



2018 Annual Groundwater Monitoring and Corrective Action Report

CCR Annual Monitoring Report

Slag Pond Area

Big Stone Plant

Big Stone City, South Dakota

Prepared for
Otter Tail Power Company

January 2019

2018 CCR Annual Groundwater Monitoring and Corrective Action Report

Slag Pond Area

Big Stone Plant Big Stone City, South Dakota

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Acronyms

Acronym	Description
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
OTP	Otter Tail Power Company
SSI	Statistically Significant Increase
TSA	Temporary Storage Area

1.0 Introduction

Otter Tail Power Company (OTP) operates Big Stone Plant, a coal-fired generation unit near Big Stone City, South Dakota. Until plant operations were changed in September 2018, coal combustion residuals (CCR) from plant operations were placed in an on-site surface impoundment, referred to as the Slag Pond. The Slag Pond is an incised impoundment that is required to comply with the provisions of the US Environmental Protection Agency (EPA) CCR Rule (40 CFR Parts 257 and 261 Disposal of Coal Combustion Residuals from Electric Utilities) for existing CCR surface impoundments.

CCR was removed from the Slag Pond and temporarily stored in an on-site facility, referred to as the Temporary Storage Area (TSA). The TSA is required to comply with the applicable provisions of the CCR Rule for existing CCR landfills. The TSA is located adjacent to the Slag Pond.

Both the Slag Pond and TSA underwent closure construction activities in 2018 and are no longer active.

The Slag Pond Area, in which the groundwater monitoring system is located, consists of the Slag Pond and TSA. The Slag Pond Area is shown on Figure 1. The Slag Pond Area is a multiunit groundwater monitoring system as allowed by §257.91(d).

This 2018 Annual Groundwater Monitoring and Corrective Action Report (Annual Report) describes the monitoring program and results for the Slag Pond Area at Big Stone Plant (Site).

1.1 Purpose

As stated in Section §257.90(e) of the CCR rule, the purpose of the Annual Report is to:

- Document the status of monitoring and corrective action program for the CCR unit
- Summarize key actions completed
- Describe any problems encountered
- Discuss actions to resolve the problems
- Highlight key activities for the upcoming year

1.2 Status of the Groundwater Monitoring and Corrective Action Program

The 2017 Annual Groundwater Monitoring and Corrective Action Report, Slag Pond Area (Barr, 2018) documented the results of the baseline groundwater monitoring. The evaluation of groundwater monitoring data for statistically significant increases over background levels for the constituents listed in Appendix III began on October 17, 2017 and continued in 2018.

1.3 CCR Rule Requirements

This Annual Report has been prepared in accordance with the requirements of §257.90(e) of the CCR Rule, as outlined in the following Table 1.

Table 1 CCR Rule Requirements

CCR Rule Reference	Content Required in Report	Location
§257.90(e)(1)	Map showing the CCR unit and all monitoring wells that are part of the groundwater monitoring system	Section 2.1.1 Documentation; see Figure 1
§257.90(e)(2)	Discuss any new or decommissioned monitoring wells	Section 2.1.2 Changes to Monitoring System
§257.90(e)(3)	Provide the number and date groundwater samples were collected, and the monitoring (i.e., detection or assessment)	Section 2.2 Monitoring and Analytical Results
§257.90(e)(4)	Discuss any transition between monitoring programs	Section 2.4 Key Activities for Upcoming Year
§257.90(e)(5)	Other information specified in §257.90 through §257.98	Other information not required in this report

2.0 Groundwater Monitoring and Corrective Action Program

This section documents the status of the groundwater monitoring and corrective action program for the Slag Pond and TSA CCR units for 2018. The groundwater monitoring system is described in Section 2.1, the monitoring and analytical results are described in Section 2.2, key actions completed and problems encountered are described in Section 2.3, and key activities planned for 2019 are described in Section 2.4.

2.1 Groundwater Monitoring System

2.1.1 Documentation

Figure 1 shows an aerial image of the CCR unit and all background (or upgradient) and downgradient monitoring wells, including the well identification numbers, that are part of the groundwater monitoring program, as required by §257.90(e)(1). Further details on the monitoring system and the CCR unit monitoring wells can be found in the Groundwater Monitoring System Report, Big Stone Plant Slag Pond Area (Barr, 2016) on the plant's website.

2.1.2 Changes to Monitoring System

The groundwater monitoring system was unchanged in 2018.

2.2 Monitoring and Analytical Results

A total of 14 groundwater samples were collected and analyzed for the constituents listed in Appendix III (Part 257) in 2018 under the detection monitoring program, consistent with the requirements of §257.94(c). Dates of sampling are reported on the field data sheets and analytical laboratory reports in Appendix A.

Two semiannual samples were collected from monitoring wells SLAG 2B, SLAG 4, SLAG 5, SLAG 6, SLAG 7, SLAG 8, and SLAG 9. In addition to the semiannual samples, three resamples were collected from monitoring wells SLAG 2B, SLAG 6, and SLAG 7 for field pH on June 20, 2018.

In addition to the semiannual samples, seven groundwater samples were collected and analyzed for the constituents listed in Appendix IV (Part 257) in 2018. Samples were collected from monitoring wells SLAG 2B, SLAG 4, SLAG 5, SLAG 6, SLAG 7, SLAG 8, and SLAG 9 after completion of closure construction activities in the Slag Pond Area in accordance with 40 CFR 257.102(c). Dates of sampling are reported on the field data sheets and analytical laboratory reports in Appendix A.

2.3 Key Actions Completed/Problems Encountered

The following key actions were completed for the groundwater monitoring program during 2018:

- Completed semiannual detection monitoring sampling for each background and downgradient well.

-
- Determined, pursuant to §257.93(h), that a statistically significant increase over background levels did not occur for any of the constituents listed in Appendix III at any downgradient monitoring well.

No problems were encountered during the report period.

