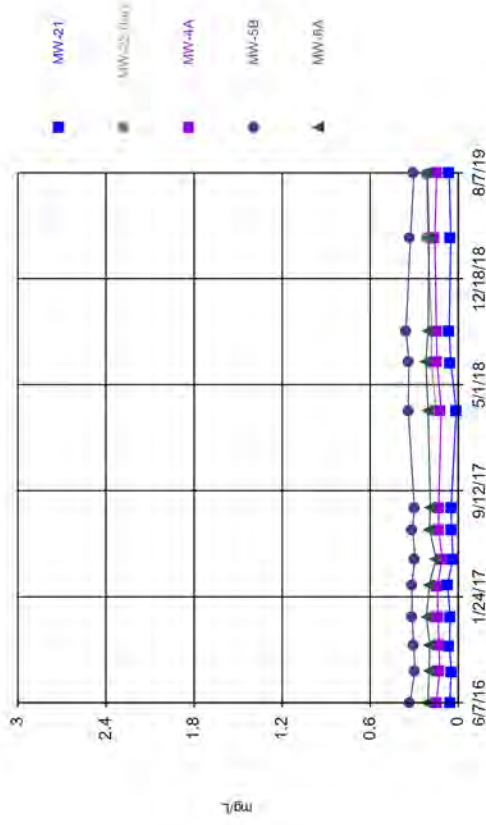
Hollow symbols indicate censored values.

Time Series



Constituent: Barium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

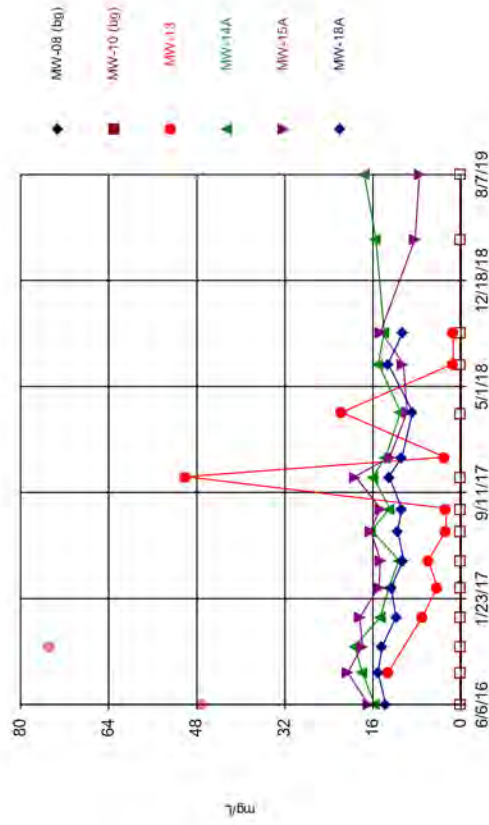
Time Series



Constituent: Barium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Hollow symbols indicate censored values.

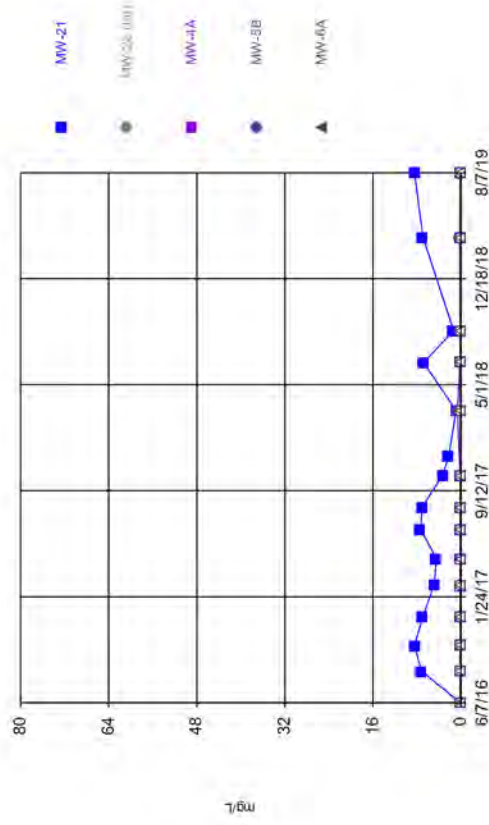
Time Series



Constituent: Boron Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Hollow symbols indicate censored values.

Time Series



Constituent: Boron Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Barium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		0.168			2.13 (o)	<0.1
6/7/2016	0.0861					
6/8/2016			0.0302	0.0443		
8/15/2016		0.161	0.0616	0.0402	0.044	0.0391
8/16/2016	0.0671					
10/10/2016	0.0706	0.163	0.0477			
10/11/2016				0.0391	0.0426	0.0381
12/14/2016	0.0645	0.15	0.0945	0.0383	0.0406	0.0394
2/17/2017		0.151	0.0872	0.0306	0.0402	0.0403
2/21/2017	0.0594 (F1)					
4/17/2017	0.0636	0.138	0.0559	0.0341	0.0364	
4/18/2017						0.0297
6/19/2017	0.076	0.154				
6/20/2017			0.0783			
6/21/2017				0.0338	0.0327	0.0313
8/7/2017	0.0596	0.157				
8/8/2017			0.0857	0.031	0.0338	0.0329
3/5/2018		0.129				
3/6/2018	0.0617		0.132			
3/7/2018				0.0285	0.0352	0.0281
6/19/2018	0.0761	0.162				
6/20/2018			0.118	0.0314	0.0338	0.0352
8/27/2018	0.0649	0.216				
8/28/2018			0.122			
8/29/2018				0.0344	0.0335	0.036
3/18/2019	0.0751					
3/19/2019		0.185				
3/20/2019				0.0328	0.037	
8/6/2019	0.0733					
8/7/2019		0.215		0.0398	0.047	

Time Series

Constituent: Barium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			0.15	0.331	0.209
6/8/2016	0.0573				
8/15/2016	0.0482				
8/16/2016			0.128	0.295	0.199
10/10/2016	0.0606				
10/11/2016			0.131	0.304	0.196
12/12/2016	0.056		0.139	0.315	0.216
2/17/2017			0.143		
2/21/2017	0.0735			0.316	0.197
4/17/2017			0.111	0.296	0.152
4/18/2017	0.0356				
6/20/2017	0.0461		0.133	0.31	
6/21/2017					0.197
8/7/2017			0.133		
8/8/2017	0.0499			0.3	0.19
3/6/2018	0.0148	0.15	0.117	0.341	0.206
6/19/2018	0.0515	0.184			
6/21/2018			0.144	0.336	0.222
8/27/2018		0.181			
8/28/2018	0.0622		0.149		
8/29/2018				0.357	0.206
3/19/2019		0.209	0.161	0.326	0.2
3/20/2019	0.0511				
8/6/2019		0.215			
8/7/2019	0.0624		0.147	0.301	0.211

Time Series

Constituent: Boron (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.2			16.8	13.7
6/7/2016	<0.2					
6/8/2016			47.2 (o)	15.8		
8/15/2016		<0.2	13.3	17.9	20.6	15.1
8/16/2016	<0.2					
10/10/2016	<0.2	<0.2	74.8 (o)			
10/11/2016				19.3	17.9	14.3
12/14/2016	<0.2	<0.2	7.03	14.7	18.4	11.8
2/17/2017		<0.2	4.35	13.1	14.9	12.7
2/21/2017	<0.2					
4/17/2017	<0.2	<0.2	5.93	11.3	14.7	
4/18/2017						10.5
6/19/2017	<0.2	<0.2				
6/20/2017			2.77			
6/21/2017				16.3	16.4	11.5
8/7/2017	<0.2	<0.2				
8/8/2017			2.72	13	14.7	10.8
10/16/2017	<0.2	<0.2	50			
10/17/2017				16	19.2	13.1
11/28/2017			2.92 (R)	13.7 (R)	12.9 (R)	10.7 (R)
3/5/2018		<0.2				
3/6/2018	<0.2		21.7			
3/7/2018				11	9.8	8.81
6/19/2018	<0.2	<0.2				
6/20/2018			1.34	15	10.5	13.3
8/27/2018	<0.2	<0.2				
8/28/2018			1.45			
8/29/2018				14	14.6	10.5
3/18/2019	<0.2					
3/19/2019		<0.2				
3/20/2019				15.5	8.35	
8/6/2019	0.205					
8/7/2019		<0.2		17.6	7.56	

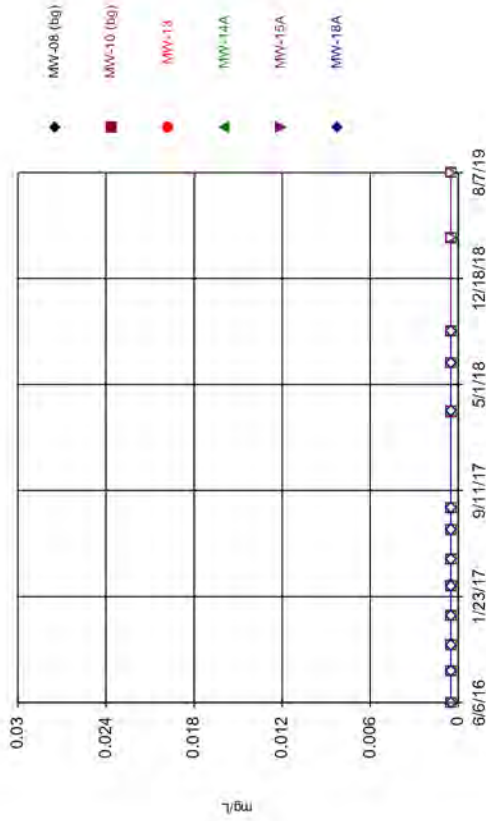
Time Series

Constituent: Boron (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

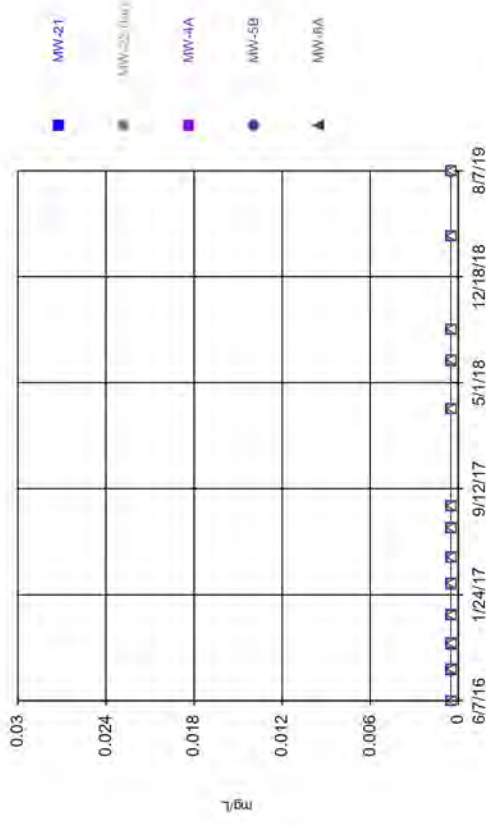
	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.2	<0.2	<0.2
6/8/2016	<0.2				
8/15/2016	7.23				
8/16/2016			<0.2	<0.2	<0.2
10/10/2016	8.45				
10/11/2016			<0.2	<0.2	<0.2
12/12/2016	6.93		<0.2	<0.2	<0.2
2/17/2017			<0.2		
2/21/2017	4.87			<0.2	<0.2
4/17/2017			<0.2	<0.2	<0.2
4/18/2017	4.49				
6/20/2017	7.36		<0.2	<0.2	
6/21/2017					<0.2
8/7/2017			<0.2		
8/8/2017	7.05			<0.2	<0.2
10/16/2017	3.33		<0.2		
10/17/2017				<0.2	<0.2
11/28/2017	2.24 (R)				
3/6/2018	0.885	<0.2	0.66	<0.2	<0.2
6/19/2018	6.84	<0.2			
6/21/2018			<0.2	<0.2	<0.2
8/27/2018		<0.2			
8/28/2018	1.36		<0.2		
8/29/2018				<0.2	<0.2
3/19/2019		0.299	<0.2	<0.2	<0.2
3/20/2019	6.95				
8/6/2019		<0.2			
8/7/2019	8.46		<0.2	<0.2	<0.2

Time Series



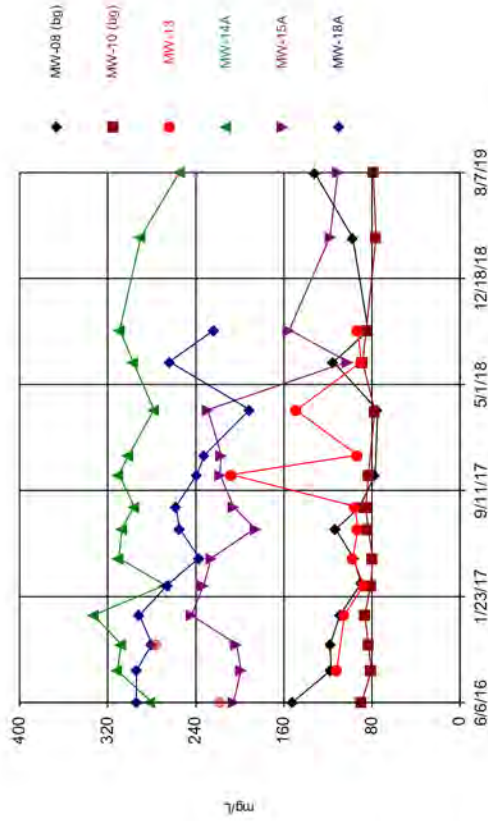
Constituent: Cadmium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



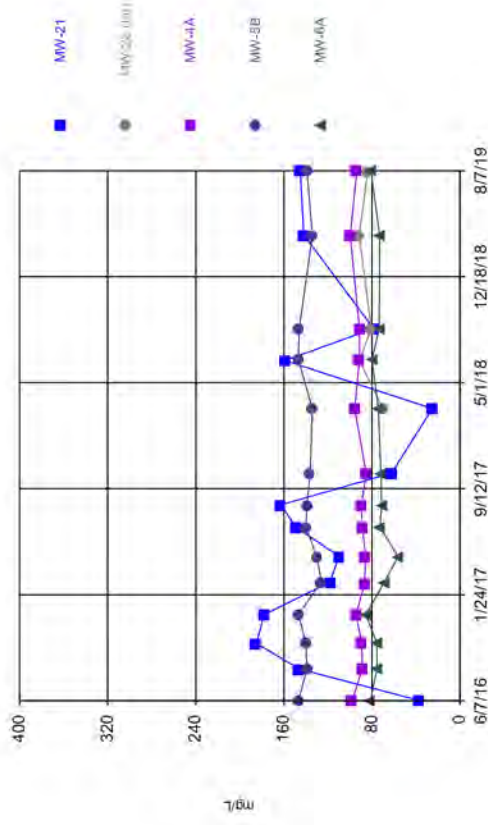
Constituent: Cadmium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: Calcium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: Calcium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Cadmium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.0005			<0.0005	<0.0005
6/7/2016	<0.0005					
6/8/2016			<0.0005	<0.0005		
8/15/2016		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8/16/2016	<0.0005					
10/10/2016	<0.0005	<0.0005	<0.0005			
10/11/2016				<0.0005	<0.0005	<0.0005
12/14/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
2/17/2017		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
2/21/2017	<0.0005					
4/17/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
4/18/2017						<0.0005
6/19/2017	<0.0005	<0.0005				
6/20/2017			<0.0005			
6/21/2017				<0.0005	<0.0005	<0.0005
8/7/2017	<0.0005	<0.0005				
8/8/2017			<0.0005	<0.0005	<0.0005	<0.0005
3/5/2018		<0.0005				
3/6/2018	<0.0005		<0.0005			
3/7/2018				<0.0005	<0.0005	<0.0005
6/19/2018	<0.0005	<0.0005				
6/20/2018			<0.0005	<0.0005	<0.0005	<0.0005
8/27/2018	<0.0005	<0.0005				
8/28/2018			<0.0005			
8/29/2018				<0.0005	<0.0005	<0.0005
3/18/2019	<0.0005					
3/19/2019		<0.0005				
3/20/2019				<0.0005	<0.0005	
8/6/2019	<0.0005					
8/7/2019		<0.0005		<0.0005	<0.0005	

Time Series

Constituent: Cadmium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.0005	<0.0005	<0.0005
6/8/2016	<0.0005				
8/15/2016	<0.0005				
8/16/2016			<0.0005	<0.0005	<0.0005
10/10/2016	<0.0005				
10/11/2016			<0.0005	<0.0005	<0.0005
12/12/2016	<0.0005		<0.0005	<0.0005	<0.0005
2/17/2017			<0.0005		
2/21/2017	<0.0005			<0.0005	<0.0005
4/17/2017			<0.0005	<0.0005	<0.0005
4/18/2017	<0.0005				
6/20/2017	<0.0005		<0.0005	<0.0005	
6/21/2017					<0.0005
8/7/2017			<0.0005		
8/8/2017	<0.0005			<0.0005	<0.0005
3/6/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6/19/2018	<0.0005	<0.0005			
6/21/2018			<0.0005	<0.0005	<0.0005
8/27/2018		<0.0005			
8/28/2018	<0.0005		<0.0005		
8/29/2018				<0.0005	<0.0005
3/19/2019		<0.0005	<0.0005	<0.0005	<0.0005
3/20/2019	<0.0005				
8/6/2019		<0.0005			
8/7/2019	<0.0005		<0.0005	<0.0005	<0.0005

Time Series

Constituent: Calcium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		89.3			206	294
6/7/2016	152					
6/8/2016			218 (o)	281		
8/15/2016		80.7	112	311	199	294
8/16/2016	117					
10/10/2016	118	83.3	276 (o)			
10/11/2016				308	203	280
12/14/2016	109	86.5	105	333	244	291
2/17/2017		81.2	87.6	268	233	266
2/21/2017	89.9					
4/17/2017	96.5	79.2	97.5	310	226	
4/18/2017						237
6/19/2017	113	83.6				
6/20/2017			92.8			
6/21/2017				307	186	255
8/7/2017	91.3	85.5				
8/8/2017			95.4	296	206	258
10/16/2017	77	83.3	208			
10/17/2017				310	218	239
11/28/2017			93.2 (R)	301 (R)	217 (R)	232 (R)
3/5/2018		77.3				
3/6/2018	74.7		149			
3/7/2018				278	229	191
6/19/2018	115	88.5				
6/20/2018			89.5	297	102	264
8/27/2018	83.6	85.4				
8/28/2018			93.1			
8/29/2018				309	155	223
3/18/2019	97.6					
3/19/2019		76.3				
3/20/2019				290	118	
8/6/2019	132					
8/7/2019		78.9		255	111	

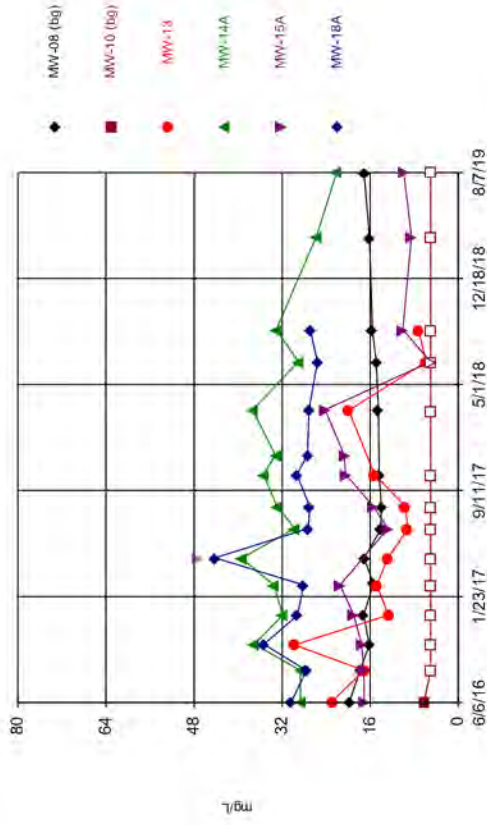
Time Series

Constituent: Calcium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			98.2	147	81.4
6/8/2016	37.2				
8/15/2016	146				
8/16/2016			88.8	139	75.4
10/10/2016	185				
10/11/2016			89.3	140	75.7
12/12/2016	178		94.5	147	85.6
2/17/2017			86.8		
2/21/2017	118			126	68.8
4/17/2017			85.9	130	56.3
4/18/2017	110				
6/20/2017	149		88.7	140	
6/21/2017					72.9
8/7/2017			89.7		
8/8/2017	163			139	71.2
10/16/2017	62.3		85.3		
10/17/2017				136	71.9
3/6/2018	25.1	69.8	95.8	134	74.1
6/19/2018	159	91.5			
6/21/2018			91.4	147	80.1
8/27/2018		80.7			
8/28/2018	78.7		91.3		
8/29/2018				146	73.3
3/19/2019		91.6	99.7	134	73.2
3/20/2019	142				
8/6/2019		83.8			
8/7/2019	145		93.8	139	80.9

Soletis™ V10.0.23 UG
Hollow symbols indicate censored values.