2.4 Key Activities for Upcoming Year

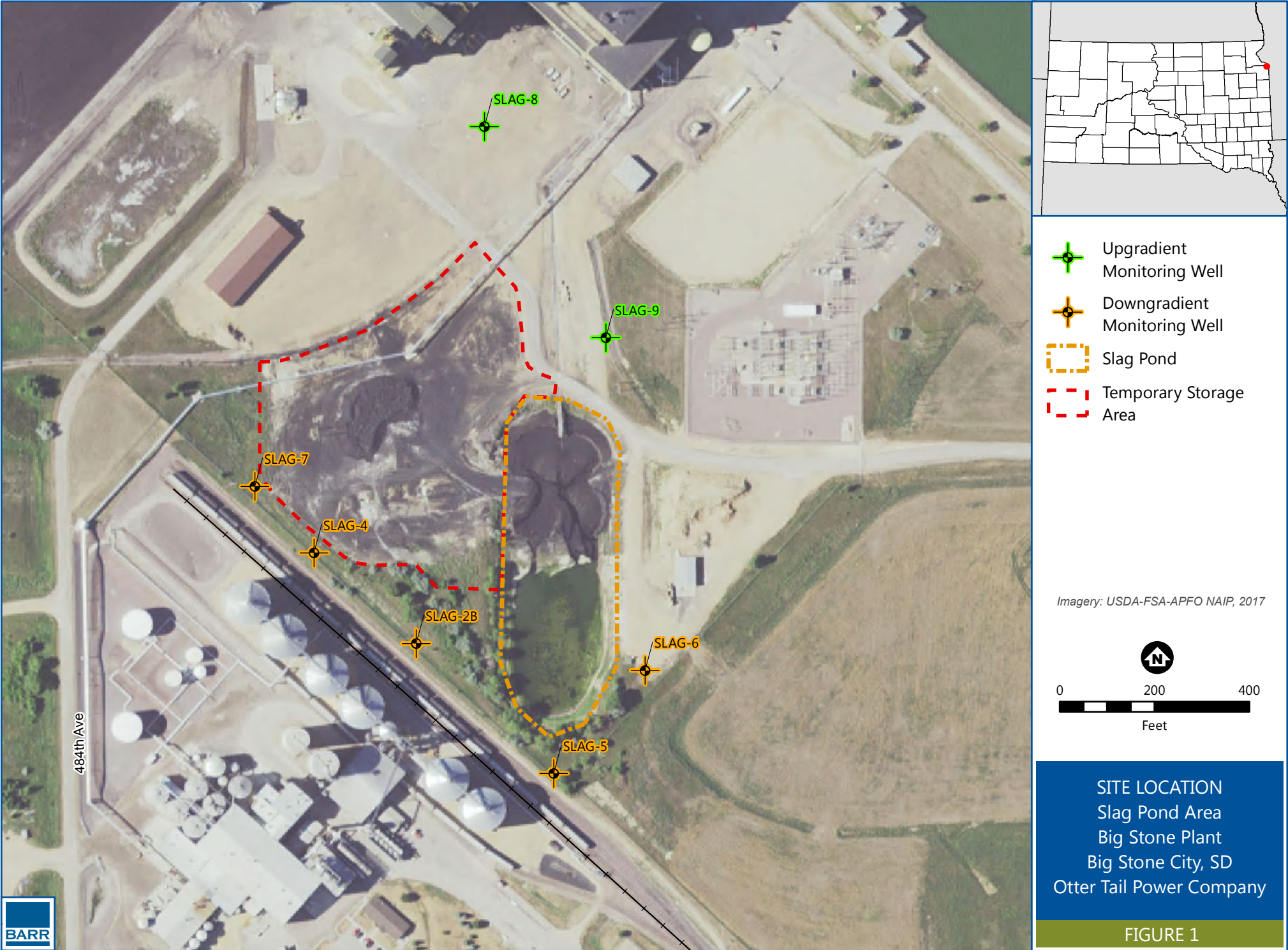
The following key groundwater monitoring program activities are planned for 2019:

- Continue the groundwater monitoring program in accordance with the CCR rule with a goal of closing both the Slag Pond and the TSA.
- Evaluate analytical results from the 2019 semiannual detection monitoring events for statistically significant increases (SSIs) according to the CCR Groundwater Sampling and Analysis Plan (Carlson McCain, 2017).

3.0 References

- Barr, 2018. 2017 Annual Groundwater Monitoring and Corrective Action Report, Big Stone Plant Slag Pond Area. Prepared for Otter Tail Power Company. January 2018.
- Barr, 2016. Groundwater Monitoring System Report, Big Stone Plant Slag Pond Area. Prepared for Otter Tail Power Company. December 2016.
- Carlson McCain, 2017. CCR Groundwater Sampling and Analysis Plan (Including Statistical Method Selection and Certification), Big Stone Plant Slag Pond Area. Prepared for Otter Tail Power Company. October 2017.

Figures



Appendices

Appendix A

Laboratory Reports and Field Sheets



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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FINAL REPORT COMPLETION DATE: 18 May 18 *AS*

Date Reported: 15 May 2018

MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Work Order #: 31-0151_SLAG
Account #: 006106
PO #: 48680

Project Name: BIG STONE PLANT

T. H. H. 18 May 18
Field Service Manager/Date Reviewed

[Signature] 15 May 18
Chemistry Lab Manager/Date Reviewed

[Signature] 18 May 2018
Quality Assurance Director/Date Reviewed

RL = Reporting Limits
NQ = Not Present, Qualitative Only
PQ = Present, Qualitative Only
ND = Not Determined

All data for this report has been approved by MVTL Laboratory Management.

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 15 May 2018
Lab Number: 18-A17816
Work Order #: 31-0151
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 16 Apr 2018 12:36
Sampled By: MVTL FIELD PERSONNEL
Date Received: 16 Apr 2018 19:10
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: SLAG 4

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.35	units	1.00	I-1586-85	16 Apr 18 1:26	JLH
pH	* 6.8	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	1360 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	50.9	mg/L	3.0	SM 4500 Cl E	20 Apr 18 9:48	KCJ
Solids, Total Dissolved	2560	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	459.0 ~	mg/L	0.500	SW6010C	24 Apr 18 10:56	RMV
Boron	0.773	mg/L	0.100	SW6010C	19 Apr 18 17:08	RMV
Fluoride	0.210 @	mg/L	0.020	EPA 300.0	26 Apr 18 10:45	RMV

* Holding Time Exceeded

~ Sample diluted due to result above calibration of linear range.

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.

The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix

! = Due to sample quantity

= Due to concentration of other analytes

+ = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 15 May 2018
Lab Number: 18-A17817
Work Order #: 31-0151
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 16 Apr 2018 14:30
Sampled By: MVTL FIELD PERSONNEL
Date Received: 16 Apr 2018 19:10
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: SLAG 5

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.42	units	1.00	I-1586-85	16 Apr 18 14:30	BMW
pH	* 7.2	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	85.1 @	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	12.2	mg/L	3.0	SM 4500 Cl E	20 Apr 18 10:06	KCJ
Solids, Total Dissolved	573	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	110.0	mg/L	0.500	SW6010C	19 Apr 18 17:08	RMV
Boron	0.586	mg/L	0.100	SW6010C	19 Apr 18 17:08	RMV
Fluoride	0.200	mg/L	0.020	EPA 300.0	26 Apr 18 10:45	RMV

* Holding Time Exceeded

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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 15 May 2018
Lab Number: 18-A17818
Work Order #: 31-0151
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 16 Apr 2018 15:10
Sampled By: MVTL FIELD PERSONNEL
Date Received: 16 Apr 2018 19:10
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: SLAG 6

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.69	units	1.00	I-1586-85	16 Apr 18 15:10	JLH
pH	* 7.2	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	295 @	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	9.4	mg/L	3.0	SM 4500 Cl E	20 Apr 18 10:06	KCJ
Solids, Total Dissolved	1030	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	171.0	mg/L	0.500	SW6010C	19 Apr 18 17:08	RMV
Boron	2.370	mg/L	0.100	SW6010C	19 Apr 18 17:08	RMV
Fluoride	0.510 @	mg/L	0.020	EPA 300.0	26 Apr 18 10:45	RMV

* Holding Time Exceeded

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MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 15 May 2018
Lab Number: 18-A17819
Work Order #: 31-0151
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 16 Apr 2018 11:48
Sampled By: MVTL FIELD PERSONNEL
Date Received: 16 Apr 2018 19:10
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: SLAG 7

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	8.63	units	1.00	I-1586-85	16 Apr 18 11:48	JLH
pH	* 7.6	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:57	MCS
Sulfate	516 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:16	AKF
Chloride	5.3	mg/L	3.0	SM 4500 Cl E	20 Apr 18 10:06	KCJ
Solids, Total Dissolved	1210	mg/L	10	SM 2540 C-97	18 Apr 18 14:17	MCS
Calcium	231.0 @	mg/L	0.500	SW6010C	19 Apr 18 17:08	RMV
Boron	1.260	mg/L	0.100	SW6010C	19 Apr 18 17:08	RMV
Fluoride	0.310 @	mg/L	0.020	EPA 300.0	26 Apr 18 10:45	RMV

* Holding Time Exceeded

~ Sample diluted due to result above calibration of linear range.