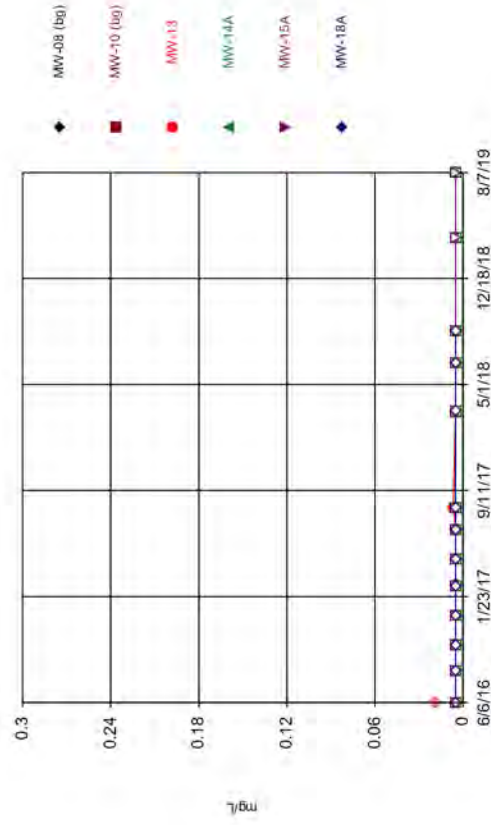
Time Series



Constituent: Chloride Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletis™ V10.0.23 UG
Hollow symbols indicate censored values.

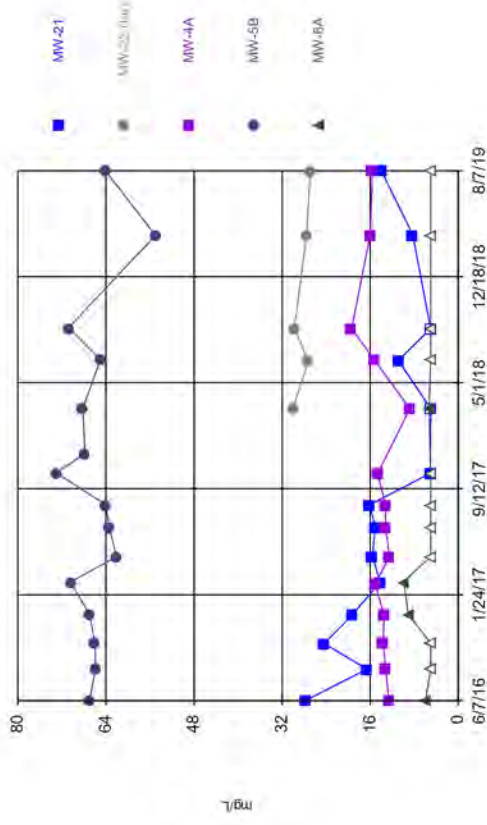
Time Series



Constituent: Chromium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletis™ V10.0.23 UG
Hollow symbols indicate censored values.

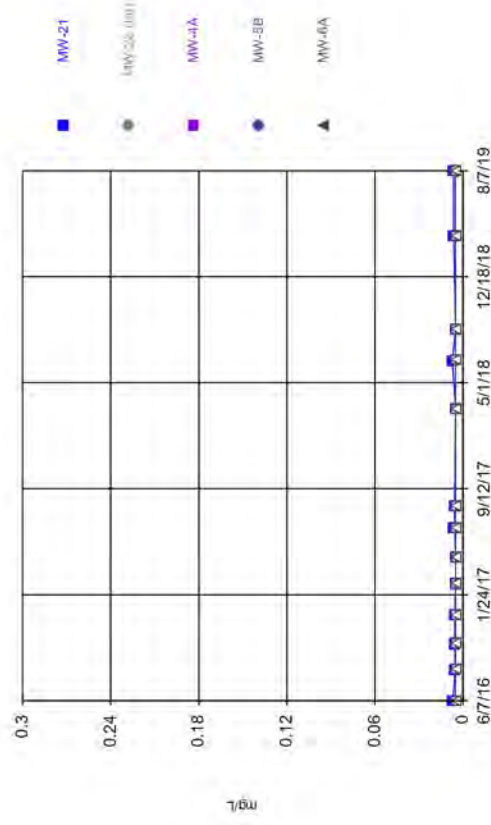
Time Series



Constituent: Chloride Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletis™ V10.0.23 UG
Hollow symbols indicate censored values.

Time Series



Constituent: Chromium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		6.22			17.1	30.4
6/7/2016	19.8					
6/8/2016			22.9	28.7		
8/15/2016		<5	17.1	28.7	17.2	27.6
8/16/2016	17.8					
10/10/2016	16.2	<5	29.8			
10/11/2016				37	17.6	35.3
12/14/2016	17.2	<5	12.7	31.9	19	29.2
2/17/2017		<5	14.8	33.5	21.5	28.1
2/21/2017	15.4					
4/17/2017	17.1	<5	12.8	39.4	47.4 (o)	
4/18/2017						44.2
6/19/2017	14.1	<5				
6/20/2017			9.17			
6/21/2017				29.7	12.8	27.2
8/7/2017	14	<5				
8/8/2017			9.62	32.9	15.4	27
10/16/2017	14.4	<5	15.2			
10/17/2017				35.4	20.5	29.3
11/28/2017				33.2 (R)	20.7 (R)	27.4 (R)
3/5/2018		<5				
3/6/2018	14.5		19.9			
3/7/2018				37.4	24.2	27.1
6/19/2018	14.9	<5				
6/20/2018			5.84	29	<5	25.6
8/27/2018	15.6	<5				
8/28/2018			7.24			
8/29/2018				33.1	10.1	26.9
3/18/2019	16.1					
3/19/2019		<5				
3/20/2019				25.8	8.54	
8/6/2019	17.1					
8/7/2019		<5		22.1	9.91	

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			12.6	67	5.97
6/8/2016	27.7				
8/15/2016	16.6				
8/16/2016			13.2	65.9	<5
10/10/2016	24.4				
10/11/2016			13.6	66	<5
12/12/2016	19.2		13.5	67	9.08
2/17/2017			15.1		
2/21/2017	14.2			70.4	9.93
4/17/2017			12.5	62.1	<5
4/18/2017	15.6				
6/20/2017	15.1		13.2	63.4	
6/21/2017					<5
8/7/2017			13.2		
8/8/2017	16.1			64	<5
10/16/2017	5.09		14.7		
10/17/2017				73	<5
11/28/2017				67.8 (R)	
3/6/2018	<5	30	8.81	68.2	5.33
6/19/2018	10.9	27.2			
6/21/2018			15.3	65	<5
8/27/2018		29.8			
8/28/2018	<5		19.4		
8/29/2018				70.8	<5
3/19/2019		27.6	16	55	<5
3/20/2019	8.3				
8/6/2019		26.9			
8/7/2019	14		15.6	64.1	<5

Time Series

Constituent: Chromium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

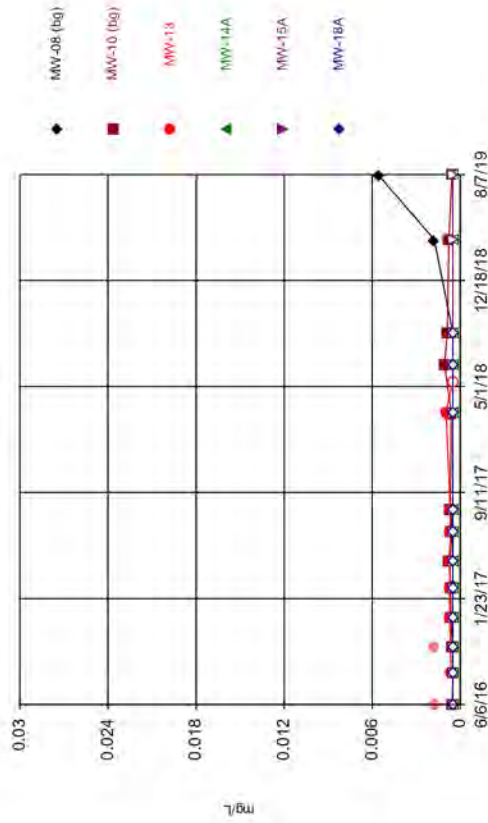
	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.005			<0.005	<0.005
6/7/2016	<0.005					
6/8/2016			0.0191 (o)	<0.005		
8/15/2016		<0.005	<0.005	<0.005	<0.005	<0.005
8/16/2016	<0.005					
10/10/2016	<0.005	<0.005	<0.005			
10/11/2016				<0.005	<0.005	<0.005
12/14/2016	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2/17/2017		<0.005	<0.005	<0.005 (F2)	<0.005	<0.005
2/21/2017	<0.005					
4/17/2017	<0.005	<0.005	<0.005	<0.005	<0.005	
4/18/2017						<0.005
6/19/2017	<0.005	<0.005				
6/20/2017			<0.005			
6/21/2017				<0.005	<0.005	<0.005
8/7/2017	<0.005	<0.005				
8/8/2017			0.00658	<0.005	<0.005	<0.005
3/5/2018		<0.005				
3/6/2018	<0.005		<0.005			
3/7/2018				<0.005	<0.005	<0.005
6/19/2018	<0.005	<0.005				
6/20/2018			<0.005	<0.005	<0.005	<0.005
8/27/2018	<0.005	<0.005				
8/28/2018			<0.005			
8/29/2018				<0.005	<0.005	<0.005
3/18/2019	<0.005					
3/19/2019		<0.005				
3/20/2019				<0.005	<0.005	
8/6/2019	<0.005					
8/7/2019		<0.005		<0.005	<0.005	

Time Series

Constituent: Chromium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

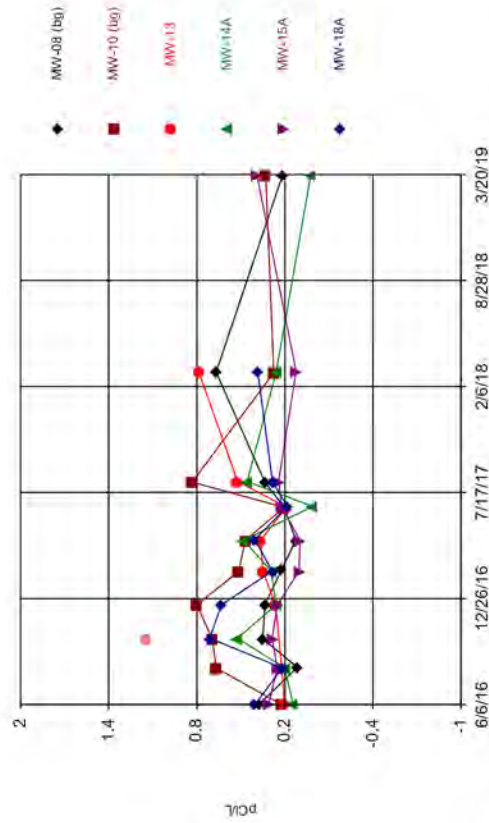
	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.005	<0.005	<0.005
6/8/2016	0.00694				
8/15/2016	0.00538				
8/16/2016			<0.005	<0.005	<0.005
10/10/2016	0.00582				
10/11/2016			<0.005	<0.005	<0.005
12/12/2016	0.00561		<0.005	<0.005	<0.005
2/17/2017			<0.005		
2/21/2017	<0.005			<0.005	<0.005
4/17/2017			<0.005	<0.005	<0.005
4/18/2017	<0.005				
6/20/2017	0.00586		<0.005	<0.005	
6/21/2017					<0.005
8/7/2017			<0.005		
8/8/2017	0.00572			<0.005	<0.005
3/6/2018	<0.005	<0.005	<0.005	<0.005	<0.005
6/19/2018	0.00726	<0.005			
6/21/2018			<0.005	<0.005	<0.005
8/27/2018		<0.005			
8/28/2018	<0.005		<0.005		
8/29/2018				<0.005	<0.005
3/19/2019		<0.005	<0.005	<0.005	<0.005
3/20/2019	0.00647				
8/6/2019		<0.005			
8/7/2019	0.00637		<0.005	<0.005	<0.005

Time Series



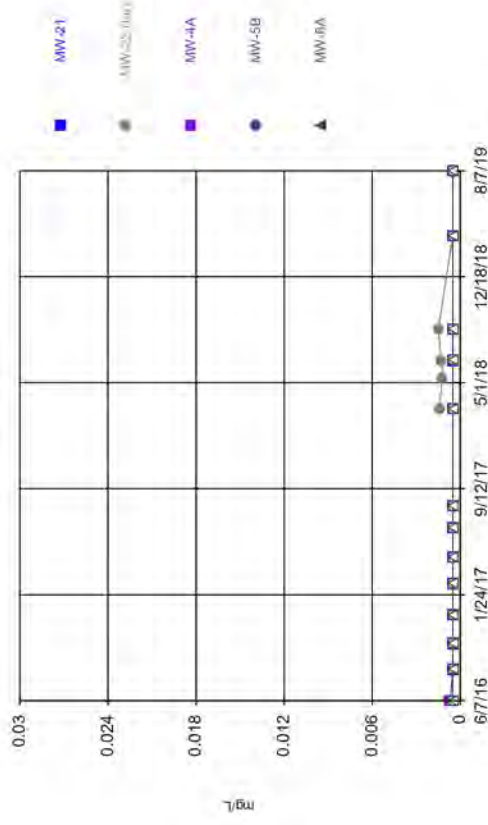
Constituent: Cobalt Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



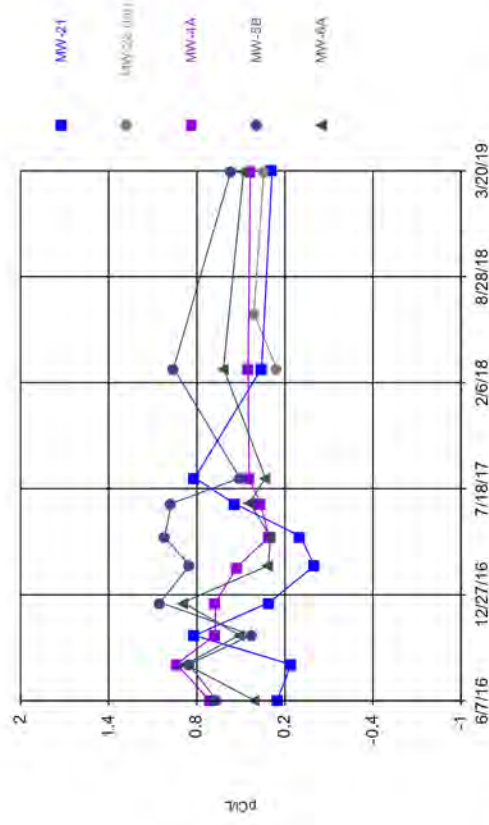
Constituent: Cobalt Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: Cobalt Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: Cobalt Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Cobalt (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		0.000555			<0.0005	<0.0005
6/7/2016	<0.0005					
6/8/2016			0.00172 (o)	<0.0005		
8/15/2016		<0.0005	0.000637	<0.0005	<0.0005	<0.0005
8/16/2016	<0.0005					
10/10/2016	<0.0005	0.000523	0.00179 (o)			
10/11/2016				<0.0005	<0.0005	<0.0005
12/14/2016	<0.0005	0.000638	0.000717	<0.0005	<0.0005	<0.0005
2/17/2017		0.000663	0.000727	<0.0005	<0.0005	<0.0005
2/21/2017	<0.0005					
4/17/2017	<0.0005	0.000779	0.000695	<0.0005	<0.0005	
4/18/2017						<0.0005
6/19/2017	0.000601	0.000621				
6/20/2017			0.000682			
6/21/2017				<0.0005	<0.0005	<0.0005
8/7/2017	0.00051	0.000695				
8/8/2017			0.000686	<0.0005	<0.0005	<0.0005
3/5/2018		0.000627				
3/6/2018	<0.0005		0.000964			
3/7/2018				<0.0005	<0.0005	<0.0005
5/14/2018			<0.0005			
6/19/2018	<0.0005	0.00107				
6/20/2018			<0.0005	<0.0005	<0.0005	<0.0005
8/27/2018	<0.0005	0.00088				
8/28/2018			<0.0005			
8/29/2018				<0.0005	<0.0005	<0.0005
3/18/2019	0.00177					
3/19/2019		0.000783				
3/20/2019				<0.0005	<0.0005	
8/6/2019	0.00558					
8/7/2019		0.000572		<0.0005	<0.0005	

Time Series

Constituent: Cobalt (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			0.000681	<0.0005	<0.0005
6/8/2016	<0.0005				
8/15/2016	<0.0005				
8/16/2016			<0.0005	<0.0005	<0.0005
10/10/2016	<0.0005				
10/11/2016			<0.0005	<0.0005	<0.0005
12/12/2016	<0.0005		<0.0005	<0.0005	<0.0005
2/17/2017			<0.0005		
2/21/2017	<0.0005			<0.0005	<0.0005
4/17/2017			<0.0005	<0.0005	<0.0005
4/18/2017	<0.0005				
6/20/2017	<0.0005		<0.0005	<0.0005	
6/21/2017					<0.0005
8/7/2017			<0.0005		
8/8/2017	<0.0005			<0.0005	<0.0005
3/6/2018	<0.0005	0.00142	<0.0005	<0.0005	<0.0005
5/14/2018		0.0012			
6/19/2018	<0.0005	0.00129			
6/21/2018			<0.0005	<0.0005	<0.0005
8/27/2018		0.00149			
8/28/2018	<0.0005		<0.0005		
8/29/2018				<0.0005	<0.0005
3/19/2019		<0.0005	<0.0005	<0.0005	<0.0005
3/20/2019	<0.0005				
8/6/2019		<0.0005			
8/7/2019	<0.0005		<0.0005	<0.0005	<0.0005