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= Due to concentration of other analytes
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MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 15 May 2018
Lab Number: 18-A17820
Work Order #: 31-0151
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 16 Apr 2018 13:08
Sampled By: MVTL FIELD PERSONNEL
Date Received: 16 Apr 2018 19:10
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: SLAG 2B

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					19 Apr 18	JMS
pH, Field	9.43	units	1.00	I-1586-85	16 Apr 18 13:08	JLH
pH	* 9.2	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:57	MCS
Sulfate	390 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:16	AKF
Chloride	20.9	mg/L	3.0	SM 4500 Cl E	20 Apr 18 10:06	KCJ
Solids, Total Dissolved	730	mg/L	10	SM 2540 C-97	18 Apr 18 14:17	MCS
Calcium	134.0	mg/L	0.500	SW6010C	24 Apr 18 11:35	RMV
Boron	1.930	mg/L	0.100	SW6010C	23 Apr 18 14:11	RMV
Fluoride	0.220 @	mg/L	0.020	EPA 300.0	30 Apr 18 12:45	RMV

* Holding Time Exceeded

~ Sample diluted due to result above calibration of linear range.

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MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 15 May 2018
 Lab Number: 18-A17821
 Work Order #: 31-0151
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 16 Apr 2018 15:11
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 16 Apr 2018 19:10
 PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: SLAG 8

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					19 Apr 18	JMS
pH, Field	6.94	units	1.00	I-1586-85	16 Apr 18 15:11	JLH
pH	* 7.2	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:57	MCS
Sulfate	262 @	mg/L	5.0	ASTM D516-07	19 Apr 18 9:16	AKF
Chloride	47.4	mg/L	3.0	SM 4500 Cl E	20 Apr 18 10:06	KCJ
Solids, Total Dissolved	942	mg/L	10	SM 2540 C-97	18 Apr 18 14:17	MCS
Calcium	121.0	mg/L	0.500	SW6010C	24 Apr 18 11:35	RMV
Boron	0.603	mg/L	0.100	SW6010C	23 Apr 18 14:11	RMV
Fluoride	0.540 @	mg/L	0.020	EPA 300.0	26 Apr 18 18:31	RMV

* Holding Time Exceeded

RL = Reporting Limit

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 ! = Due to sample quantity + = Due to internal standard response

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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 15 May 2018
Lab Number: 18-A17822
Work Order #: 31-0151
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 16 Apr 2018 14:26
Sampled By: MVTL FIELD PERSONNEL
Date Received: 16 Apr 2018 19:10
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: SLAG 9

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					19 Apr 18	JMS
pH, Field	7.50	units	1.00	I-1586-85	16 Apr 18 14:26	JLH
pH	* 7.0	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:57	MCS
Sulfate	904 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:16	AKF
Chloride	10.7	mg/L	3.0	SM 4500 Cl E	20 Apr 18 10:06	KCJ
Solids, Total Dissolved	1720	mg/L	10	SM 2540 C-97	18 Apr 18 14:17	MCS
Calcium	327.0	mg/L	0.500	SW6010C	24 Apr 18 11:35	RMV
Boron	0.208	mg/L	0.100	SW6010C	23 Apr 18 14:11	RMV
Fluoride	0.260 @	mg/L	0.020	EPA 300.0	26 Apr 18 18:31	RMV

* Holding Time Exceeded

~ Sample diluted due to result above calibration of linear range.

RL = Reporting Limit

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Page: 15 of 15

INORGANIC AND METALS ANALYSES:

No problems were encountered with these analyses.

Page: 1 of 1

Quality Control Report
Lab IDs: 18-A17810 to 18-A17822

Project: BIG STONE PLANT

Work Order: 201831-0151

Analyte	LCS Spike Amt	LCS Rec %	LCS % Rec Limits	Matrix Spike Amt	Matrix Spike ID	Matrix Spike Orig Result	Matrix Spike Result	Matrix Spike Rec %	Matrix Spike % Rec Limits	MSD/ Dup Orig Result	MSD/ Dup Result	MSD Rec %	MSD/ Dup RPD	MSD/ Dup RPD Limit (<)	Known Rec (%)	Known % Rec Limits	Method Blank
Boron mg/L	1.000	97	85-115	1.00	18-A17811	3.940	5.140	120	75-125	5.140	4.890	95	5.0	10	92	90-110	< 0.1
	1.000	100	85-115	1.00	18-A17819	1.260	2.430	117	75-125	2.430	2.480	122	2.0	10	95	90-110	< 0.1
	1.000	99	85-115	1.00	18-A17793	1.120	2.080	96	75-125	2.080	2.010	89	3.4	10	95	90-110	< 0.1
	1.000	99	85-115	1.00	18-A17819	1.340	2.370	103	75-125	2.370	2.350	101	0.8	10	94	90-110	< 0.1
Calcium mg/L	50.00	99	85-115	50.0	18-A17811	107.0	161.0	108	75-125	161.0	157.0	100	2.5	10	93	90-110	< 0.5
	50.00	101	85-115	50.0	18-A17819	231.0	289.0	116	75-125	289.0	292.0	122	1.0	10	95	90-110	< 0.5
	50.00	100	85-115	50.0	18-A17819	241.0	295.0	108	75-125	295.0	292.0	102	1.0	10	96	90-110	< 0.5
	50.00	100	85-115	50.0	18-A17793	233.0	282.0	98	75-125	282.0	290.0	114	2.8	10	97	90-110	< 0.5
Chloride mg/L	-	-	-	60.0	18-A17816	50.9	113	104	86-117	113	116	108	2.6	5	99	90-110	< 3
	-	-	-	60.0	18-A17440	7.7	67.3	99	85-115	67.3	69.2	102	2.8	5	99	90-110	< 3
Fluoride mg/L	-	-	-	0.20	18-A17810	0.370	0.580	105	75-125	0.580	0.590	110	1.7	10	103	90-110	< 0.02
	-	-	-	1.00	18-D1309	1.03	1.92	89	75-125	1.92	2.13	110	10	10	93	90-110	< 0.02
	-	-	-	1.00	18-A18659	0.590	1.59	100	75-125	1.59	1.46	87	8.5	10	103	90-110	< 0.02
pH units	-	-	-	-	-	-	-	-	-	7.2	7.2	-	0.0	2.5	101	90-110	-
	-	-	-	-	-	-	-	-	-	7.0	7.0	-	0.0	2.5	101	90-110	-
Solids, Total Dissolved mg/L	-	-	-	-	-	-	-	-	-	372	368	-	1.1	10	104	85-115	< 10
	-	-	-	-	-	-	-	-	-	1030	1050	-	1.9	7	100	85-115	< 10
	-	-	-	-	-	-	-	-	-	2750	2800	-	1.8	7			
	-	-	-	-	-	-	-	-	-	7660	7330	-	4.4	7			
Sulfate mg/L	-	-	-	500	18-A17818	295	834	108	68-132	834	846	110	1.4	5	99	80-120	< 5
	-	-	-	500	18-A17822	904	1330	85	68-132	1330	1310	81	1.5	5	98	80-120	< 5
	-	-	-	500	18-A17793	1570	1920	70	68-132	1920	1970	80	2.6	5			