Time Series

Constituent: Combined Radium 226 + 228 (pCi/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		0.223 (U)			0.31 (U)	0.405 (U)
6/7/2016	0.375 (U)					
6/8/2016			0.205 (U)	0.145 (U)		
8/15/2016		0.668	0.222 (U)	0.202 (U)	0.251 (U)	0.218 (U)
8/16/2016	0.115 (U)					
10/10/2016	0.35 (U)	0.694	1.14 (o)			
10/11/2016				0.523	0.286 (U)	0.711
12/14/2016	0.336 (U)	0.799	0.262 (U)	0.26 (U)	0.251 (U)	0.633
2/17/2017		0.513	0.35 (U)	0.293 (U)	0.103 (U)	0.286 (U)
2/21/2017	0.221 (U)					
4/17/2017	0.126 (U)	0.47	0.365	0.48	0.0966 (U)	
4/18/2017						0.405
6/19/2017	0.204 (U)	0.204 (U)				
6/20/2017			0.192 (U)			
6/21/2017				0.0131 (U)	0.221 (U)	0.184 (U)
8/7/2017	0.336 (U)	0.831				
8/8/2017			0.523	0.456	0.244 (U)	0.284 (U)
3/5/2018		0.276 (U)				
3/6/2018	0.668		0.785			
3/7/2018				0.258 (U)	0.123 (U)	0.384 (U)
3/18/2019	0.217 (U)					
3/19/2019		0.331 (U)				
3/20/2019				0.0223 (U)	0.391 (U)	

Time Series

Constituent: Combined Radium 226 + 228 (pCi/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

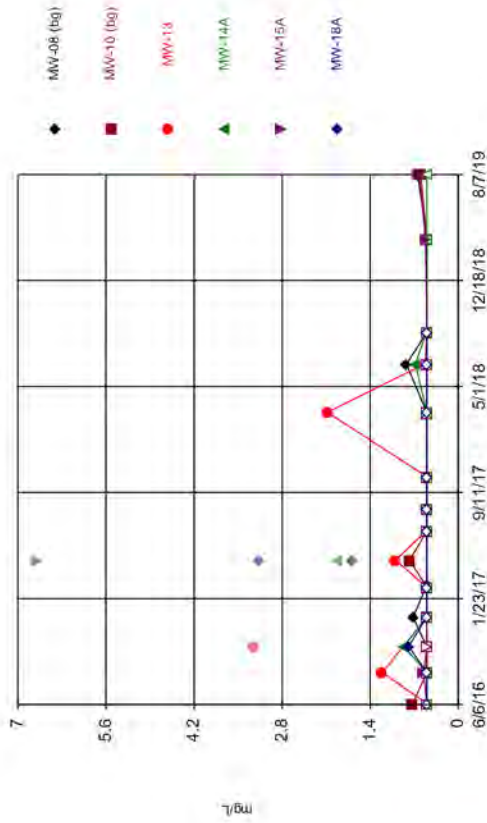
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			0.711 (U)	0.665	0.405
6/8/2016	0.253 (U)				
8/15/2016	0.159 (U)				
8/16/2016			0.938 (U)	0.854	0.876
10/10/2016	0.817				
10/11/2016			0.674	0.428 (U)	0.512
12/12/2016	0.306 (U)		0.672	1.05	0.894
2/17/2017			0.528		
2/21/2017	-0.000573 (U)			0.85	0.314 (U)
4/17/2017			0.309 (U)	1.02	0.298 (U)
4/18/2017	0.0953 (U)				
6/20/2017	0.545		0.368	0.973	
6/21/2017					0.44
8/7/2017			0.443		
8/8/2017	0.814			0.507	0.333 (U)
3/6/2018	0.358	0.257 (U)	0.45	0.959	0.618
6/19/2018		0.412 (U)			
3/19/2019		0.343 (U)	0.436	0.568	0.481
3/20/2019	0.287 (U)				

Soletis™ V10.0.23 UG

Hollow symbols indicate censored values.

Time Series

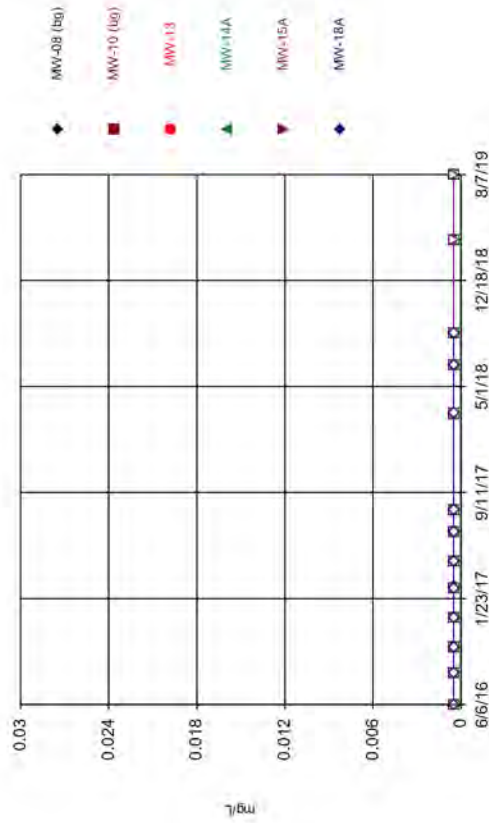


Constituent: Fluoride Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletis™ V10.0.23 UG

Hollow symbols indicate censored values.

Time Series

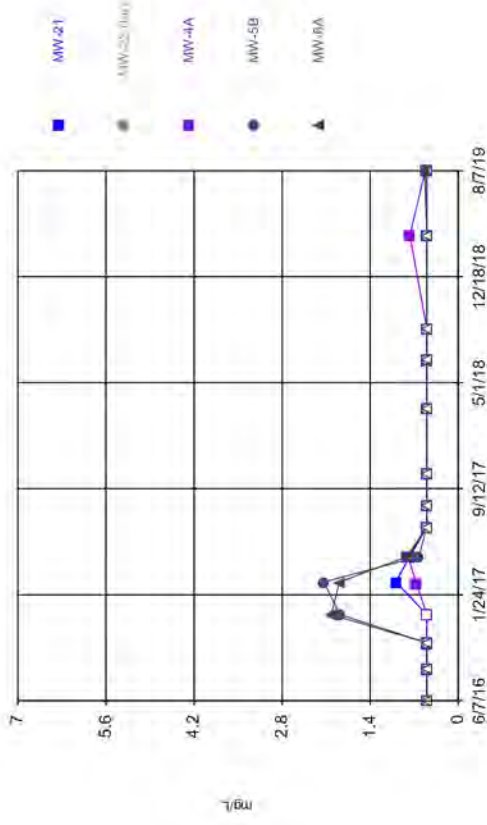


Constituent: Lead Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletis™ V10.0.23 UG

Hollow symbols indicate censored values.

Time Series

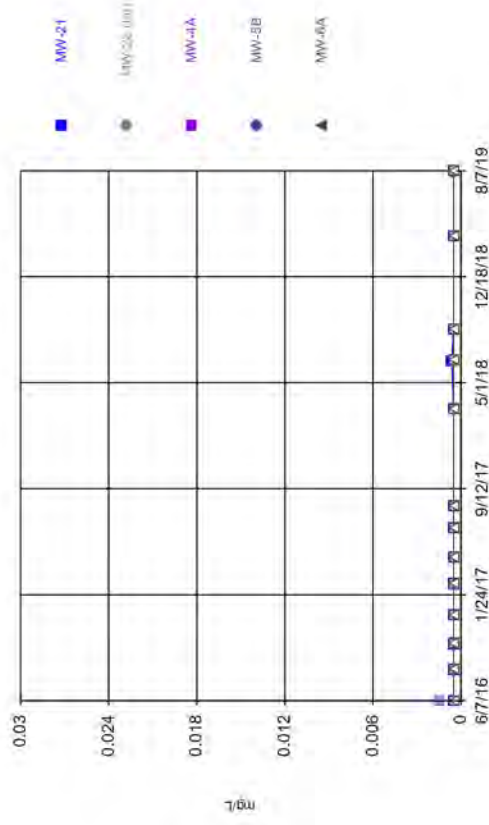


Constituent: Fluoride Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletis™ V10.0.23 UG

Hollow symbols indicate censored values.

Time Series



Constituent: Lead Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Fluoride (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		0.731			<0.5	<0.5
6/7/2016	<0.5					
6/8/2016			<0.5	<0.5		
8/15/2016		<0.5	1.21	<0.5	0.549	<0.5
8/16/2016	<0.5					
10/10/2016	<0.5	<0.5	3.25 (o)			
10/11/2016				0.867	<0.5	0.791
12/14/2016	0.72	<0.5	<0.5	<0.5	<0.5	<0.5 (F2)
2/17/2017		<0.5	<0.5	<0.5	<0.5	<0.5
2/21/2017	<0.5					
4/17/2017	1.69 (Fo)	0.774	0.997	1.93 (o)	6.7 (o)	
4/18/2017						3.16 (o)
6/19/2017	<0.5	<0.5				
6/20/2017			<0.5			
6/21/2017				<0.5	<0.5	<0.5
8/7/2017	<0.5	<0.5				
8/8/2017			<0.5	<0.5	<0.5	<0.5
10/16/2017	<0.5	<0.5	<0.5			
10/17/2017				<0.5	<0.5	<0.5
3/5/2018		<0.5				
3/6/2018	<0.5		2.08			
3/7/2018				<0.5	<0.5	<0.5
6/19/2018	0.826	<0.5				
6/20/2018			0.528	0.684	<0.5	<0.5
8/27/2018	<0.5	<0.5				
8/28/2018			<0.5			
8/29/2018				<0.5	<0.5	<0.5
3/18/2019	<0.5					
3/19/2019		<0.5				
3/20/2019				<0.5	0.523	
8/6/2019	0.643					
8/7/2019		0.596		<0.5	0.625	

Time Series

Constituent: Fluoride (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.5	<0.5	<0.5
6/8/2016	<0.5				
8/15/2016	<0.5				
8/16/2016			<0.5	<0.5	<0.5
10/10/2016	<0.5				
10/11/2016			<0.5	<0.5	<0.5
12/12/2016	<0.5		<0.5	1.88	2.02
2/17/2017			0.664		
2/21/2017	0.993			2.14	1.89
4/17/2017			0.801	0.627	0.814
4/18/2017	0.768				
6/20/2017	<0.5		<0.5	<0.5	
6/21/2017					<0.5
8/7/2017			<0.5		
8/8/2017	<0.5			<0.5	<0.5
10/16/2017	<0.5		<0.5		
10/17/2017				<0.5	<0.5
3/6/2018	<0.5	<0.5	<0.5	<0.5	<0.5
6/19/2018	<0.5	<0.5			
6/21/2018			<0.5	<0.5	<0.5
8/27/2018		<0.5			
8/28/2018	<0.5		<0.5		
8/29/2018				<0.5	<0.5
3/19/2019		<0.5	0.771	<0.5	<0.5
3/20/2019	<0.5				
8/6/2019		0.507			
8/7/2019	<0.5		0.525	<0.5	0.535

Time Series

Constituent: Lead (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.0005			<0.0005	<0.0005
6/7/2016	<0.0005					
6/8/2016			<0.0005	<0.0005		
8/15/2016		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8/16/2016	<0.0005					
10/10/2016	<0.0005	<0.0005	<0.0005			
10/11/2016				<0.0005	<0.0005	<0.0005
12/14/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
2/17/2017		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
2/21/2017	<0.0005					
4/17/2017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
4/18/2017						<0.0005
6/19/2017	<0.0005	<0.0005				
6/20/2017			<0.0005			
6/21/2017				<0.0005	<0.0005	<0.0005
8/7/2017	<0.0005	<0.0005				
8/8/2017			<0.0005	<0.0005	<0.0005	<0.0005
3/5/2018		<0.0005				
3/6/2018	<0.0005		<0.0005			
3/7/2018				<0.0005	<0.0005	<0.0005
6/19/2018	<0.0005	<0.0005				
6/20/2018			<0.0005	<0.0005	<0.0005	<0.0005
8/27/2018	<0.0005	<0.0005				
8/28/2018			<0.0005			
8/29/2018				<0.0005	<0.0005	<0.0005
3/18/2019	<0.0005					
3/19/2019		<0.0005				
3/20/2019				<0.0005	<0.0005	
8/6/2019	<0.0005					
8/7/2019		<0.0005		<0.0005	<0.0005	

Time Series

Constituent: Lead (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

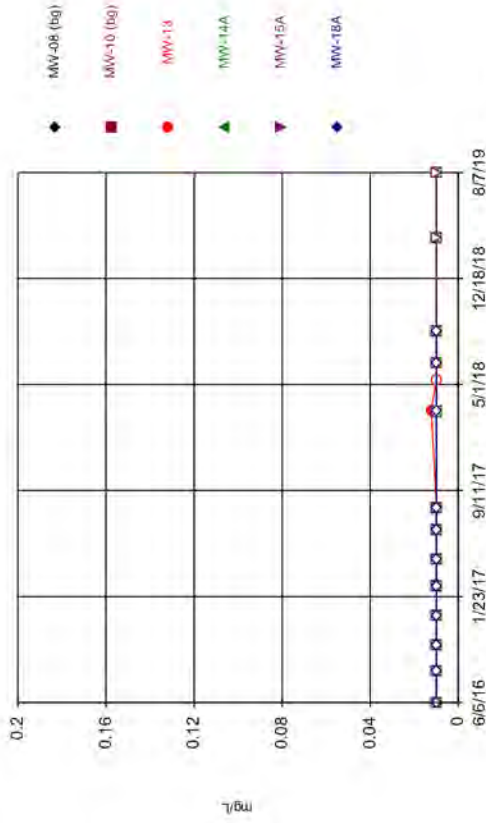
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			0.00147 (o)	<0.0005	<0.0005
6/8/2016	<0.0005				
8/15/2016	<0.0005				
8/16/2016			<0.0005	<0.0005	<0.0005
10/10/2016	<0.0005				
10/11/2016			<0.0005	<0.0005	<0.0005
12/12/2016	<0.0005		<0.0005	<0.0005	<0.0005
2/17/2017			<0.0005		
2/21/2017	<0.0005			<0.0005	<0.0005
4/17/2017			<0.0005	<0.0005	<0.0005
4/18/2017	<0.0005				
6/20/2017	<0.0005		<0.0005	<0.0005	
6/21/2017					<0.0005
8/7/2017			<0.0005		
8/8/2017	<0.0005			<0.0005	<0.0005
3/6/2018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6/19/2018	0.000633	<0.0005			
6/21/2018			<0.0005	<0.0005	<0.0005
8/27/2018		<0.0005			
8/28/2018	<0.0005		<0.0005		
8/29/2018				<0.0005	<0.0005
3/19/2019		<0.0005	<0.0005	<0.0005	<0.0005
3/20/2019	<0.0005				
8/6/2019		<0.0005			
8/7/2019	<0.0005		<0.0005	<0.0005	<0.0005

Soletka™ V10.0.23 (UG)

Hollow symbols indicate censored values.

Time Series

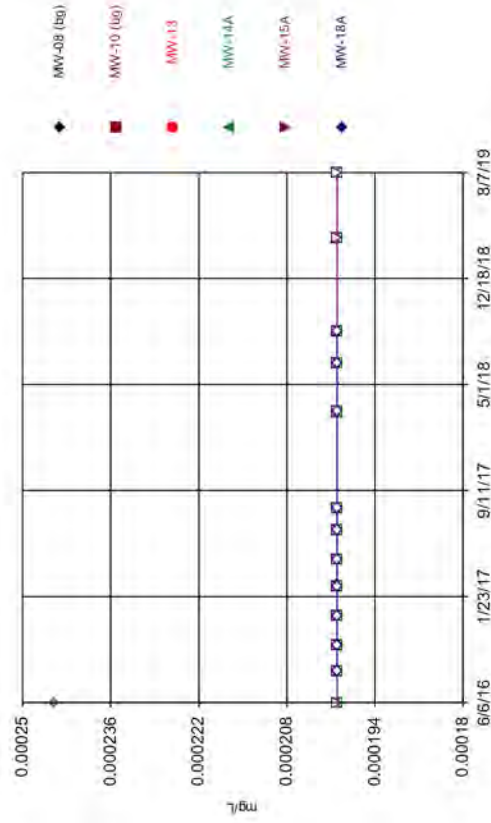


Constituent: Lithium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletka™ V10.0.23 (UG)

Hollow symbols indicate censored values.

Time Series

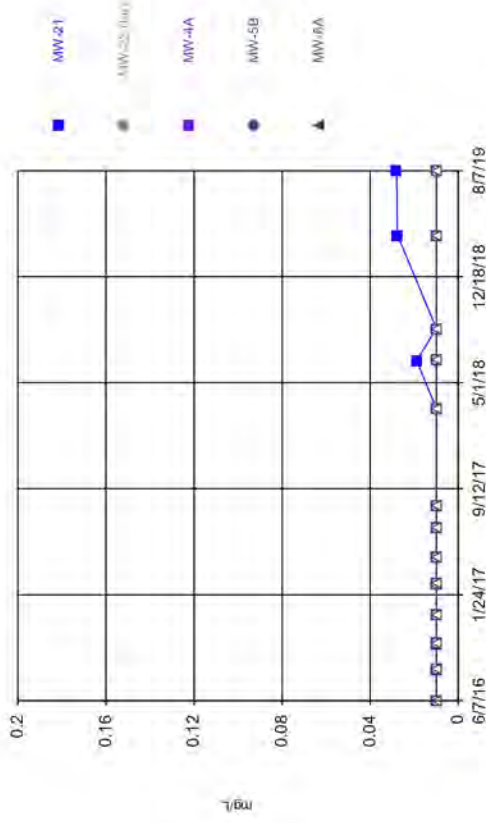


Constituent: Mercury Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletka™ V10.0.23 (UG)

Hollow symbols indicate censored values.

Time Series

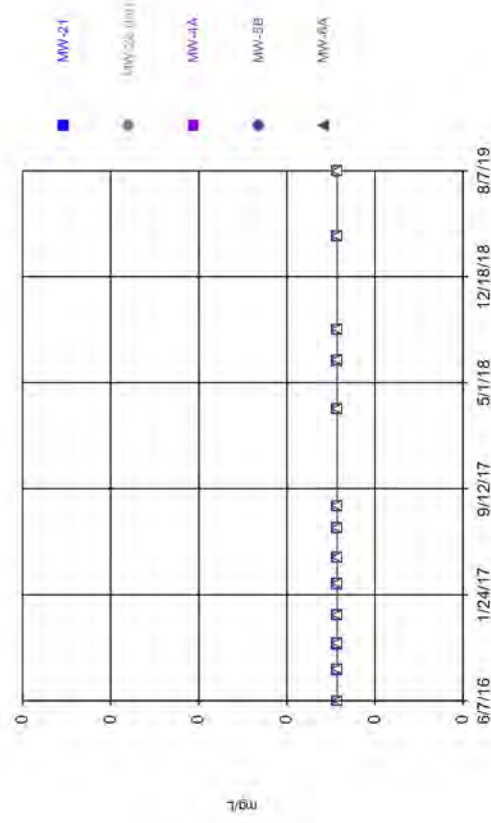


Constituent: Lithium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Soletka™ V10.0.23 (UG)

Hollow symbols indicate censored values.

Time Series



Constituent: Mercury Analysis Run 10/31/2019 2:45 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Lithium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.01			<0.01	<0.01
6/7/2016	<0.01					
6/8/2016			<0.01	<0.01		
8/15/2016		<0.01	<0.01	<0.01	<0.01	<0.01
8/16/2016	<0.01					
10/10/2016	<0.01	<0.01	<0.01			
10/11/2016				<0.01	<0.01	<0.01
12/14/2016	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2/17/2017		<0.01	<0.01	<0.01	<0.01	<0.01
2/21/2017	<0.01					
4/17/2017	<0.01	<0.01	<0.01	<0.01	<0.01	
4/18/2017						<0.01
6/19/2017	<0.01	<0.01				
6/20/2017			<0.01			
6/21/2017				<0.01	<0.01	<0.01
8/7/2017	<0.01	<0.01				
8/8/2017			<0.01	<0.01	<0.01	<0.01
3/5/2018		<0.01				
3/6/2018	<0.01		0.0122			
3/7/2018				<0.01	<0.01	<0.01
5/14/2018			<0.01			
6/19/2018	<0.01	<0.01				
6/20/2018			<0.01	<0.01	<0.01	<0.01
8/27/2018	<0.01	<0.01				
8/28/2018			<0.01			
8/29/2018				<0.01	<0.01	<0.01
3/18/2019	<0.01					
3/19/2019		<0.01				
3/20/2019				<0.01	<0.01	
8/6/2019	<0.01					
8/7/2019		<0.01		<0.01	<0.01	

Time Series

Constituent: Lithium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.01	<0.01	<0.01
6/8/2016	<0.01				
8/15/2016	<0.01				
8/16/2016			<0.01	<0.01	<0.01
10/10/2016	<0.01				
10/11/2016			<0.01	<0.01	<0.01
12/12/2016	<0.01		<0.01	<0.01	<0.01
2/17/2017			<0.01		
2/21/2017	<0.01			<0.01	<0.01
4/17/2017			<0.01	<0.01	<0.01
4/18/2017	<0.01				
6/20/2017	<0.01		<0.01	<0.01	
6/21/2017					<0.01
8/7/2017			<0.01		
8/8/2017	<0.01			<0.01	<0.01
3/6/2018	<0.01	<0.01	<0.01	<0.01	<0.01
6/19/2018	0.0189	<0.01			
6/21/2018			<0.01	<0.01	<0.01
8/27/2018		<0.01			
8/28/2018	<0.01		<0.01		
8/29/2018				<0.01	<0.01
3/19/2019		<0.01	<0.01	<0.01	<0.01
3/20/2019	0.0277				
8/6/2019		<0.01			
8/7/2019	0.0279		<0.01	<0.01	<0.01

Time Series

Constituent: Mercury (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

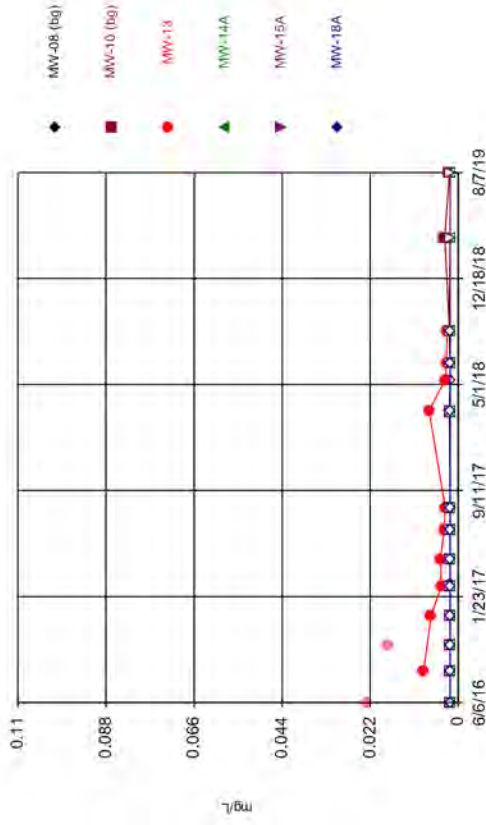
	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.0002			<0.0002	0.000245 (o)
6/7/2016	<0.0002					
6/8/2016			<0.0002	<0.0002		
8/15/2016		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
8/16/2016	<0.0002					
10/10/2016	<0.0002	<0.0002	<0.0002			
10/11/2016				<0.0002	<0.0002	<0.0002
12/14/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
2/17/2017		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
2/21/2017	<0.0002					
4/17/2017	<0.0002	<0.0002 (F1)	<0.0002	<0.0002	<0.0002	
4/18/2017						<0.0002
6/19/2017	<0.0002	<0.0002				
6/20/2017			<0.0002			
6/21/2017				<0.0002	<0.0002	<0.0002
8/7/2017	<0.0002	<0.0002				
8/8/2017			<0.0002	<0.0002	<0.0002	<0.0002
3/5/2018		<0.0002				
3/6/2018	<0.0002		<0.0002			
3/7/2018				<0.0002	<0.0002	<0.0002
6/19/2018	<0.0002	<0.0002				
6/20/2018			<0.0002	<0.0002	<0.0002	<0.0002
8/27/2018	<0.0002	<0.0002				
8/28/2018			<0.0002			
8/29/2018				<0.0002	<0.0002	<0.0002
3/18/2019	<0.0002					
3/19/2019		<0.0002				
3/20/2019				<0.0002	<0.0002	
8/6/2019	<0.0002					
8/7/2019		<0.0002		<0.0002	<0.0002	

Time Series

Constituent: Mercury (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

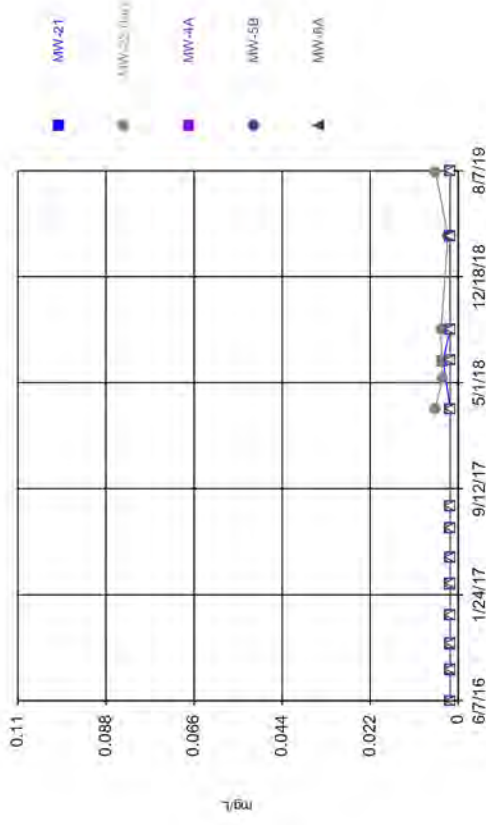
	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.0002	<0.0002	<0.0002
6/8/2016	<0.0002				
8/15/2016	<0.0002				
8/16/2016			<0.0002	<0.0002	<0.0002
10/10/2016	<0.0002				
10/11/2016			<0.0002	<0.0002	<0.0002
12/12/2016	<0.0002		<0.0002	<0.0002	<0.0002
2/17/2017			<0.0002		
2/21/2017	<0.0002			<0.0002	<0.0002
4/17/2017			<0.0002	<0.0002	<0.0002
4/18/2017	<0.0002				
6/20/2017	<0.0002		<0.0002	<0.0002	
6/21/2017					<0.0002
8/7/2017			<0.0002		
8/8/2017	<0.0002			<0.0002	<0.0002
3/6/2018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
6/19/2018	<0.0002	<0.0002			
6/21/2018			<0.0002	<0.0002	<0.0002
8/27/2018		<0.0002			
8/28/2018	<0.0002		<0.0002		
8/29/2018				<0.0002	<0.0002
3/19/2019		<0.0002	<0.0002	<0.0002	<0.0002
3/20/2019	<0.0002				
8/6/2019		<0.0002			
8/7/2019	<0.0002		<0.0002	<0.0002	<0.0002

Time Series



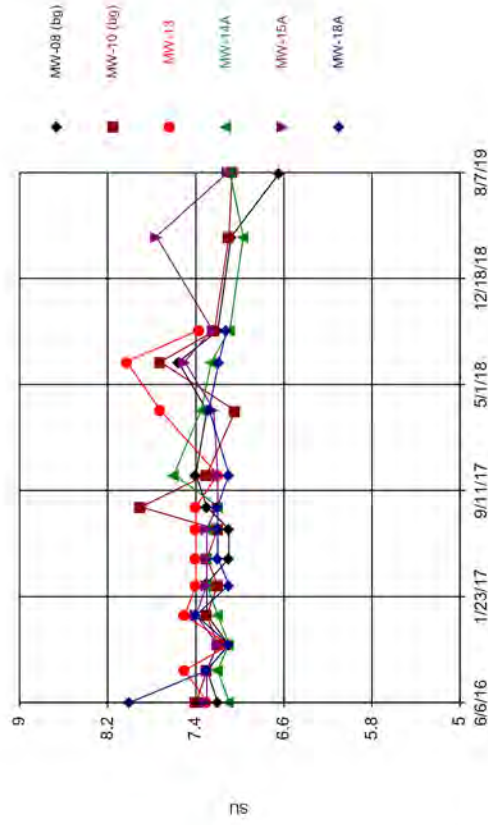
Constituent: Molybdenum Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



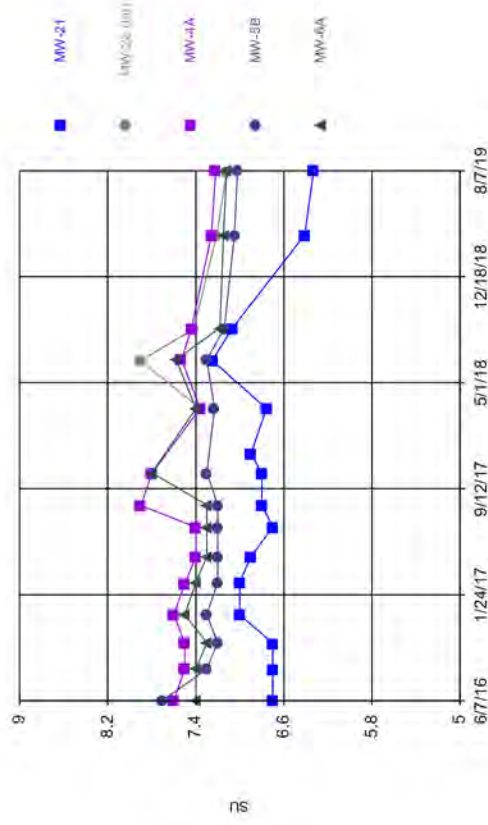
Constituent: Molybdenum Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: pH Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: pH Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Molybdenum (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.002			<0.002	<0.002
6/7/2016	<0.002					
6/8/2016			0.0227 (o)	<0.002		
8/15/2016		<0.002	0.00867	<0.002	<0.002	<0.002
8/16/2016	<0.002					
10/10/2016	<0.002	<0.002	0.0176 (o)			
10/11/2016				<0.002	<0.002	<0.002
12/14/2016	<0.002	<0.002	0.00676	<0.002	<0.002	<0.002
2/17/2017		<0.002	0.00416	<0.002	<0.002	<0.002
2/21/2017	<0.002					
4/17/2017	<0.002	<0.002	0.00443	<0.002	<0.002	
4/18/2017						<0.002
6/19/2017	<0.002	<0.002				
6/20/2017			0.00346			
6/21/2017				<0.002	<0.002	<0.002
8/7/2017	<0.002	<0.002				
8/8/2017			0.00329	<0.002	<0.002	<0.002
3/5/2018		<0.002				
3/6/2018	0.0022		0.00732			
3/7/2018				<0.002	<0.002	<0.002
5/14/2018	<0.002		0.00308			
6/19/2018	<0.002	<0.002				
6/20/2018			0.00296	<0.002	<0.002	<0.002
8/27/2018	0.00224	0.0022				
8/28/2018			0.00278			
8/29/2018				<0.002	<0.002	<0.002
3/18/2019	<0.002					
3/19/2019		0.00341				
3/20/2019				<0.002	<0.002	
8/6/2019	<0.002					
8/7/2019		0.00219		<0.002	<0.002	

Time Series

Constituent: Molybdenum (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.002	<0.002	<0.002
6/8/2016	<0.002				
8/15/2016	<0.002				
8/16/2016			<0.002	<0.002	<0.002
10/10/2016	<0.002				
10/11/2016			<0.002	<0.002	<0.002
12/12/2016	<0.002		<0.002	<0.002	<0.002
2/17/2017			<0.002		
2/21/2017	<0.002			<0.002	<0.002
4/17/2017			<0.002	<0.002	<0.002
4/18/2017	<0.002				
6/20/2017	<0.002		<0.002	<0.002	
6/21/2017					<0.002
8/7/2017			<0.002		
8/8/2017	<0.002			<0.002	<0.002
3/6/2018	<0.002	0.00568	<0.002	<0.002	<0.002
5/14/2018		0.00385			
6/19/2018	0.00383	0.00423			
6/21/2018			<0.002	<0.002	<0.002
8/27/2018		0.00424			
8/28/2018	<0.002		<0.002		
8/29/2018				<0.002	<0.002
3/19/2019		0.00263	<0.002	0.00212	<0.002
3/20/2019	<0.002				
8/6/2019		0.00574			
8/7/2019	<0.002		<0.002	<0.002	<0.002

Time Series

Constituent: pH (SU) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

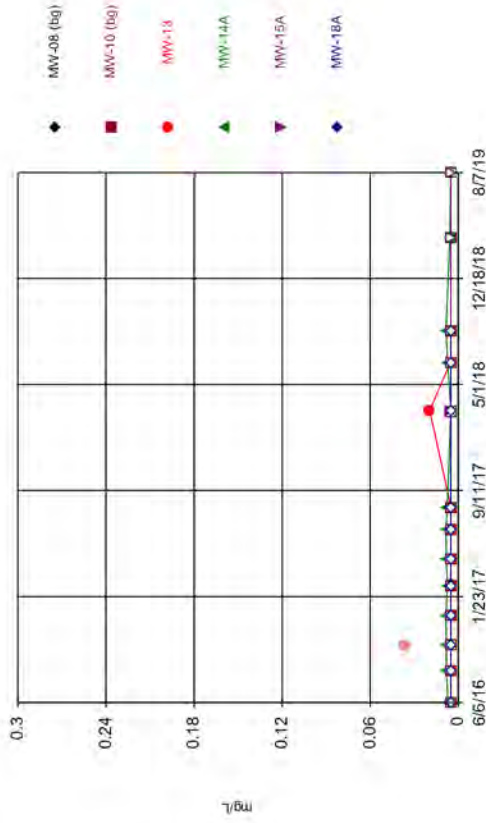
	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		7.4			7.3	8
6/7/2016	7.2					
6/8/2016			7.3	7.1		
8/15/2016		7.3	7.5	7.2	7.3	7.3
8/16/2016	7.3					
10/10/2016	7.1	7.2	7.1			
10/11/2016				7.1	7.2	7.1
12/14/2016	7.3	7.3	7.5	7.2	7.4	7.4
2/17/2017		7.2	7.4	7.3	7.3	7.1
2/21/2017	7.3					
4/17/2017	7.1	7.3	7.4	7.3	7.3	
4/18/2017						7.2
6/19/2017	7.1	7.2				
6/20/2017			7.4			
6/21/2017				7.3	7.3	7.2
8/7/2017	7.3	7.9				
8/8/2017			7.4	7.2	7.2	7.2
10/16/2017	7.4	7.3	7.2			
10/17/2017				7.6	7.2	7.1
3/5/2018		7.04				
3/6/2018	7.3		7.72			
3/7/2018				7.35	7.24	7.28
6/19/2018	7.56	7.72				
6/20/2018			8.03	7.26	7.5	7.19
8/27/2018	7.2	7.23				
8/28/2018			7.37			
8/29/2018				7.09	7.25	7.12
3/19/2019	7.08	7.1				
3/20/2019				6.97	7.76	
8/6/2019	6.64					
8/7/2019		7.07		7.09	7.11	

Time Series

Constituent: pH (SU) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

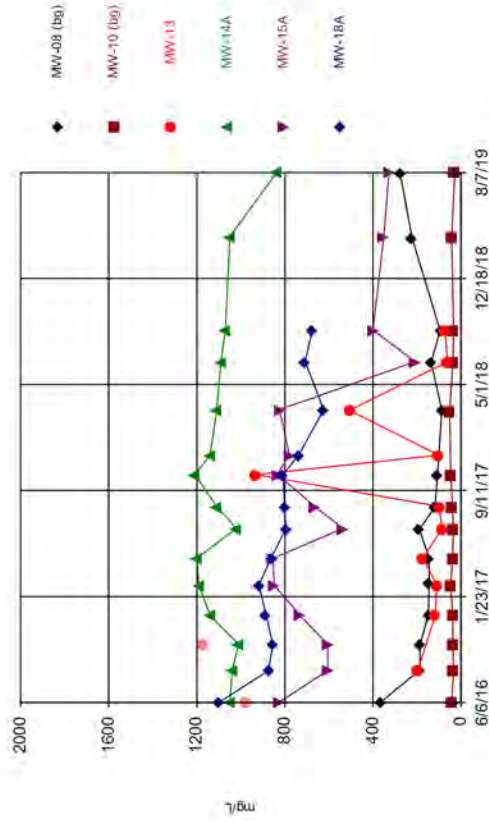
	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			7.6	7.7	7.4
6/8/2016	6.7				
8/15/2016	6.7				
8/16/2016			7.5	7.3	7.4
10/10/2016	6.7				
10/11/2016			7.5	7.2	7.3
12/12/2016	7		7.6	7.3	7.5
2/17/2017			7.5		
2/21/2017	7			7.2	7.4
4/17/2017			7.4	7.2	7.3
4/18/2017	6.9				
6/20/2017	6.7		7.4	7.2	
6/21/2017					7.3
8/7/2017			7.9		
8/8/2017	6.8			7.2	7.3
10/16/2017	6.8		7.8		
10/17/2017				7.3	7.8
11/28/2017	6.9 (R)				
3/6/2018	6.76	7.36	7.36	7.23	7.4
6/19/2018	7.25	7.9			
6/21/2018			7.53	7.3	7.58
8/27/2018		7.42			
8/28/2018	7.07		7.44		
8/29/2018				7.14	7.18
3/19/2019		7.21	7.26	7.05	7.15
3/20/2019	6.41				
8/6/2019		7.12			
8/7/2019	6.33		7.22	7.02	7.12

Time Series



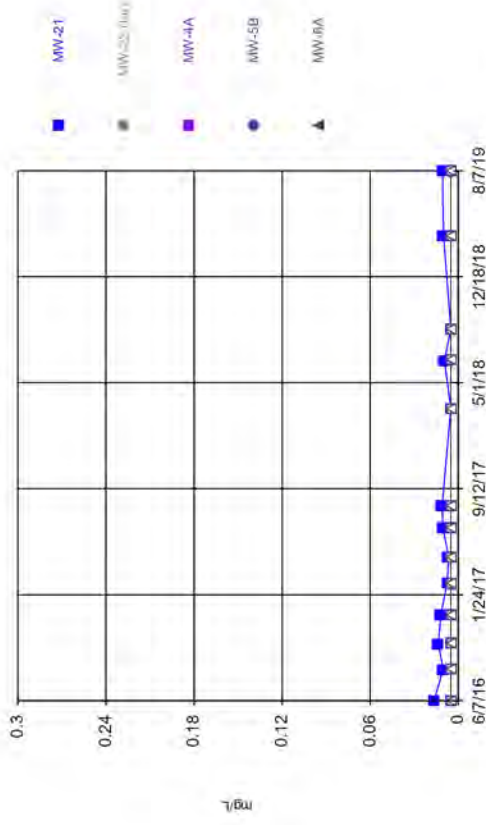
Constituent: Selenium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