Approved by:



Minnesota Valley Testing Laboratories

1126 North Front Street New Ulm, MN 56003

Phone: 800 782 3557

Fax: 507 359 2890

Field Service Chain of Custody Record

Project Otter Tail Power Company	Project Type: Big Stone Plant CCR	Name of Samplers: Jess Holman, BS Matt Sfein, Ben Wolf
Report: Otter Tail Power Company	Carbon Copy: Barr Engineering	Quote Number:
Attn: Paul Vukonich	Attn:	Work Order Number:
Address: P.O. Box 496	Address:	Lab Numbers:
Fergus Falls, MN 56538-0496		
Phone: 218-739-8349		

Sample Information					Bottle Type													Analysis	
Lab Number	Sample ID	Unique Station ID	Date	Time	Sample Type	Sample Location	1000 HNO3	Filtered Y or N	1000 none	500 HNO3	Filter? Y or N	500 H2SO4	Filter? Y or N	1000 Amber none	1000 Amber H2SO4	500 NaOH	Other: 150 H2SO4	Other: 150 None	Analysis Required
ATB3	H2OX		1/2 Apr 18	1547	GW				1	1	N								Boron, Calcium
14	H3OX			1303	GW				1	1	N								Chloride, pH
15	H4OX			1438	GW				1	1	N								Fluoride, TDS
ATB10	H-6			1308	GW				1	1	N								Sulfate on all
11	H-8			1416	GW				1	1	N								
12	H-9			1527	GW				1	1	N								
ATB16	Slag 4			1236	GW				1	1	N								
17	Slag 5			1430	GW				1	1	N								
18	Slag 6			1510	GW				1	1	N								

Comments:

WORK ORDER #2

Samples Relinquished By: <i>all Hill</i>			Samples Received By: <i>A. Reed</i>		
Date: <i>17 Apr 18</i>	Time: <i>1910</i>	Temp: <i>0.9</i>	Date: <i>17 Apr 18</i>	Time: <i>800</i>	Temp: <i>2.4C</i>
Samples Relinquished into: <i>Fridge</i> Log in Cart Other:					
Samples Relinquished By:			Samples Received By:		
Date:	Time:	Temp:	Date:	Time:	Temp:
Delivery:	Samplers	Other:	Seal Number(s) - If Used		
Transport:	Ambient	Ice	Other:	Seals Intact?	Yes No

Minnesota Valley Testing Laboratories

1126 North Front Street New Ulm, MN 56003
Phone: 800 782 3557 Fax: 507 359 2890

Field Service Chain of Custody Record

Project Otter Tail Power Company	Project Type: Big Stone Plant CCR	Name of Samplers: Jeff Hoffmann, BS Matt Stein, Ben Wolf
Report: Otter Tail Power Company	Carbon Copy: Barr Engineering	Quote Number:
Attn: Paul Vukonich	Attn:	Work Order Number:
Address P.O. Box 496	Address:	Lab Numbers:
Fergus Falls, MN 56538-0496		
Phone: 218-739-8349		

Sample Information					Bottle Type										Analysis				
Lab Number	Sample ID	Unique Station ID	Date	Time	Sample Type	Sample Location	1000 HNO3	Filtered Y or N	1000 none	500 HNO3	Filter? Y or N	500 H2SO4	Filter? Y or N	1000 Amber none	1000 Amber H2SO4	500 NaOH	Other: 150 H2SO4	Other: 150 None	Analysis Required
19	Slag 7		16 Apr 18	11:48	GW				1	1	N								Boron, Calcium
20	Slag 2B			13:08	GW				1	1	N								Chloride, pH
21	Slag 8			15:11	GW				1	1	N								Fluoride, TDS
22	Slag 9			14:26	GW				1	1	N								Sulfate on all

Comments:

WORK ORDER #2

R35

Samples Relinquished By: [Signature]			Samples Received By: [Signature]		
Date: 17 Apr 18	Time: 19:10	Temp: 0.9 F	Date: 17 Apr 18	Time: 12:48 PM	Temp: 3-40
Samples Relinquished into: <u>Fridge</u> Log in Cart Other:					
Samples Relinquished By:			Samples Received By:		
Date:	Time:	Temp:	Date:	Time:	Temp:
Delivery:	Samplers	Other:	Seal Number(s) - If Used		
Transport:	Ambient	Ice	Other:	Seals Intact?	Yes No

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Jeff Hoffman

Site: Otter Tail Power Co./ Big Stone

Facility ID:

Date: 16 Apr 18

Unique Station ID

Sample ID: Slag 4

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary:

Protective Posts? ☒ Yes ☐ No

State ID Tag? Yes ☒ No

Grout Seal Intact? Yes ☒ No

Well Information

Well Depth: 39.22

Constructed Depth: 39.00

Casing Diameter: 2"

Water Level Before Purge: 19.83

Well Volume: 3.16 Gallons

Well Casing Elevation: 111

Static Water Elevation:

Previous Static: ↓

Water Level After Sam: 25.84

Measurement Method: Elec. WLI Steel Tape

Sampling Information

Weather Conditions: Temp: 31° Wind: NW-13 Sky: Sunny

Sampling Method: Grundfos ☒ Bladder ☐ Disp. B: Whale ☐ Grab ☐ Other:

Dedicated Equipment: Yes ☒ No

Pumping Rate: 125 gpm

Well Purged Dry? Yes ☒ No

Time Pump Began: 11:57 (am)/ pm

Time Purged Dry?

Time of Sampling: 12:36 (am)/ pm

Duplicate Sample? Yes ☒ No

Sample Eh: 130.6

Sample Appearance: General: Slightly Cloudy

Color: none Phase: none Odor: none

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SE Q #	Comments:
<u>1210</u>	<u>7.37</u>	<u>2874</u>	<u>9.75</u>	<u>NA</u>	<u>NA</u>	<u>3.25</u>	<u>1</u>	
<u>1223</u>	<u>7.37</u>	<u>2905</u>	<u>9.73</u>			<u>6.50</u>	<u>2</u>	
<u>1236</u>	<u>7.35</u>	<u>2910</u>	<u>9.72</u>			<u>9.75</u>	<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized? ☒ Yes ☐ No

Amount Water R: 9.75 Gallons

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 560

507 354 8517

Groundwater Assessmer

Sampling Personn

Ben Wolf

Site:

Otter Tail Power Co./ Big Stone

Facility ID:

Date: 16 Apr 18

Unique Station ID:

Sample ID:

Slag 5

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessan

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☒ Yes ☐ No

Grout Seal Intact? ☒ Yes ☐ No

Well Information

Well Depth: 39.00

Constructed Depth 38.80

Casing Diameter: 2"

Water Level Before Purg 23.04

Well Volume: 2.60 Gallons

Well Casing Elevation: 1107.30

Static Water Elevation:

Previous Static: 1085.56

Water Level After Sample: 36.16

Measurement Method: Elec. WLI Steel Tape

Sampling Information

Weather Condior Temp: 35

Wind: NW @ 10

Sky: Fair

Sampling Method: Grundfos Bladder SS/T Disp. Bailer ☒ Whale ☐ Grab ☐ Other:

Dedicated Equipm Yes ☒ No ☐ Pumping Rate: .25 gpm

Well Purged Dry? ☒ Yes ☐ No Time Pump Began: 1414 am / 1 pm

Time Purged Dry? 1425 Time of Sampling: 1430 am / 1 pm

Duplicate Sample: Yes ☒ No ☐ ID: - Sample EH: 110.5

Sample Appearance General: clear Color: none Phase: none Odor: none

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1425	7.44	1088	10.25	NA	NA	2.75	1	
							2	
							3	
1430	7.42	1075	10.33				4	Recharge
							5	

Stabilize Yes ☒ No ☐

Amount Water Removed: 2.75 Gallons

Comments:

Exceptions to Protocol:

1000 none
500 HNO₃-total

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Jeff Hoffman

Site:

Otter Tail Power Co./ Big Stone

Facility ID:

Date: 16 Apr 18

Unique Station ID:

Sample ID:

Slag 6

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary:

Protective Posts? ☒ Yes ☐ No

State ID Tag? Yes ☒ No

Grout Seal Intact? Yes ☒ No

Well Information

Well Depth: 37.50

Constructed Depth: 37.30

Casing Diameter: 2"

Water Level Before Purge: 21.62

Well Volume: 2.59 Gallons

Well Casing Elevation: NA

Static Water Elevation:

Previous Static:

Water Level After Samp

Measurement Method: ☒ Elec. WLI ☐ Steel Tape

Sampling Information

Weather Conditions: Temp: 38° Wind: NW 5 Sky: Sunny

Sampling Method: Grundfos Bladder SS/T Disp. Bailer Whale Grab Other:

Dedicated Equipment: Yes ☒ No

Pumping Rate: 1.25 gpm

Well Purged Dry? ☒ Yes ☐ No

Time Pump Began: 13:17:14 am ☒ pm

Time Purged Dry? 15:05

Time of Sampling: 15:10 am ☒ pm

Duplicate Sample? Yes ☒ No

Sample EH: 126.4

Sample Appearance: General: Slightly Cloudy Color: none Phase: none Odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1455	7.71	1322	11.01	NA	NA	2.75	1	
1510	7.129	1427	10.55	1	1	5.25	2	Recharge
							3	
							4	
							5	

Stabilized Yes

☒ No

Amount Water Remove: 5.25

Gallons

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Jeff Hoffman

Site:

Otter Tail Power Co./ Big Stone

Facility ID:

Date: 14 Apr 18

Unique Station ID:

Sample ID: Slag 7

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary:

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☐ Yes ☒ No

Grout Seal Intact? ☐ Yes ☒ No

Well Information

Well Depth: 49.04

Constructed Depth: 48.70

Casing Diameter: 2"

Water Level Before Purge: 15.20

Well Volume: 5.52 Gallons

Well Casing Elevation: NA

Static Water Elevation:

Previous Static: L

Water Level After Sample

Measurement Method: ☒ Elec. W/ Steel Tape

Sampling Information

Weather Conditions: Temp: 31°

Wind: NW-13

Sky: Sunny

Sampling Method: Grundfos

☒ Bladder SST

☐ Disp. Baller

☐ Whale

☐ Grab

☐ Other:

Dedicated Equipment Yes ☒ No

Pumping Rate: 0.25 gpm

Well Purged Dry? ☒ Yes ☐ No

Time Pump Began 11:20 ☒ am ☐ pm

Time Purged Dry? 11:43

Time of Sampling: 11:48 ☒ am ☐ pm

Duplicate Sample? ☐ Yes ☐ No ID:

Sample EH: 85.3

Sample Appearance: General: Slightly Cloudy Color: none

Phase: none Odor: none

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1143	9.56	1716	9.23	NA	NA	5.75	1	
1148	8.63	1611	9.07	1	1		2	Recharge
							3	
							4	
							5	

Stabilized? Yes ☒ No

Amount Water Removed: 5.75

Gallons

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 5607

507 354 8517

Groundwater Assessor

Sampling Personne

Jeff Hoffman

Site:

Otter Tail Power Co./ Big Stone

Facility ID:

Date:

16 Apr 18

Unique Station ID:

Sample ID:

Slag 2B

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☒ Yes ☐ No

Grout Seal Intact? ☒ Yes ☐ No

Well Information

Well Depth: 40.94

Constructed Depth: 40.80

Casing Diameter: 2"

Water Level Before Purge 11.48 19.63

Well Volume: 3.47 Gallons

Well Casing Elevation:

Static Water Elevation:

Previous Static:

Water Level After Sample

Measurement Method: Elec. WL Steel Tape

Sampling Information

Weather Condition: Temp: 31

Wind: NW 13

Sky: Sunny

Sampling Method: Grundfos

☒ Bladder SS/T

Disp. Bailer

Whale

Grab

Other:

Dedicated Equipment Yes ☐ No ☒

Well Purged Dry? ☒ Yes ☐ No

Time Purged Dry? 1303

Duplicate Sample? Yes ☐ No ☒

ID:

Sample Appearance General: clear

Color: none

Phase: none

Odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1303	9.14	1308	9.07	MA	MA	3.5	1	
1308	9.43	1181	8.76				2	Recharge
							3	
							4	
							5	

Stabilized Yes ☐ No ☒

Amount Water Removed: 3.5

Gallons

Comments:

Exceptions to Protocol:

* Slow Recharge

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Jeff Hoffman

Site: Otter Tail Power Co./ Big Stone

Facility ID: _____

Date: 16 Apr 18

Unique Station ID: _____

Sample ID: _____ Slag 8

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary: _____

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☒ Yes ☐ No

Grout Seal Intact? ☒ Yes ☐ No

Well Information

Well Depth: 52.25

Constructed Depth: 52.09

Casing Diameter: 2"

Water Level Before Purge: 19.74

Well Volume: 5.30 Gallons

Well Casing Elevation: NA

Static Water Elevation: I

Previous Static: _____

Water Level After Sample: _____

Measurement Method: Elec. WLP Steel Tape

Sampling Information

Weather Conditions: Temp: 36

Wind: NNW 14

Sky: Sunny

Sampling Method: Grundfos Bladder SS/T Disp. Bailer Whale Grab Other: _____

Dedicated Equipment Yes ☒ No

Pumping Rate: 0.25 gpm

Well Purged Dry? Yes ☒ No

Time Pump Began: 1405 am / pm

Time Purged Dry? _____

Time of Sampling: 1511 am / pm

Duplicate Sample? Yes ☒ No

ID: _____

Sample EH: 129.0

Sample Appearance: General: clear

Color: None

Phase: None

Odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>1427</u>	<u>6.99</u>	<u>1436</u>	<u>10.97</u>	<u>NA</u>	<u>NA</u>	<u>5.5</u>	<u>1</u>	
<u>1449</u>	<u>6.96</u>	<u>1428</u>	<u>10.77</u>	<u>I</u>	<u>I</u>	<u>11</u>	<u>2</u>	
<u>1511</u>	<u>6.94</u>	<u>1424</u>	<u>10.77</u>	<u>I</u>	<u>I</u>	<u>16.5</u>	<u>3</u>	
				<u>I</u>	<u>I</u>		<u>4</u>	
				<u>I</u>	<u>I</u>		<u>5</u>	