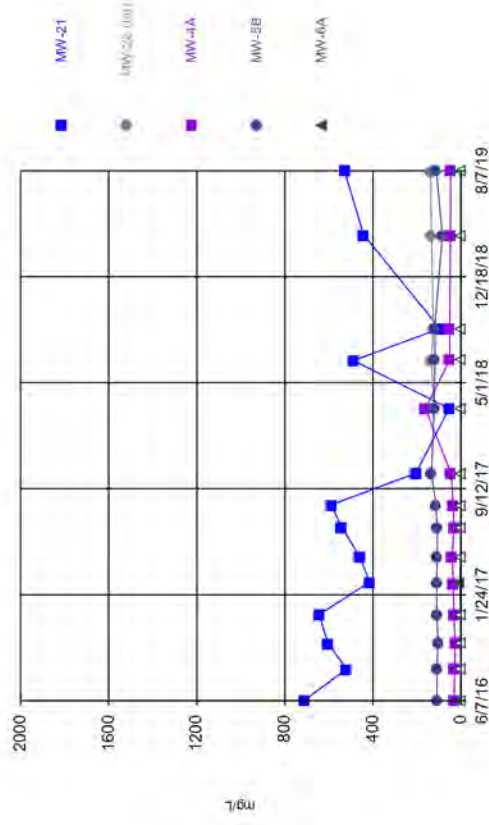
Constituent: Sulfate Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: Selenium Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series



Constituent: Sulfate Analysis Run 10/31/2019 2:45 PM View: Distributional Tests Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Time Series

Constituent: Selenium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.005			<0.005	<0.005
6/7/2016	<0.005					
6/8/2016			<0.005	0.0071		
8/15/2016		<0.005	<0.005	0.00811	<0.005	<0.005
8/16/2016	<0.005					
10/10/2016	<0.005	<0.005	0.0364 (o)			
10/11/2016				0.00821	<0.005	<0.005
12/14/2016	<0.005	<0.005	<0.005	0.00834	<0.005	<0.005
2/17/2017		<0.005	<0.005	0.00752	<0.005	<0.005
2/21/2017	<0.005					
4/17/2017	<0.005	<0.005	<0.005	0.00823	<0.005	
4/18/2017						<0.005
6/19/2017	<0.005	<0.005				
6/20/2017			<0.005			
6/21/2017				0.00829	<0.005	<0.005
8/7/2017	<0.005	<0.005				
8/8/2017			<0.005	0.00759	<0.005	<0.005
3/5/2018		<0.005				
3/6/2018	<0.005		0.0195			
3/7/2018				<0.005	0.00502	<0.005
6/19/2018	<0.005	<0.005				
6/20/2018			<0.005	0.00739	<0.005	<0.005
8/27/2018	<0.005	<0.005				
8/28/2018			<0.005			
8/29/2018				0.00827	<0.005	<0.005
3/18/2019	<0.005					
3/19/2019		<0.005				
3/20/2019				0.00569	<0.005	
8/6/2019	<0.005					
8/7/2019		<0.005		<0.005	<0.005	

Time Series

Constituent: Selenium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.005	<0.005	<0.005
6/8/2016	0.0165				
8/15/2016	0.0103				
8/16/2016			<0.005	<0.005	<0.005
10/10/2016	0.0137				
10/11/2016			<0.005	<0.005	<0.005
12/12/2016	0.0119		<0.005	<0.005	<0.005
2/17/2017			<0.005		
2/21/2017	0.0074			<0.005	<0.005
4/17/2017			<0.005	<0.005	<0.005
4/18/2017	0.00674				
6/20/2017	0.0106		<0.005	<0.005	
6/21/2017					<0.005
8/7/2017			<0.005		
8/8/2017	0.0109			<0.005	<0.005
3/6/2018	<0.005	<0.005	<0.005	<0.005	<0.005
6/19/2018	0.00939	<0.005			
6/21/2018			<0.005	<0.005	<0.005
8/27/2018		<0.005			
8/28/2018	<0.005		<0.005		
8/29/2018				<0.005	<0.005
3/19/2019		<0.005	<0.005	<0.005	<0.005
3/20/2019	0.0102				
8/6/2019		<0.005			
8/7/2019	0.0108		<0.005	<0.005	<0.005

Time Series

Constituent: Sulfate (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		42.1			827	1100
6/7/2016	366					
6/8/2016			975 (o)	1050		
8/15/2016		33.8	197	1040	605	874
8/16/2016	187					
10/10/2016	187	36.4	1170 (o)			
10/11/2016				1010	607	855
12/14/2016	149	38.4	117	1140	732	886
2/17/2017		47.3	110	1190	849	917
2/21/2017	145					
4/17/2017	145	38.3	174	1200	853	
4/18/2017						863
6/19/2017	190	35.4				
6/20/2017			86.7			
6/21/2017				1020	537	796
8/7/2017	119	39				
8/8/2017			99.4	1110	664	801
10/16/2017	106	46.9	931			
10/17/2017				1210	835	808
11/28/2017			102 (R)	1140 (R)	779 (R)	737 (R)
3/5/2018		51.4				
3/6/2018	87.3		506			
3/7/2018				1110	824	624
6/19/2018	136	37.3				
6/20/2018			62.1	1090	210	709
8/27/2018	94.7	34.3				
8/28/2018			72.7			
8/29/2018				1070	400	675
3/18/2019	223					
3/19/2019		42.8				
3/20/2019				1050	351	
8/6/2019	276					
8/7/2019		28.8		837	327	

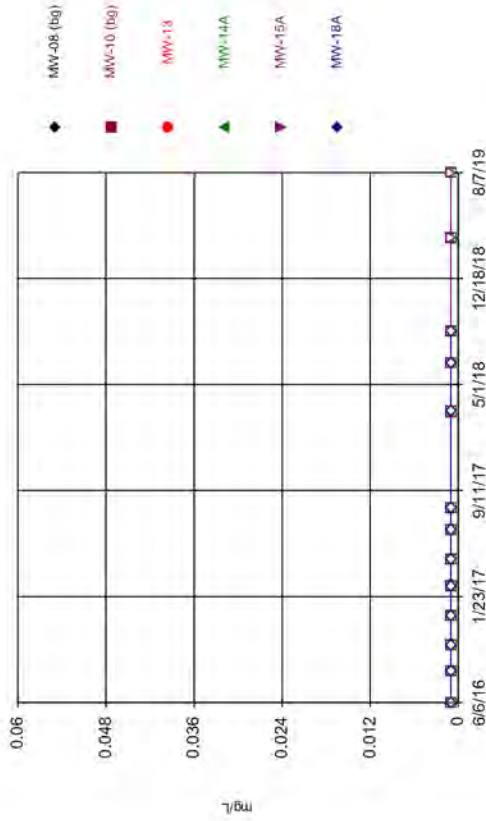
Time Series

Constituent: Sulfate (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

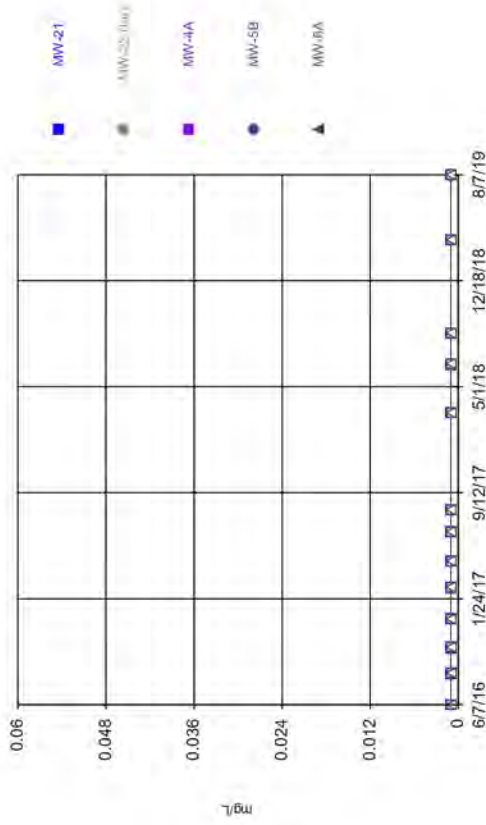
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			32.2	109	<5
6/8/2016	713				
8/15/2016	520				
8/16/2016			28.4	109	<5
10/10/2016	603				
10/11/2016			27.2	105	<5
12/12/2016	645		32.7	109	<5
2/17/2017			36		
2/21/2017	415			111	5.94
4/17/2017			39.5	108	<5
4/18/2017	461				
6/20/2017	541		33	108	
6/21/2017					<5
8/7/2017			35.3		
8/8/2017	590			114	<5
10/16/2017	206		45.4		
10/17/2017				135	<5
3/6/2018	53.7	123	162	122	<5
6/19/2018	489	134			
6/21/2018			51.3	119	<5
8/27/2018		125			
8/28/2018	96.6		52.2		
8/29/2018				120	<5
3/19/2019		134	48	85	<5
3/20/2019	442				
8/6/2019		139			
8/7/2019	529		47	112	<5

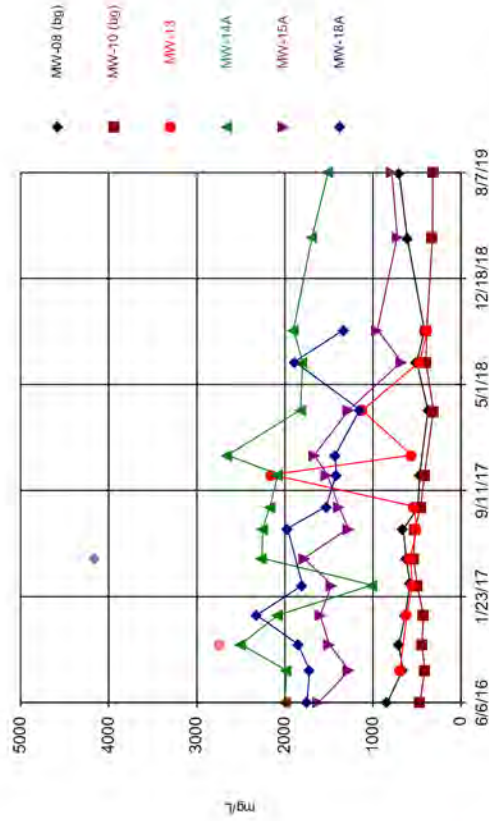
Time Series



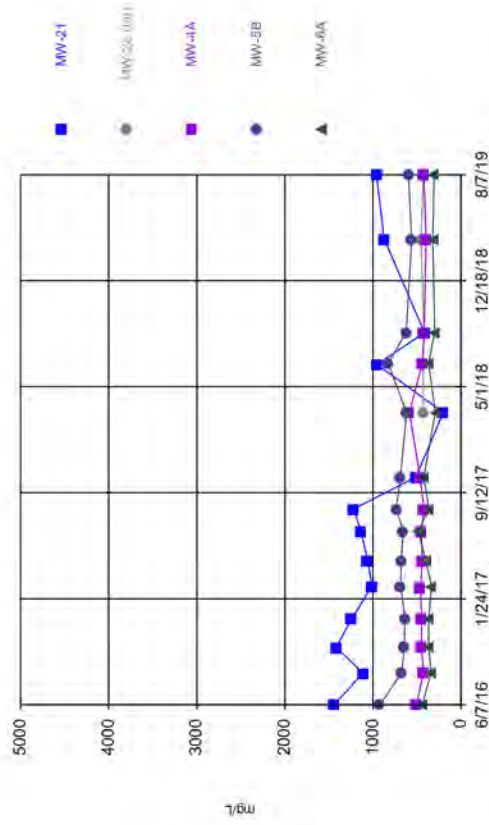
Time Series



Time Series



Time Series



Time Series

Constituent: Thallium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		<0.001			<0.001	<0.001
6/7/2016	<0.001					
6/8/2016			<0.001	<0.001		
8/15/2016		<0.001	<0.001	<0.001	<0.001	<0.001
8/16/2016	<0.001					
10/10/2016	<0.001	<0.001	<0.001			
10/11/2016				<0.001	<0.001	<0.001
12/14/2016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2/17/2017		<0.001	<0.001	<0.001	<0.001	<0.001
2/21/2017	<0.001					
4/17/2017	<0.001	<0.001	<0.001	<0.001	<0.001	
4/18/2017						<0.001
6/19/2017	<0.001	<0.001				
6/20/2017			<0.001			
6/21/2017				<0.001	<0.001	<0.001
8/7/2017	<0.001	<0.001				
8/8/2017			<0.001	<0.001	<0.001	<0.001
3/5/2018		<0.001				
3/6/2018	<0.001		<0.001			
3/7/2018				<0.001	<0.001	<0.001
6/19/2018	<0.001	<0.001				
6/20/2018			<0.001	<0.001	<0.001	<0.001
8/27/2018	<0.001	<0.001				
8/28/2018			<0.001			
8/29/2018				<0.001	<0.001	<0.001
3/18/2019	<0.001					
3/19/2019		<0.001				
3/20/2019				<0.001	<0.001	
8/6/2019	<0.001					
8/7/2019		<0.001		<0.001	<0.001	

Time Series

Constituent: Thallium (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			<0.001	<0.001	<0.001
6/8/2016	<0.001				
8/15/2016	<0.001				
8/16/2016			<0.001	<0.001	<0.001
10/10/2016	<0.001				
10/11/2016			<0.001	<0.001	<0.001
12/12/2016	<0.001		<0.001	<0.001	<0.001
2/17/2017			<0.001		
2/21/2017	<0.001			<0.001	<0.001
4/17/2017			<0.001	<0.001	<0.001
4/18/2017	<0.001				
6/20/2017	<0.001		<0.001	<0.001	
6/21/2017					<0.001
8/7/2017			<0.001		
8/8/2017	<0.001			<0.001	<0.001
3/6/2018	<0.001	<0.001	<0.001	<0.001	<0.001
6/19/2018	<0.001	<0.001			
6/21/2018			<0.001	<0.001	<0.001
8/27/2018		<0.001			
8/28/2018	<0.001		<0.001		
8/29/2018				<0.001	<0.001
3/19/2019		<0.001	<0.001	<0.001	<0.001
3/20/2019	<0.001				
8/6/2019		<0.001			
8/7/2019	<0.001		<0.001	<0.001	<0.001

Time Series

Constituent: Total Dissolved Solids (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

	MW-08 (bg)	MW-10 (bg)	MW-13	MW-14A	MW-15A	MW-18A
6/6/2016		468			1620	1750
6/7/2016	836					
6/8/2016			1970 (o)	2000		
8/15/2016		412	694	1980	1270	1720
8/16/2016	664					
10/10/2016	708	444	2740 (o)			
10/11/2016				2500	1500	1850
12/14/2016	634	428	616	2080	1600	2320
2/17/2017		498	554	1010	1470	1800
2/21/2017	578					
4/17/2017	624	538	574	2260	1780	
4/18/2017						4160 (o)
6/19/2017	656	524				
6/20/2017			502			
6/21/2017				2250	1280	1970
8/7/2017	488	458				
8/8/2017			536	2170	1390	1530
10/16/2017	470	414	2150			
10/17/2017				2080	1520	1420
11/28/2017			562 (R)	2650 (R)	1670 (R)	1430 (R)
3/5/2018		314				
3/6/2018	376		1120			
3/7/2018				1820	1270	1150
6/19/2018	502	396				
6/20/2018			472	1800	676	1890
8/27/2018	414	392				
8/28/2018			384			
8/29/2018				1900	948	1330
3/18/2019	612					
3/19/2019		326				
3/20/2019				1690	724	
8/6/2019	702					
8/7/2019		320		1510	786	

Time Series

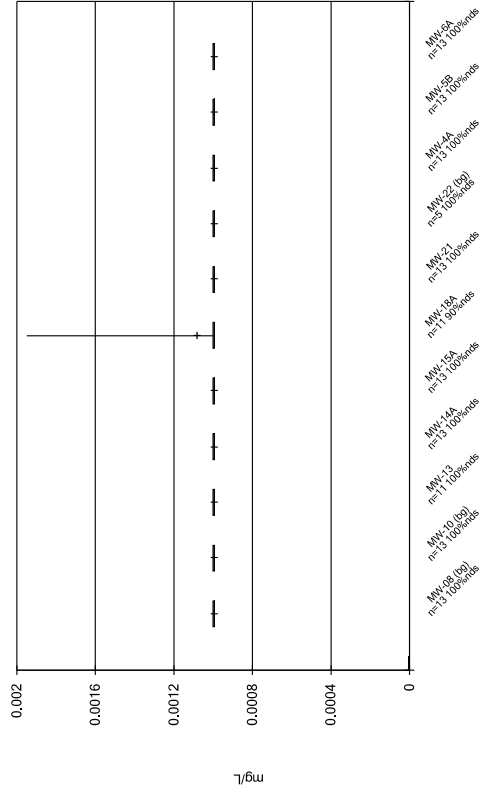
Constituent: Total Dissolved Solids (mg/L) Analysis Run 10/31/2019 2:46 PM View: Distributional Tests

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

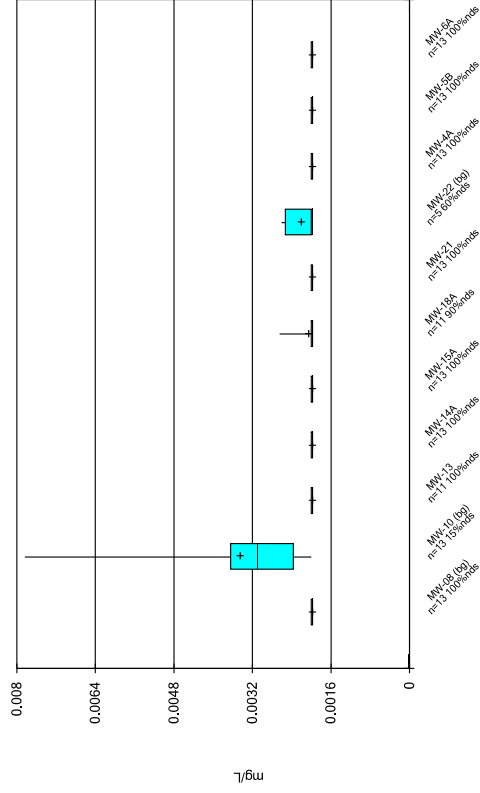
	MW-21	MW-22 (bg)	MW-4A	MW-5B	MW-6A
6/7/2016			507	920	440
6/8/2016	1440				
8/15/2016	1110				
8/16/2016			426	672	340
10/10/2016	1420				
10/11/2016			450	646	370
12/12/2016	1240		450	636	368
2/17/2017			460		
2/21/2017	1010			684	336
4/17/2017			442	680	402
4/18/2017	1060				
6/20/2017	1140		452	656	
6/21/2017					486
8/7/2017			420		
8/8/2017	1220			734	364
10/16/2017	514		466		
10/17/2017				688	424
3/6/2018	200	424	586	620	292
6/19/2018	952	434			
6/21/2018			440	828	368
8/27/2018		420			
8/28/2018	416		420		
8/29/2018				622	298
3/19/2019		456	398	562	320
3/20/2019	872				
8/6/2019		428			
8/7/2019	960		422	596	308

Box Plots

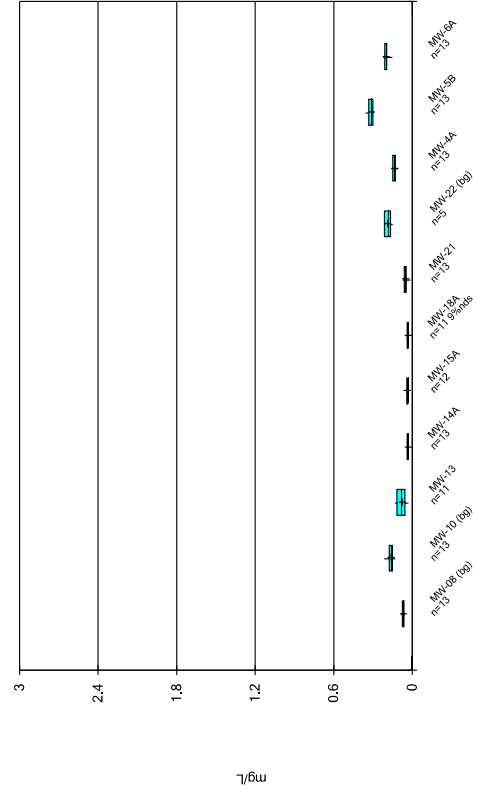
Box & Whiskers Plot



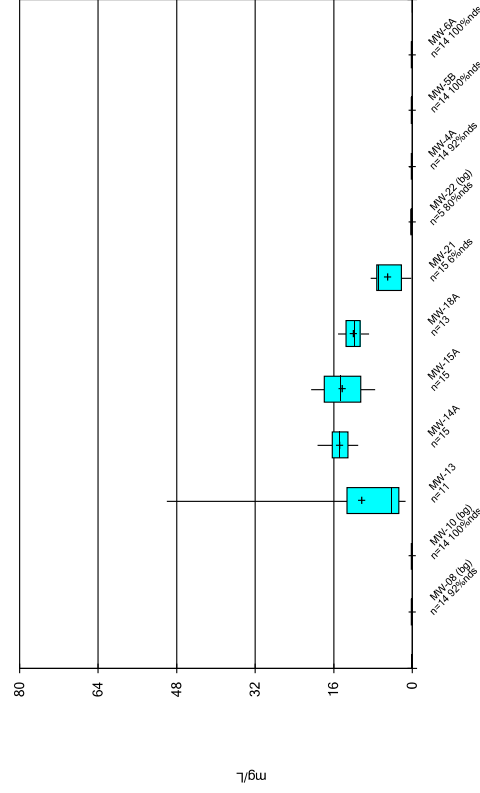
Box & Whiskers Plot



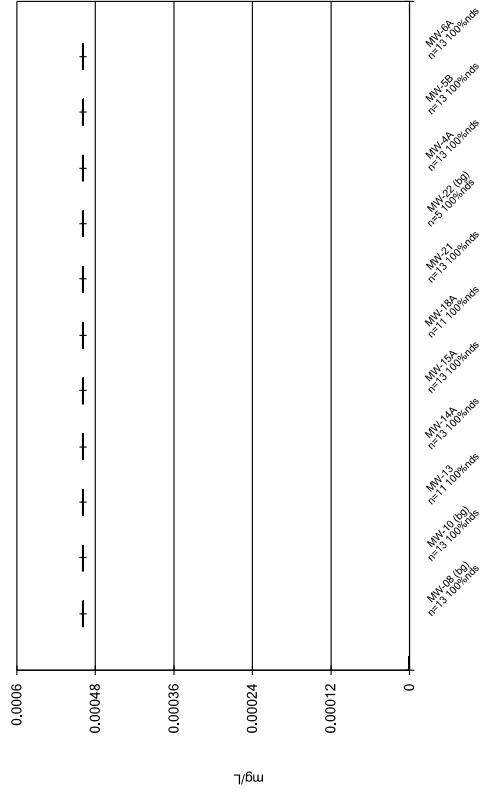
Box & Whiskers Plot



Box & Whiskers Plot

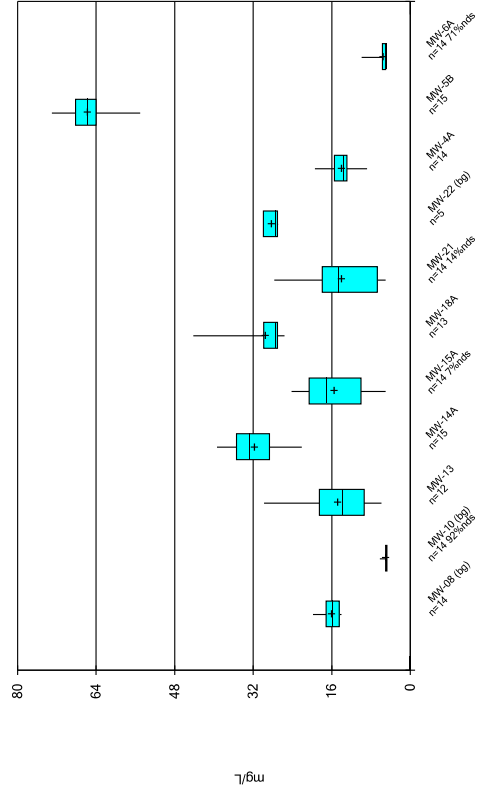


Box & Whiskers Plot



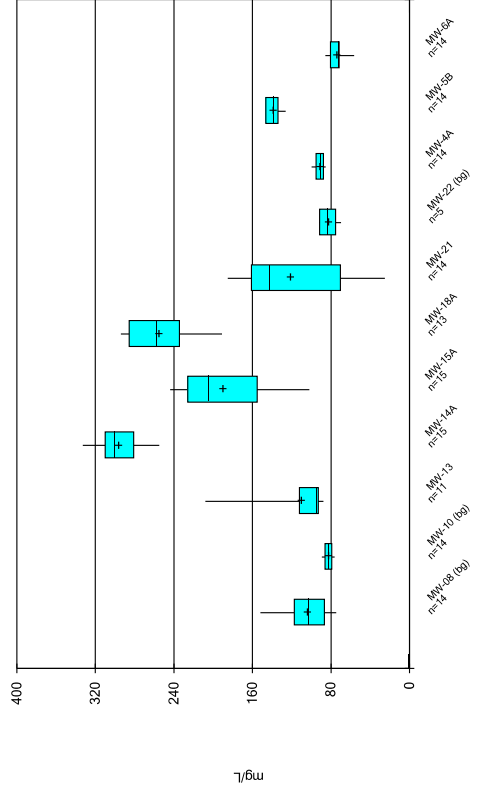
Constituent: Cadmium Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



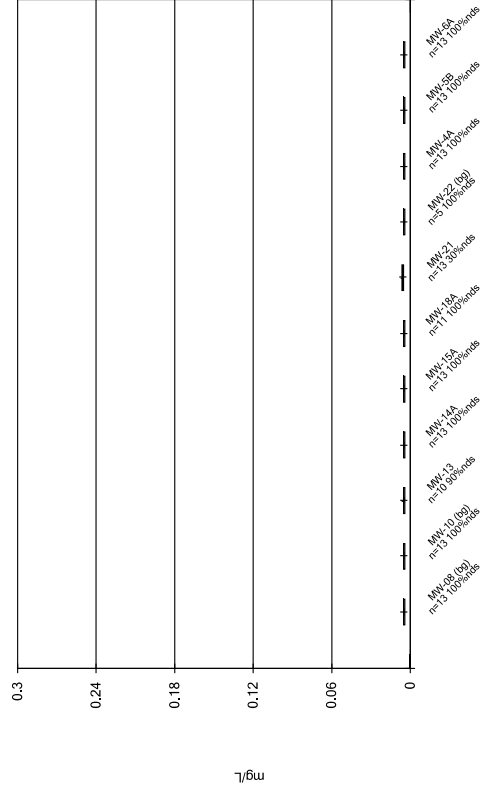
Constituent: Chloride Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



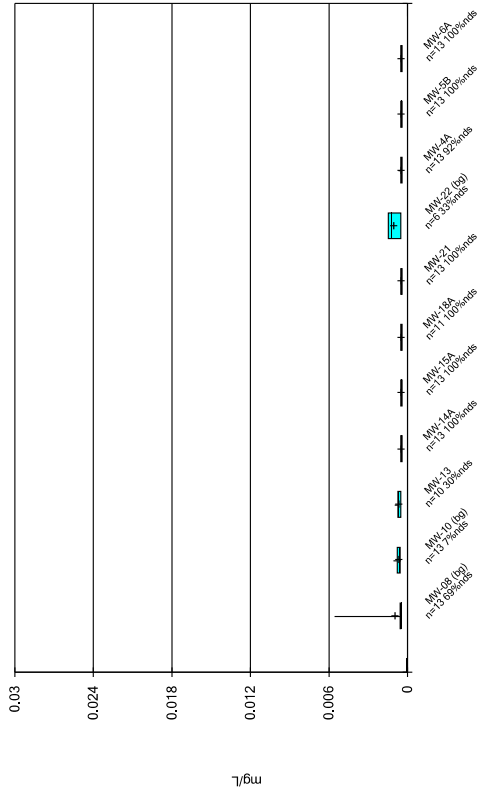
Constituent: Calcium Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot

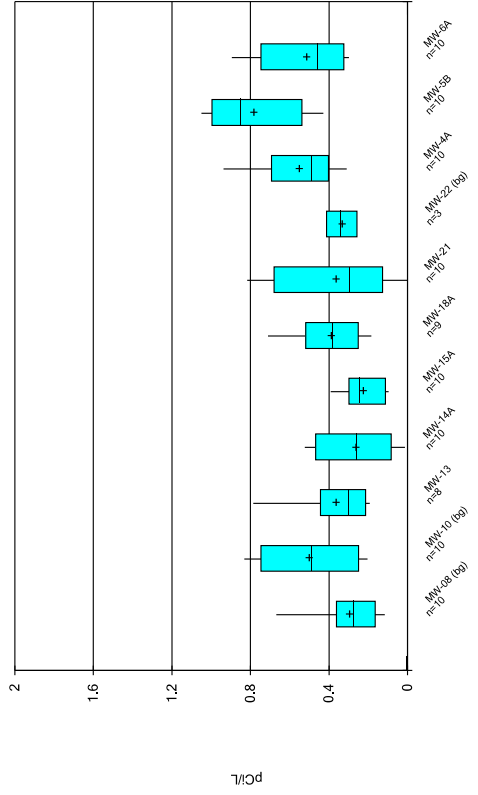


Constituent: Chromium Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

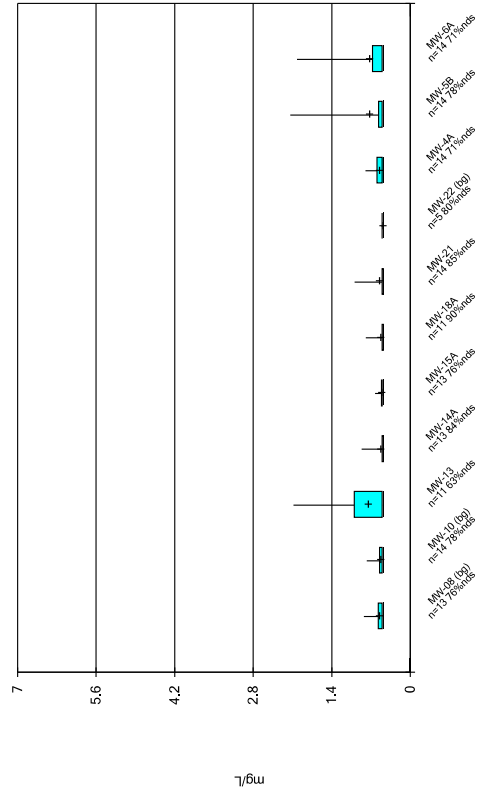
Box & Whiskers Plot



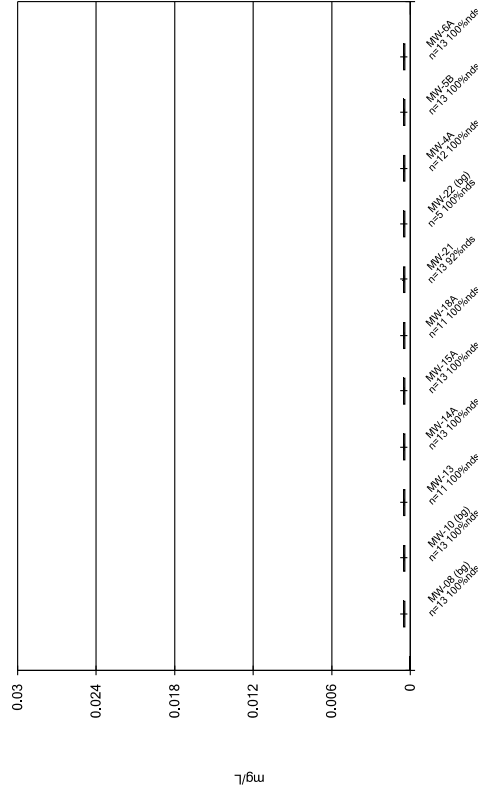
Box & Whiskers Plot



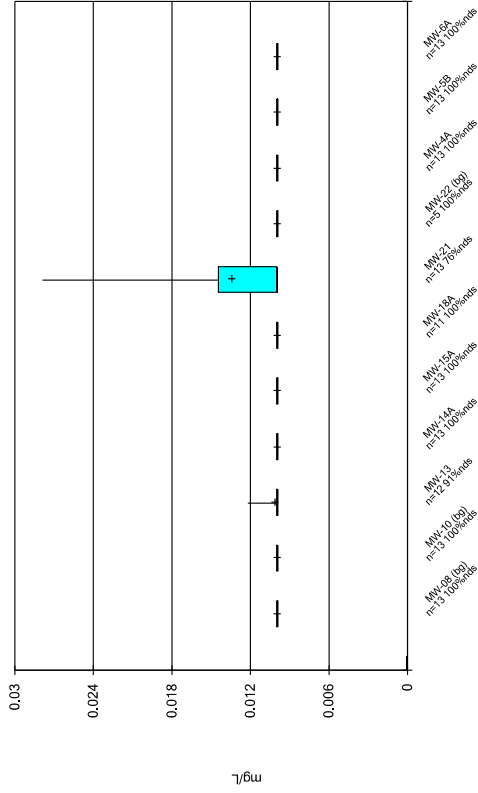
Box & Whiskers Plot



Box & Whiskers Plot

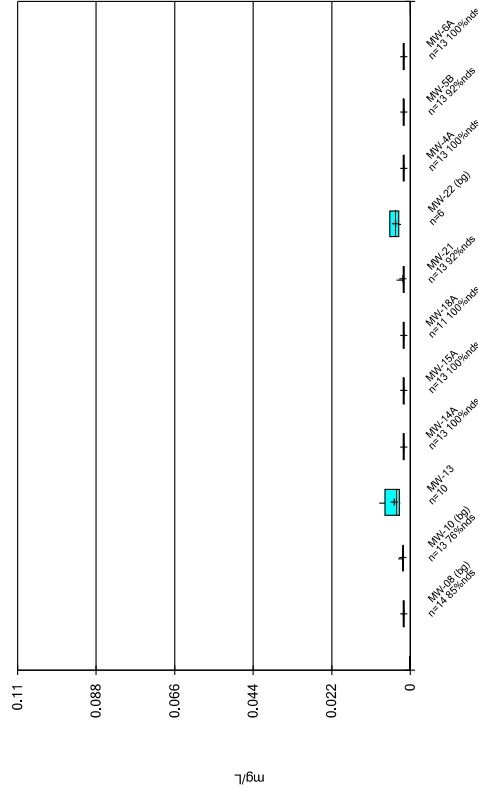


Box & Whiskers Plot



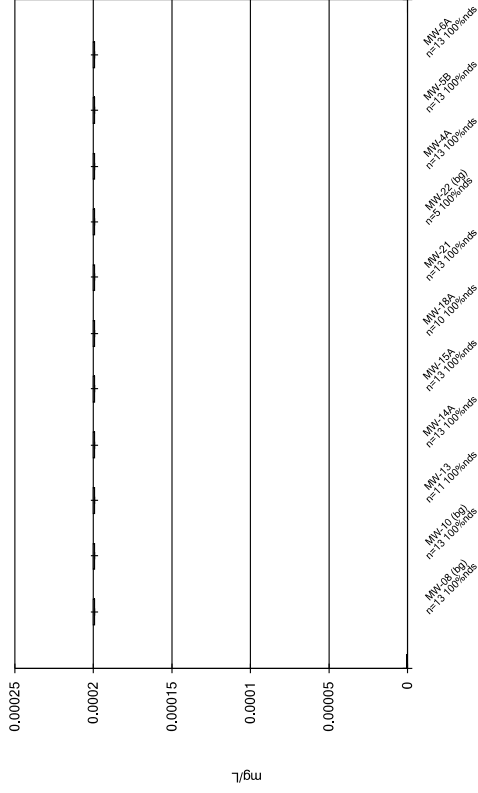
Constituent: Lithium Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



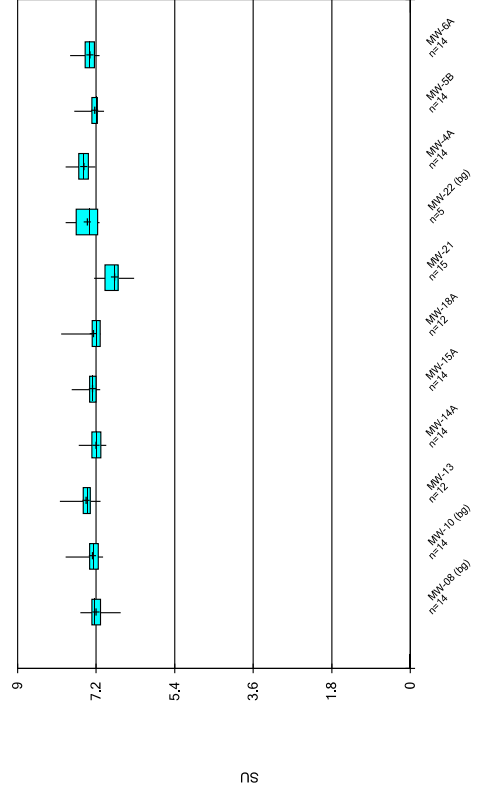
Constituent: Molybdenum Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



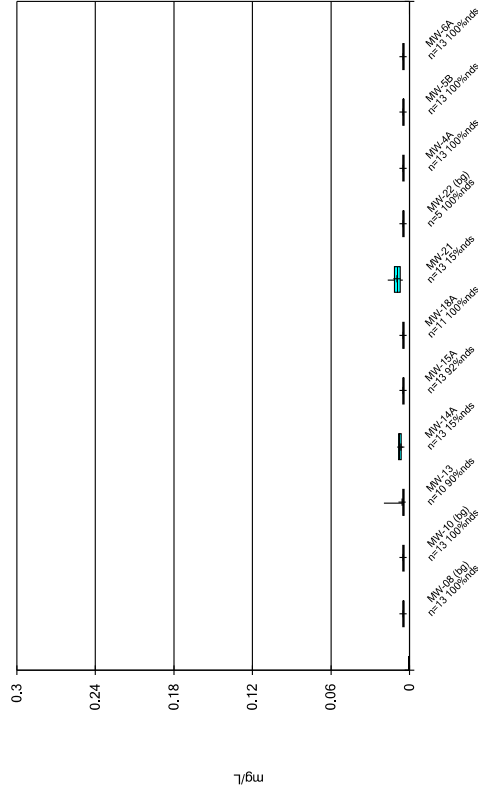
Constituent: Mercury Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



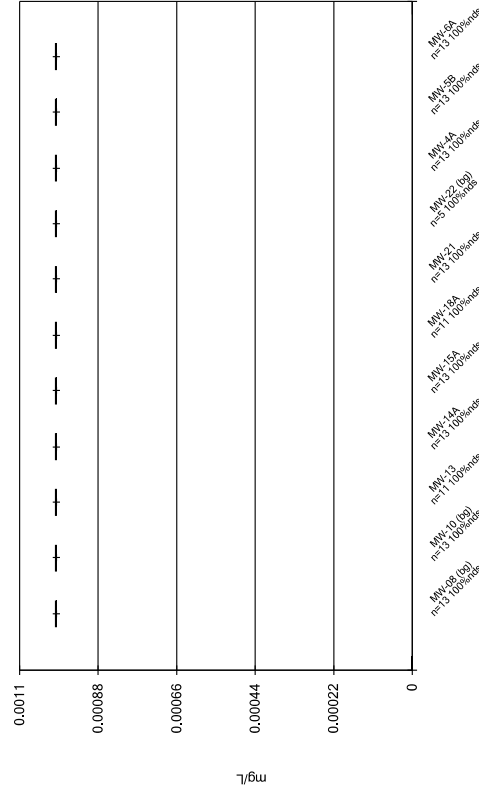
Constituent: pH Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