Stabilized? ☒ Yes ☐ No

Amount Water Removed: 16.5 Gallons

Comments: _____

Exceptions to Protocol:

- use whale pump
- casing possibly still bent

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Jeff Hoffmann

Site:

Otter Tail Power Co./ Big Stone

Facility ID:

Date:

16 Apr 13

Unique Station ID:

Sample ID:

Slag 9

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary:

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☒ Yes ☐ No

Grout Seal Intact? ☒ Yes ☐ No

Well Information

Well Depth: 51.22

Constructed Depth: 49.80

Casing Diameter: 2"

Water Level Before Purge: 16.96

Well Volume: 5.58 Gallons

Well Casing Elevation: NA

Static Water Elevation:

Previous Static:

Water Level After Sample 30.34

Measurement Method: Elec. W Steel Tape

Sampling Information

Weather Conditions: Temp: 32° Wind: NW-10 Sky: Sunny

Sampling Method: Grundfos Bladder SST Disp. Bailer Whale Grab Other:

Dedicated Equipment: Yes ☐ No ☒

Pumping Rate: 0.25 gpm

Well Purged Dry? Yes ☐ No ☒

Time Pump Began 1317 am ☐ pm ☒

Time Purged Dry?

Time of Sampling: 1426 am ☐ pm ☒

Duplicate Sample? Yes ☐ No ☒ ID: —

Sample EH: 106.5

Sample Appearance: General: Clear Color: none Phase: none Odor: none

23							S	
Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	E	
1340	7.52	2467	9.78	NA	NA	5.75	Q	
1403	7.50	2341	9.84			11.50	#	Comments:
1426	7.50	2344	9.96			17.25		
							4	
							5	

Stabilized: ☒ Yes ☐ No

Amount Water Removed: 17.25 Gallons

Comments:

Exceptions to Protocol:



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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FINAL REPORT COMPLETION DATE: 26 Jun 18

Date Reported: 22 Jun 2018

JOSH HOLLEN
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Work Order #: 31-0285
Account #: 006106
PO #: 48680

Project Name: BIG STONE

T. J. D. 25 June 18
Field Service Manager/Date Reviewed
[Signature] 22 June 18
Chemistry Lab Manager/Date Reviewed
[Signature] for 22 Jun 2018
Quality Assurance Director/Date Reviewed

RL = Reporting Limits
NQ = Not Present, Qualitative Only
PQ = Present, Qualitative Only
ND = Not Determined

All data for this report has been approved by MVTL Laboratory Management.

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



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CERTIFICATE of ANALYSIS - CCR

JOSH HOLLEN
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 22 Jun 2018
Lab Number: 18-A31221
Work Order #: 31-0285
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 20 Jun 2018 10:46
Sampled By: MVTL FIELD PERSONNEL
Date Received: 20 Jun 2018 15:00
PO #: 48680

Project Name: BIG STONE

Sample Description: SLAG 2B

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
pH, Field	7.30	units	1.00	I-1586-85	20 Jun 18 10:46	DGF

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.

The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix

= Due to concentration of other analytes

! = Due to sample quantity

+ = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



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CERTIFICATE of ANALYSIS - CCR

JOSH HOLLEN
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 22 Jun 2018
Lab Number: 18-A31222
Work Order #: 31-0285
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 20 Jun 2018 11:23
Sampled By: MVTL FIELD PERSONNEL
Date Received: 20 Jun 2018 15:00
PO #: 48680

Project Name: BIG STONE

Sample Description: SLAG 7

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
pH, Field	7.17	units	1.00	I-1586-85	20 Jun 18 11:23	DGF

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.

The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

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CERTIFICATE of ANALYSIS - CCR

JOSH HOLLEN
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Report Date: 22 Jun 2018
Lab Number: 18-A31223
Work Order #: 31-0285
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 20 Jun 2018 11:51
Sampled By: MVTI FIELD PERSONNEL
Date Received: 20 Jun 2018 15:00
PO #: 48680

Project Name: BIG STONE

Sample Description: SLAG 6

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
pH, Field	7.04	units	1.00	I-1586-85	20 Jun 18 11:51	DGF

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.

The reporting limit was elevated for any analyte requiring a dilution as coded below:

④ = Due to sample matrix

= Due to concentration of other analytes

! = Due to sample quantity

= Due to concentration of other ana
+ = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/PW # R-040

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Dusty Faresyn

Site: Otter Tail Power Co./ Big Stone

Facility ID: —

Date: 20 June 18

Unique Station ID: —

Sample ID: Slag 2B

Well Condition

Well Locked? Yes ☒ No ☐

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary: —

Protective Posts? ☒ Yes ☐ No

State ID Tag? Yes ☒ No ☐

Grout Seal Intact? Yes ☒ No ☐

Well Information

Well Depth: 40.94

Constructed Depth: 40.80

Casing Diameter: 2"

Water Level Before Purge: 18.01

Well Volume: 3.74 Gallons

Well Casing Elevation: 1111.26

Static Water Elevation: 1093.25

Previous Static: —

Water Level After Sample: 40.35

Measurement Method: Elec. Well Steel Tape

Sampling Information

Weather Conditions: Temp: 70 Wind: NNE 8 Sky: Ptly. Cloudy

Sampling Method: Grundfos Bladder SST Disp. Bailer Whale Grab Other: —

Dedicated Equipment: Yes ☒ No ☐

Well Purged Dry? ☒ Yes ☐ No

Time Purged Dry? 1041

Duplicate Sample? Yes ☒ No ☐ ID: —

Sample Appearance: General: Cloudy Color: Gray Phase: Lt. Sed. Odor: None

Pumping Rate: 0.25 gpm

Time Pump Began: 1026 am / pm

Time of Sampling: 1046 am / pm

Sample EH: 28.0

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>15</u>								
<u>1041</u>	<u>7.12</u>	<u>1859</u>	<u>10.42</u>	<u>NA</u>	<u>NA</u>	<u>3.75</u>	<u>1</u>	
							<u>2</u>	
							<u>3</u>	
							<u>4</u>	
<u>1046</u>	<u>7.30</u>	<u>1855</u>	<u>13.42</u>			<u>3.75</u>	<u>5</u>	<u>Recharge</u>

Stabilized Yes ☒ No ☐ Amount Water Removed: 3.75 Gallons

Comments:

- slow recharge!!