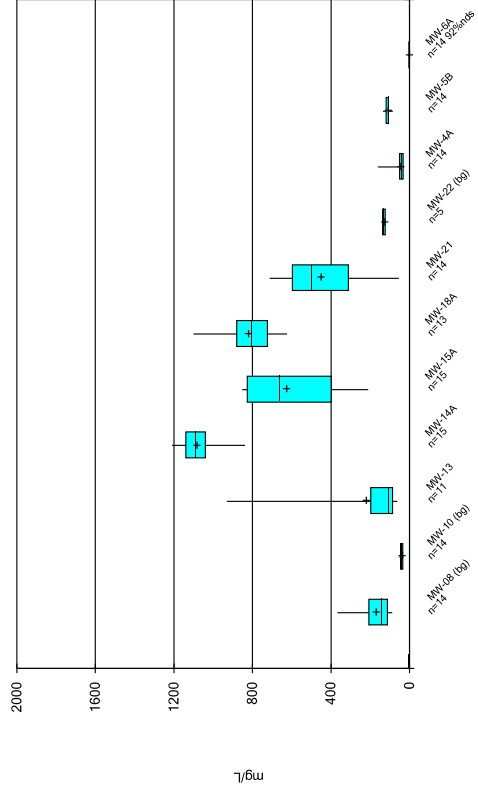
Constituent: Selenium Analysis Run 10/31/2019 3:04 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



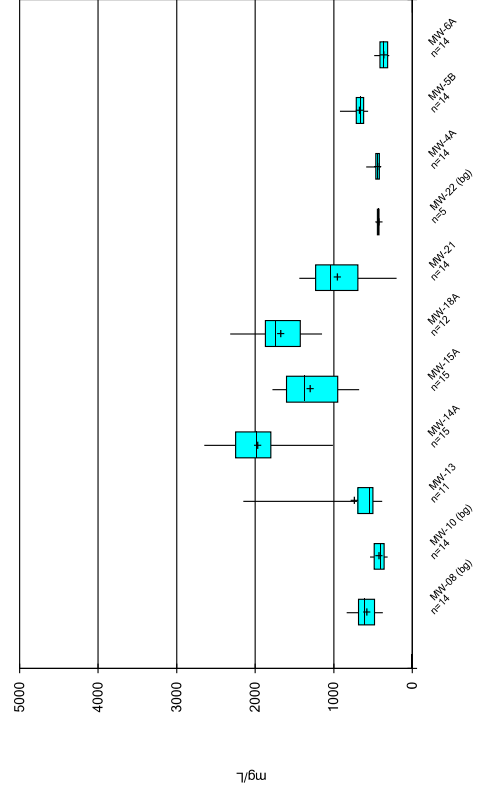
Constituent: Thallium Analysis Run 10/31/2019 3:05 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



Constituent: Sulfate Analysis Run 10/31/2019 3:05 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Box & Whiskers Plot



Constituent: Total Dissolved Solids Analysis Run 10/31/2019 3:05 PM View: Distributional Tests
 Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Confidence Intervals

Confidence Interval Summary Table - All Results (No Significant)

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 11/1/2019, 9:50 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Antimony (mg/L)	MW-14A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-15A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-21	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-4A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-5B	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Antimony (mg/L)	MW-6A	0.001	0.001	0.006	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-14A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-15A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-21	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-4A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-5B	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Arsenic (mg/L)	MW-6A	0.002	0.002	0.01	No	13	100	No	0.01	NP (NDs)
Barium (mg/L)	MW-14A	0.03872	0.03178	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-15A	0.04177	0.03437	2	No	12	0	No	0.01	Param.
Barium (mg/L)	MW-21	0.0622	0.04075	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-4A	0.1477	0.1271	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-5B	0.3319	0.3031	2	No	13	0	No	0.01	Param.
Barium (mg/L)	MW-6A	0.2118	0.1897	2	No	13	0	x^3	0.01	Param.
Beryllium (mg/L)	MW-14A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-15A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-21	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-4A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-5B	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Beryllium (mg/L)	MW-6A	0.001	0.001	0.004	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-14A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-15A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-21	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-4A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-5B	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Cadmium (mg/L)	MW-6A	0.0005	0.0005	0.005	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-14A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-15A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-21	0.006369	0.004847	0.1	No	13	30.77	No	0.01	Param.
Chromium (mg/L)	MW-4A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-5B	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Chromium (mg/L)	MW-6A	0.005	0.005	0.1	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-14A	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-15A	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-21	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-4A	0.000681	0.0005	0.006	No	13	92.31	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-5B	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Cobalt (mg/L)	MW-6A	0.0005	0.0005	0.006	No	13	100	No	0.01	NP (NDs)
Combined Radium 226 + 228 (pCi/L)	MW-14A	0.4256	0.1048	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-15A	0.3128	0.1425	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-21	0.6138	0.1129	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-4A	0.7245	0.3813	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-5B	0.9905	0.5843	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-6A	0.7108	0.3234	5	No	10	0	No	0.01	Param.
Fluoride (mg/L)	MW-14A	0.684	0.5	4	No	13	84.62	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-15A	0.549	0.5	4	No	13	76.92	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-21	0.768	0.5	4	No	14	85.71	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-4A	0.664	0.5	4	No	14	71.43	No	0.01	NP (normality)
Fluoride (mg/L)	MW-5B	0.627	0.5	4	No	14	78.57	No	0.01	NP (NDs)
Fluoride (mg/L)	MW-6A	0.814	0.5	4	No	14	71.43	No	0.01	NP (normality)
Lead (mg/L)	MW-14A	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-15A	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-21	0.000633	0.0005	0.015	No	13	92.31	No	0.01	NP (NDs)
Lead (mg/L)	MW-4A	0.0005	0.0005	0.015	No	12	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-5B	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lead (mg/L)	MW-6A	0.0005	0.0005	0.015	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-14A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-15A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-21	0.0277	0.01	0.04	No	13	76.92	No	0.01	NP (NDs)
Lithium (mg/L)	MW-4A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-5B	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Lithium (mg/L)	MW-6A	0.01	0.01	0.04	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-14A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-15A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)

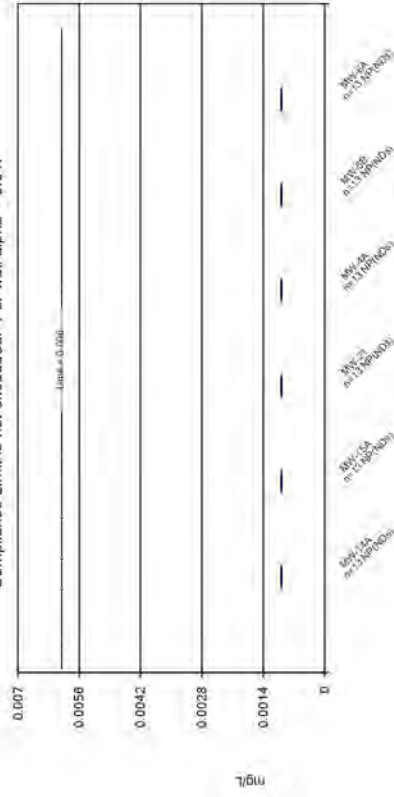
Confidence Interval Summary Table - All Results (No Significant) Page 2

Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water Printed 11/1/2019, 9:50 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Mercury (mg/L)	MW-21	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-4A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-5B	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Mercury (mg/L)	MW-6A	0.0002	0.0002	0.002	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-14A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-15A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-21	0.00383	0.002	0.1	No	13	92.31	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-4A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-5B	0.00212	0.002	0.1	No	13	92.31	No	0.01	NP (NDs)
Molybdenum (mg/L)	MW-6A	0.002	0.002	0.1	No	13	100	No	0.01	NP (NDs)
Selenium (mg/L)	MW-14A	0.00829	0.00569	0.05	No	13	15.38	No	0.01	NP (normality)
Selenium (mg/L)	MW-15A	0.00502	0.005	0.05	No	13	92.31	No	0.01	NP (NDs)
Selenium (mg/L)	MW-21	0.01238	0.006818	0.05	No	13	15.38	No	0.01	Param.
Selenium (mg/L)	MW-4A	0.005	0.005	0.05	No	13	100	No	0.01	NP (NDs)
Selenium (mg/L)	MW-5B	0.005	0.005	0.05	No	13	100	No	0.01	NP (NDs)
Selenium (mg/L)	MW-6A	0.005	0.005	0.05	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-14A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-15A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-21	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-4A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-5B	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)
Thallium (mg/L)	MW-6A	0.001	0.001	0.002	No	13	100	No	0.01	NP (NDs)

Non-Parametric Confidence Interval

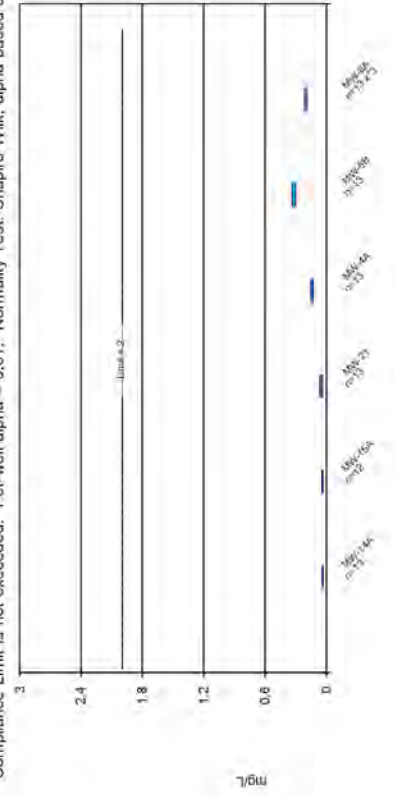
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Antimony Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Parametric Confidence Interval

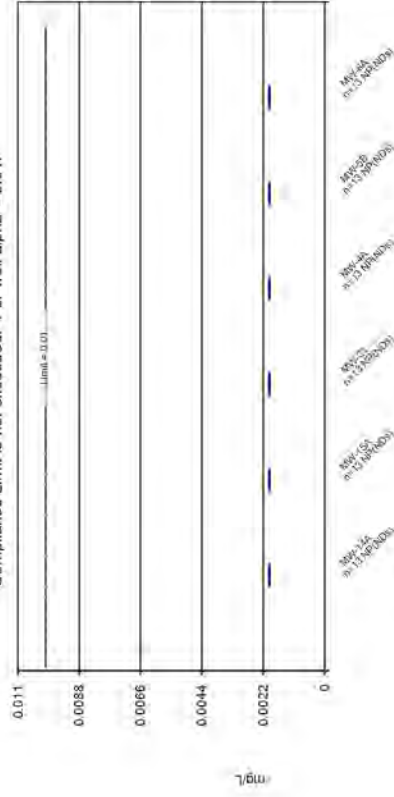
Compliance Limit is not exceeded. Per-well alpha = 0.01, Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

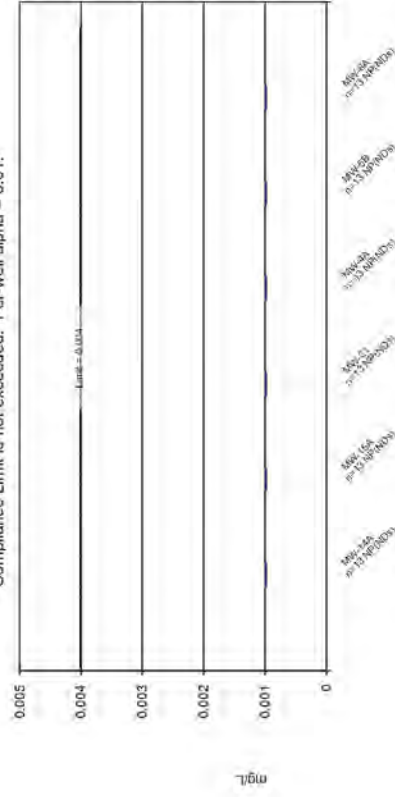
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Beryllium Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

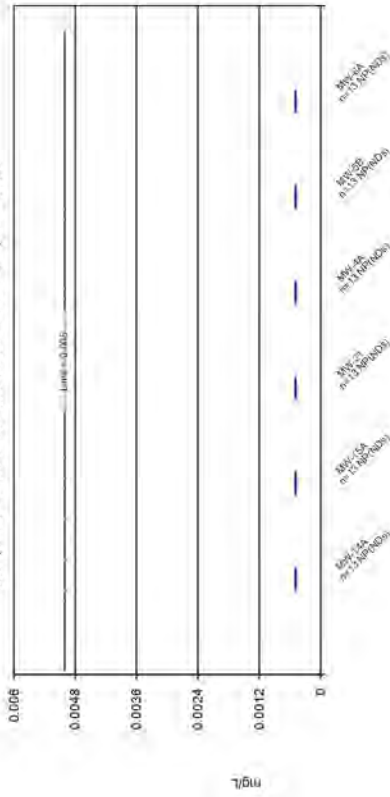
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Cadmium Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

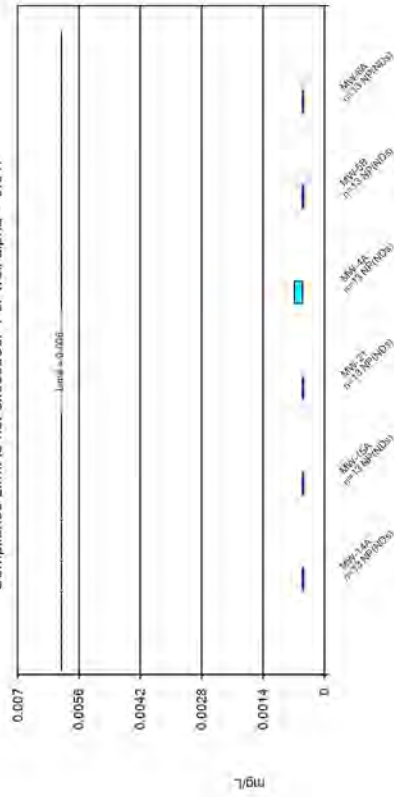
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Cadmium Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

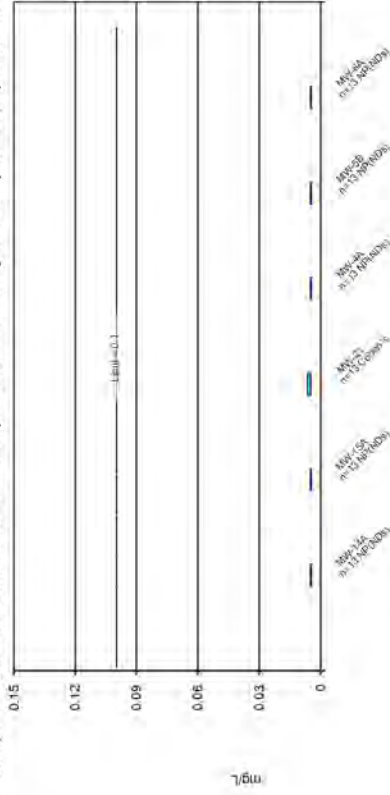
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Cobalt Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Parametric and Non-Parametric (NP) Confidence Interval

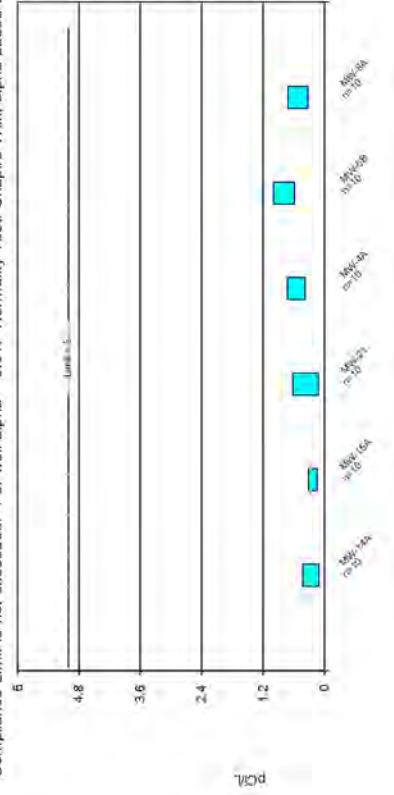
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Parametric Confidence Interval

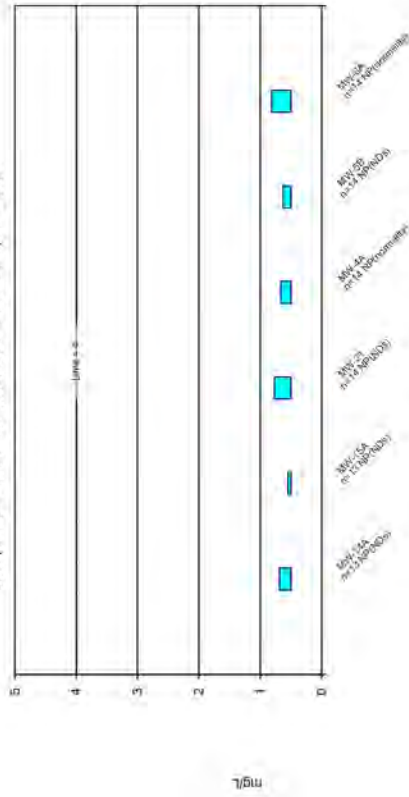
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 11/1/2019 9:49 AM View: Confidence Interval An
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

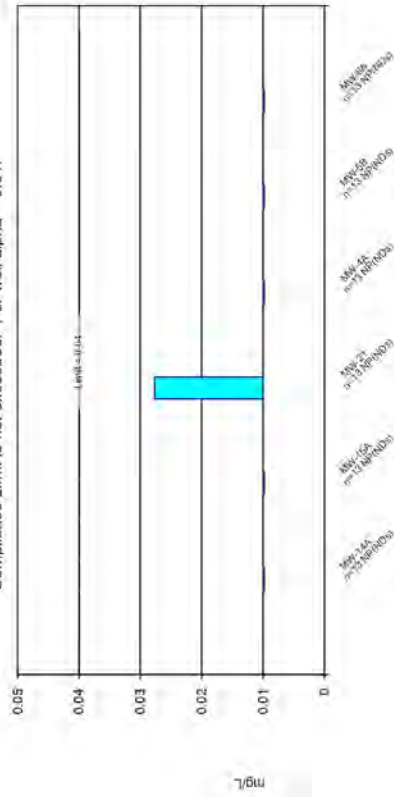
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Fluoride Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

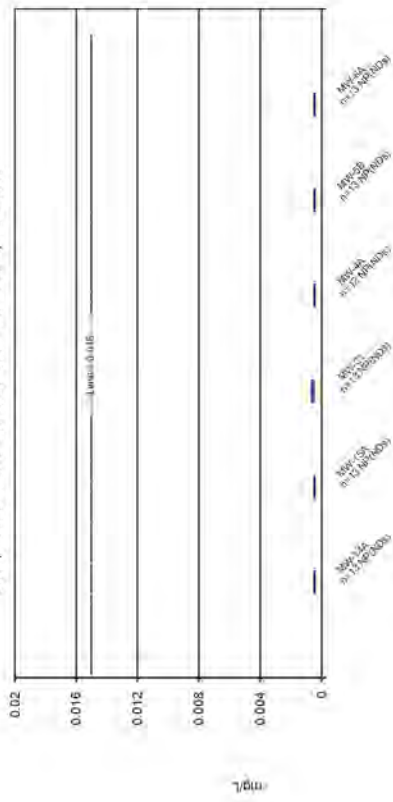
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Lithium Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