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Dusty Fargyn

Site: Otter Tail Power Co./ Big Stone

Facility ID:

Date: 20 June 18

Unique Station ID:

Sample ID: Slag 7

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary:

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☐ Yes ☒ No

Grout Seal Intact? ☐ Yes ☒ No

Well Information

Well Depth: 49.08

Constructed Depth: 48.70

Casing Diameter: 2"

Water Level Before Purge: 14.42

Well Volume: 5.65 Gallons

Well Casing Elevation: 1114.39

Static Water Elevation: 1099.97

Previous Static:

Water Level After Samp: 40.20

Measurement Method: ☒ Elec. WLL ☐ Steel Tape

Sampling Information

Weather Conditions: Temp: 72 Wind: NNE 7 Sky: Ptly. Cloudy

Sampling Method: Grundfos ☒ Bladder SS/D ☐ Disp. Bailer ☐ Whale ☐ Grab ☐ Other:

Dedicated Equipment: Yes ☒ No ☐

Pumping Rate: 0.25 gpm

Well Purged Dry? ☒ Yes ☐ No

Time Pump Began: 1055 ☒ am ☐ pm

Time Purged Dry? 1118

Time of Sampling: 1123 ☒ am ☐ pm

Duplicate Sample? Yes ☒ No ☐ ID:

Sample EH: 125.0

Sample Appearance: General: Sl. Cloudy Color: Gray Phase: Lt. Sed. Odor: None

23 Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1118	7.12	1498	10.03	NA	NA	5.75	1	
							2	
							3	
							4	
1123	7.17	1548	10.72			5.75	5	Recharge

Stabilized Yes ☒ No ☐

Amount Water Remove: 5.75 Gallons

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Dusty Farns

Site:

Otter Tail Power Co./ Big Stone

Facility ID:

Date: 20 June 18

Unique Station ID:

Sample ID:

Slag 6

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary:

Protective Posts? ☒ Yes ☐ No

State ID Tag? Yes ☒ No

Grout Seal Intact? Yes ☒ No

Well Information

Well Depth: 37.46

Constructed Depth: 37.30

Casing Diameter: 2"

Water Level Before Purge: 21.22

Well Volume: 2.64 Gallons

Well Casing Elevation: 1111.51

Static Water Elevation: 1090.29

Previous Static: NA

Water Level After Samp: 32.70

Measurement Method: ☒ Elec. WLI ☐ Steel Tape

Sampling Information

Weather Conditions: Temp: 72 Wind: NE @ 8 Sky: Partly Cloudy

Sampling Method: Grundfos ☒ Bladder SST ☐ Disp. Bailer ☐ Whale ☐ Grab ☐ Other:

Dedicated Equipment: Yes ☒ No

Pumping Rate: 0.25 gpm

Well Purged Dry? ☒ Yes ☐ No

Time Pump Began: 1128 ☒ am ☐ pm

Time Purged Dry: 1146

Time of Sampling: 1151 ☒ am ☐ pm

Duplicate Sample? Yes ☒ No

Sample EH: 139.5

Sample Appearance: General: Cloudy Color: Tan Phase: LT. Sed. Odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>1139</u>	<u>7.01</u>	<u>1360</u>	<u>11.55</u>	<u>NA</u>	<u>NA</u>	<u>2.75</u>	1	
							2	
							3	
							4	
<u>1151</u>	<u>7.04</u>	<u>1412</u>	<u>11.72</u>			<u>4.50</u>	5	<u>Recharge</u>

Stabilized Yes ☒ No

Amount Water Removed: 4.50

Gallons

Comments:

Exceptions to Protocol:



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FINAL REPORT COMPLETION DATE: 16 Jan 19 d H

Date Reported: 19 Dec 2018

MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Work Order #: 31-0547
Account #: 006106
PO #: 48080

Project Name: BIG STONE PLANT

T. J. H. 10 Jan 19
Field Service Manager/Date Reviewed
[Signature] 15 Jan 19
Chemistry Lab Manager/Date Reviewed
[Signature] 15 Jan 2019
Quality Assurance Director/Date Reviewed

RL = Reporting Limits
NQ = Not Present, Qualitative Only
PQ = Present, Qualitative Only
ND = Not Determined

All data for this report has been approved by MVTL Laboratory Management.

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 19 Dec 2018
 Lab Number: 18-A61783
 Work Order #: 31-0547
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 7 Nov 2018 9:07
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 7 Nov 2018 12:45
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: SLAG 4

Temp at Receipt: 0.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
MS Water Digestions				14 Nov 18	JMS
Water Digestions				13 Nov 18	JMS
Radium 226	See Attached			19 Dec 18 7:26	ABL
Radium 228	See Attached		EPA M9320	19 Dec 18 7:26	ABL
pH, Field	6.72 units	1.00	SM4500-H+-2011	7 Nov 18 9:07	MS
Sulfate	1310 ~ mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	47.6 mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Mercury	< 0.005 ug/L	0.005	EPA 245.7	14 Nov 18 11:44	RMB
	See Narrative				
Solids, Total Dissolved	2360 mg/L	10	SM 2540 C-97	8 Nov 18 11:54	AL
Calcium	476.0 ~ mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Lithium	0.208 mg/L	0.020	SW6010C	15 Nov 18 15:15	KAM
Barium	0.024 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Chromium	< 0.01 mg/L	0.01	SW6010C	15 Nov 18 15:15	KAM
Cobalt	< 0.005 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Boron	0.600 mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Antimony	< 5 ^@ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Arsenic	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Beryllium	< 0.25 @ ug/L	0.05	SW6020A	19 Nov 18 13:29	RMV
Cadmium	0.70 @ ug/L	0.10	SW6020A	19 Nov 18 13:29	RMV
Lead	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Molybdenum	3.91 @ ug/L	0.50	SW6020A	19 Nov 18 13:29	RMV
Selenium	< 5 ug/L	0.5	SW6020A	21 Nov 18 12:38	RMV
	^See Narrative				
Thallium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Fluoride	0.360 @ mg/L	0.020	EPA 300.0	12 Nov 18 14:36	RMV

* Holding Time Exceeded

Radium 226 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

Radium 228 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

~ Sample diluted due to result above calibration of linear range.

^ The reporting limit (RL) was elevated due to instrument performance at the lower limit of quantitation (LLOQ). This will only impact results that are found to be below the elevated RL. Results above the elevated RL are unaffected.

RL = Reporting Limit
 Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
 The reporting limit was elevated for any analyte requiring a dilution as coded below:
 @ = Due to sample matrix # = Due to concentration of other analytes
 ! = Due to sample quantity + = Due to internal standard response
 CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 19 Dec 2018
 Lab Number: 18-A61784
 Work Order #: 31-0547
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 7 Nov 2018 9:58
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 7 Nov 2018 12:45
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: SLAG 5

Temp at Receipt: 0.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
MS Water Digestions				14 Nov 18	JMS
Water Digestions				13 Nov 18	JMS
Radium 226	See Attached			19 Dec 18 7:26	ABL
Radium 228	See Attached		EPA M9320	19 Dec 18 7:26	ABL
pH, Field	7.30 units	1.00	SM4500-H+-2011	7 Nov 18 9:58	MS
Sulfate	76.5 @ mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	8.6 mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Mercury	< 0.005 ug/L	0.005	EPA 245.7	14 Nov 18 11:44	RMB
	See Narrative				
Solids, Total Dissolved	598 mg/L	10	SM 2540 C-97	12 Nov 18 10:50	AL
Calcium	124.0 mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Lithium	0.024 mg/L	0.020	SW6010C	15 Nov 18 15:15	KAM
Barium	0.146 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Chromium	< 0.01 mg/L	0.01	SW6010C	15 Nov 18 15:15	KAM
Cobalt	< 0.005 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Boron	0.453 mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Antimony	< 5 @^ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Arsenic	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Beryllium	< 0.25 @ ug/L	0.05	SW6020A	19 Nov 18 13:29	RMV
Cadmium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Lead	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Molybdenum	11.3 @ ug/L	0.50	SW6020A	19 Nov 18 13:29	RMV
Selenium	< 5 ug/L	0.5	SW6020A	21 Nov 18 12:38	RMV
	^See Narrative				
Thallium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Fluoride	0.350 @ mg/L	0.020	EPA 300.0	12 Nov 18 14:36	RMV

* Holding Time Exceeded

Radium 226 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

Radium 228 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

^ The reporting limit (RL) was elevated due to instrument performance at the lower limit of quantitation (LLOQ). This will only impact results that are found to be below the elevated RL. Results above the elevated RL are unaffected.