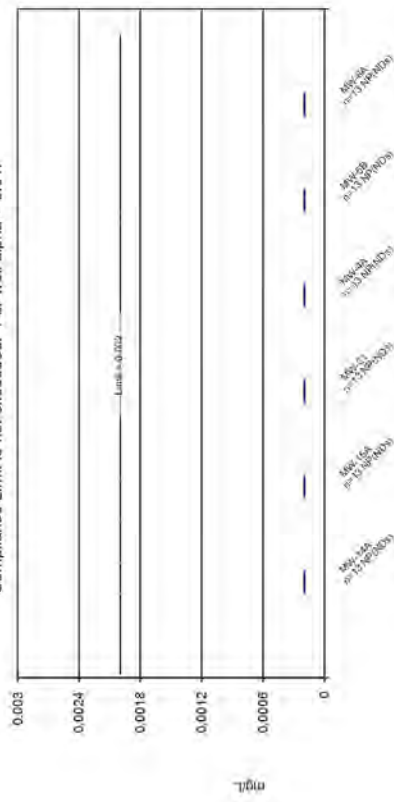
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Lead Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

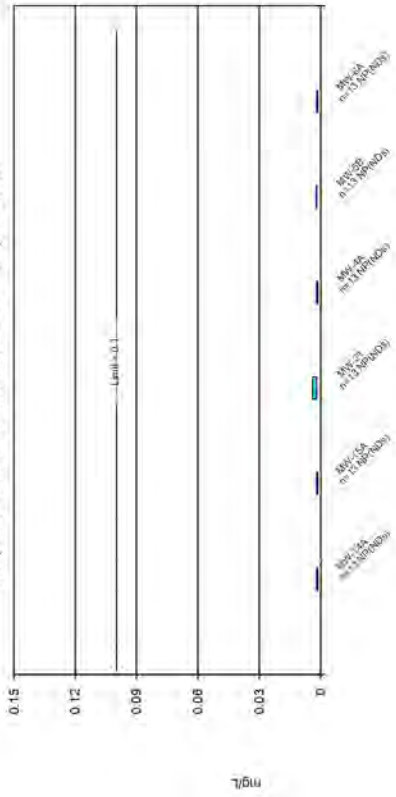
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Mercury Analysis Run 11/1/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

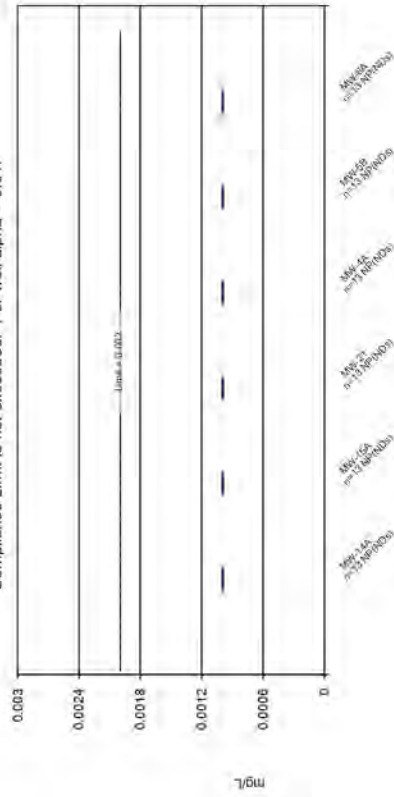
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Molybdenum Analysis Run 11/11/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Non-Parametric Confidence Interval

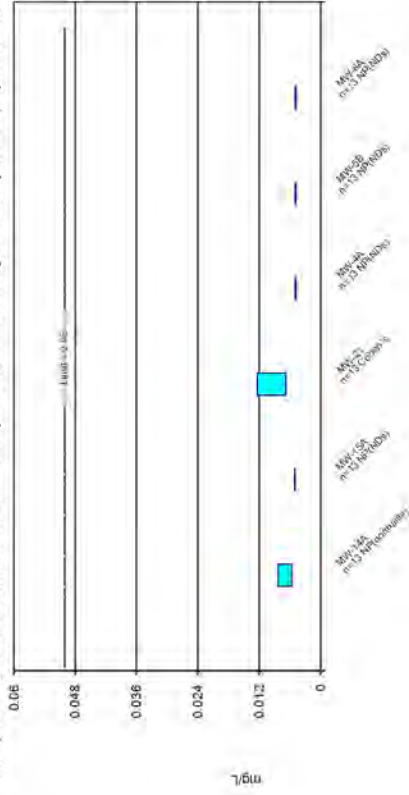
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Thallium Analysis Run 11/11/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium Analysis Run 11/11/2019 9:49 AM View: Confidence Interval Analysis
Muscatine Power & Water Client: HR Green, Inc. Data: Muscatine Power & Water

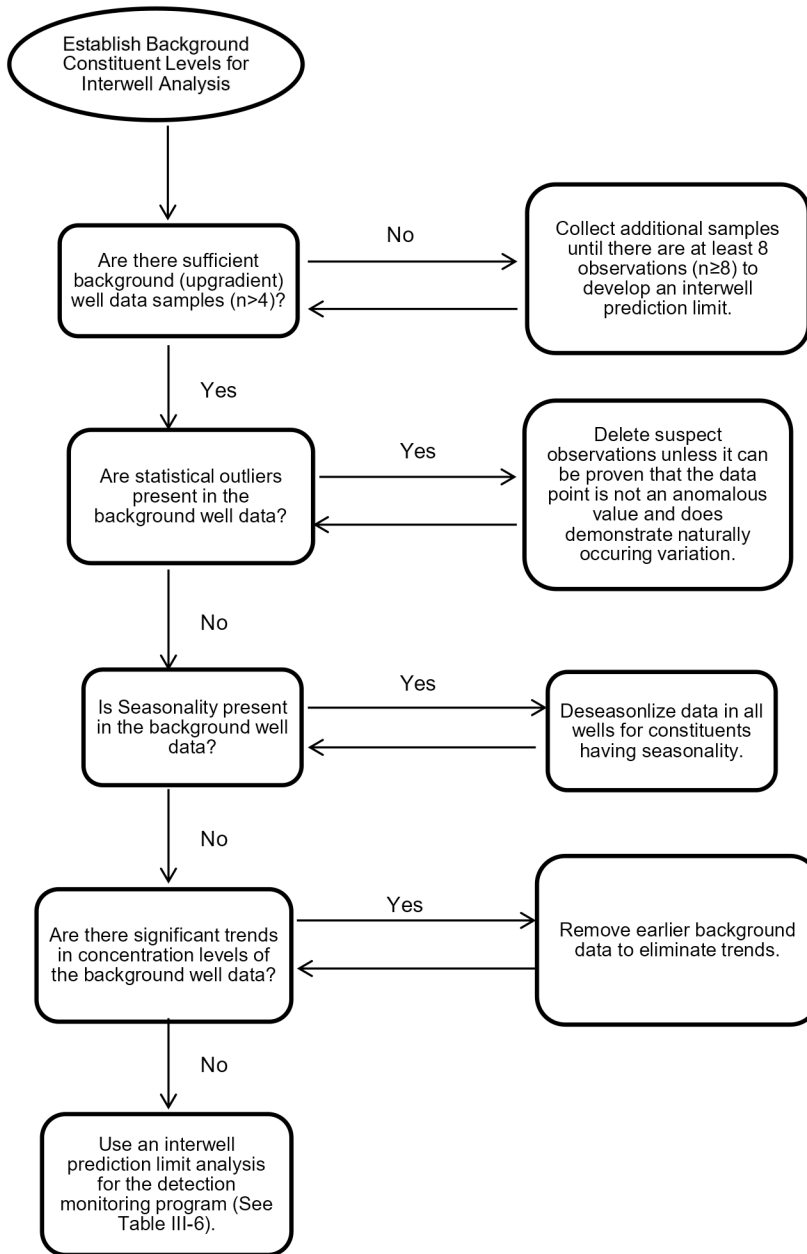


Table III-4: Methodology to Screen Background Data for Interwell Limits and Establish Background Constituent Levels

From: *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, May 2017).

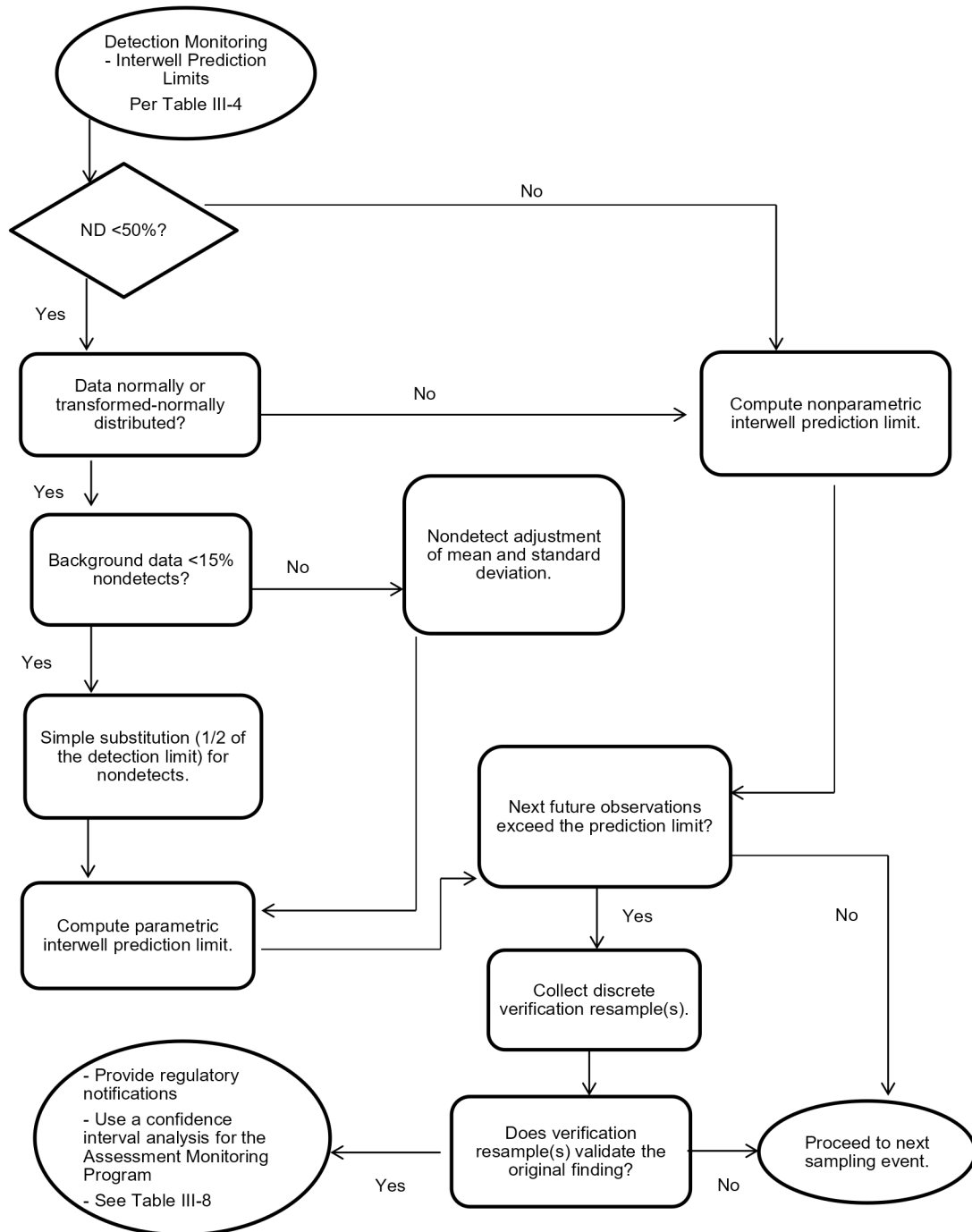


Table III-6: Methodology for Detection Monitoring - Computing Interwell Prediction Limits

From: *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, May 2017).

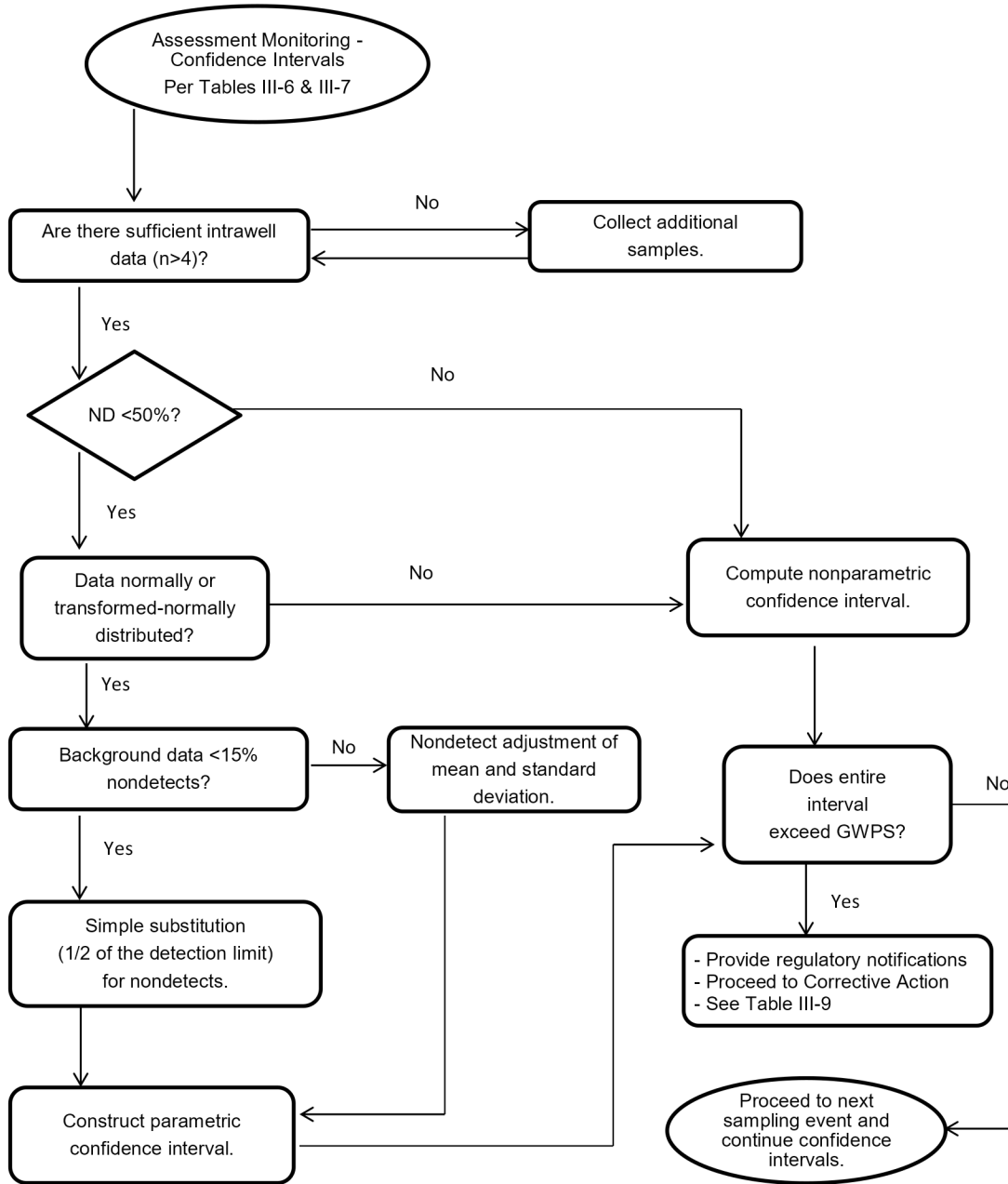


Table III-8: Methodology for Assessment Monitoring – Constructing Confidence Intervals

From: *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, May 2017).

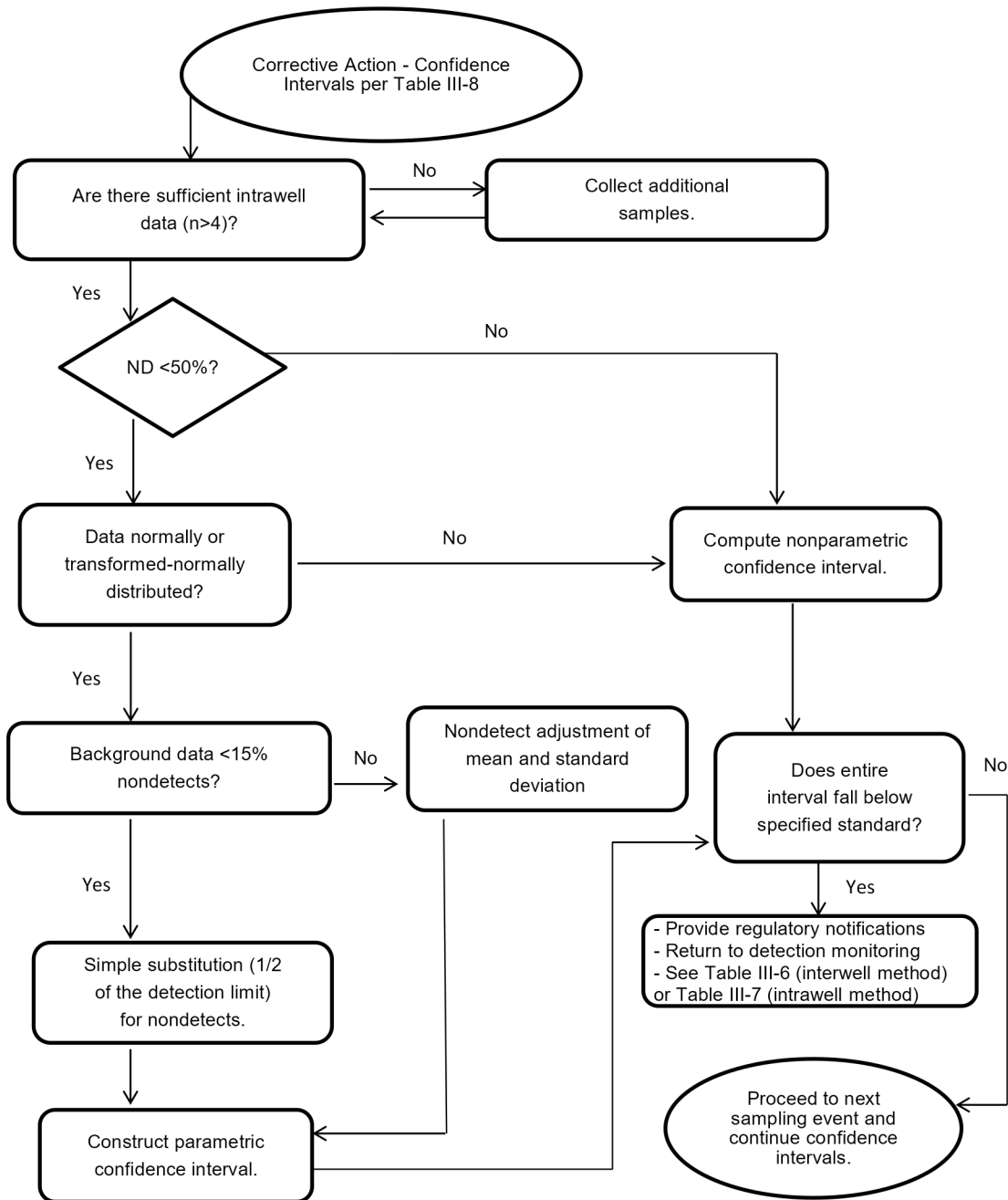


Table III-9: Methodology for Corrective Action

From: *Groundwater Monitoring System and Sampling and Analysis Program, CCR Landfill* (HR Green, May 2017).