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.

The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix

= Due to concentration of other analytes

! = Due to sample quantity

+ = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 19 Dec 2018
 Lab Number: 18-A61785
 Work Order #: 31-0547
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 6 Nov 2018 13:59
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 7 Nov 2018 12:45
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: SLAG 6

Temp at Receipt: 0.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
MS Water Digestions				14 Nov 18	JMS
Water Digestions				13 Nov 18	JMS
Radium 226	See Attached			19 Dec 18 7:26	ABL
Radium 228	See Attached		EPA M9320	19 Dec 18 7:26	ABL
pH, Field	7.00 units	1.00	SM4500-H+-2011	6 Nov 18 13:59	MS
Sulfate	212 @ mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	7.4 mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Mercury	< 0.005 ug/L	0.005	EPA 245.7	14 Nov 18 11:44	RMB
	See Narrative				
Solids, Total Dissolved	936 mg/L	10	SM 2540 C-97	12 Nov 18 10:50	AL
Calcium	148.0 mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Lithium	0.088 mg/L	0.020	SW6010C	15 Nov 18 15:15	KAM
Barium	0.039 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Chromium	< 0.01 mg/L	0.01	SW6010C	15 Nov 18 15:15	KAM
Cobalt	< 0.005 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Boron	2.270 mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Antimony	< 5 @^ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Arsenic	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Beryllium	< 0.25 @ ug/L	0.05	SW6020A	19 Nov 18 13:29	RMV
Cadmium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Lead	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Molybdenum	8.99 @ ug/L	0.50	SW6020A	19 Nov 18 13:29	RMV
Selenium	5.34 ug/L	0.50	SW6020A	21 Nov 18 12:38	RMV
	^See Narrative				
Thallium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Fluoride	0.920 @ mg/L	0.020	EPA 300.0	12 Nov 18 14:36	RMV

* Holding Time Exceeded

Radium 226 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

Radium 228 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

^ The reporting limit (RL) was elevated due to instrument performance at the lower limit of quantitation (LLOQ). This will only impact results that are found to be below the elevated RL. Results above the elevated RL are unaffected.

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards. The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix # = Due to concentration of other analytes
 ! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 19 Dec 2018
 Lab Number: 18-A61786
 Work Order #: 31-0547
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 7 Nov 2018 8:21
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 7 Nov 2018 12:45
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: SLAG 7

Temp at Receipt: 0.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
MS Water Digestions				14 Nov 18	JMS
Water Digestions				13 Nov 18	JMS
Radium 226	See Attached			19 Dec 18 7:27	ABL
Radium 228	See Attached		EPA M9320	19 Dec 18 7:27	ABL
pH, Field	7.26 units	1.00	SM4500-H+-2011	7 Nov 18 8:21	MS
Sulfate	283 @ mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	5.7 mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Mercury	< 0.005 ug/L	0.005	EPA 245.7	14 Nov 18 11:44	RMB
	See Narrative				
Solids, Total Dissolved	957 mg/L	10	SM 2540 C-97	12 Nov 18 10:50	AL
Calcium	121.0 mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Lithium	0.166 mg/L	0.020	SW6010C	15 Nov 18 15:15	KAM
Barium	0.019 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Chromium	< 0.01 mg/L	0.01	SW6010C	15 Nov 18 15:15	KAM
Cobalt	< 0.005 mg/L	0.005	SW6010C	15 Nov 18 15:15	KAM
Boron	1.400 mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Antimony	< 5 @^ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Arsenic	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Beryllium	< 0.25 @ ug/L	0.05	SW6020A	19 Nov 18 13:29	RMV
Cadmium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Lead	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Molybdenum	4.77 @ ug/L	0.50	SW6020A	19 Nov 18 13:29	RMV
Selenium	< 5 ug/L	0.5	SW6020A	21 Nov 18 12:38	RMV
	^See Narrative				
Thallium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Fluoride	0.500 @ mg/L	0.020	EPA 300.0	13 Nov 18 22:49	RMV

* Holding Time Exceeded

Radium 226 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

Radium 228 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

^ The reporting limit (RL) was elevated due to instrument performance at the lower limit of quantitation (LLOQ). This will only impact results that are found to be below the elevated RL. Results above the elevated RL are unaffected.

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards. The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix # = Due to concentration of other analytes
 ! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 19 Dec 2018
 Lab Number: 18-A61787
 Work Order #: 31-0547
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 6 Nov 2018 12:03
 Sampled By: MVT L FIELD PERSONNEL
 Date Received: 7 Nov 2018 12:45
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: SLAG 8

Temp at Receipt: 0.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
MS Water Digestions				14 Nov 18	JMS
Water Digestions				13 Nov 18	JMS
Radium 226	See Attached			19 Dec 18 7:27	ABL
Radium 228	See Attached		EPA M9320	19 Dec 18 7:27	ABL
pH, Field	6.87 units	1.00	SM4500-H+-2011	6 Nov 18 12:03	MS
Sulfate	262 ~ mg/L	5.0	ASTM D516-07	15 Nov 18 11:47	KCJ
Chloride	50.2 mg/L	3.0	SM 4500 Cl E	21 Nov 18 9:12	KCJ
Mercury	< 0.005 ug/L	0.005	EPA 245.7	14 Nov 18 11:44	RMB
	See Narrative				
Solids, Total Dissolved	946 mg/L	10	SM 2540 C-97	12 Nov 18 10:50	AL
Calcium	122.0 mg/L	0.500	SW6010C	16 Nov 18 12:06	KAM
Lithium	0.054 mg/L	0.020	SW6010C	16 Nov 18 12:06	KAM
Barium	0.048 mg/L	0.005	SW6010C	16 Nov 18 12:06	KAM
Chromium	< 0.01 mg/L	0.01	SW6010C	16 Nov 18 12:06	KAM
Cobalt	< 0.005 mg/L	0.005	SW6010C	16 Nov 18 12:06	KAM
Boron	0.716 mg/L	0.100	SW6010C	16 Nov 18 12:06	KAM
	See Narrative				
Antimony	< 5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Arsenic	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Beryllium	< 0.25 @ ug/L	0.05	SW6020A	19 Nov 18 13:29	RMV
Cadmium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Lead	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Molybdenum	8.58 @ ug/L	0.50	SW6020A	19 Nov 18 13:29	RMV
Selenium	19.0 ug/L	0.50	SW6020A	21 Nov 18 12:38	RMV
	^See Narrative				
Thallium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Fluoride	0.600 @ mg/L	0.020	EPA 300.0	13 Nov 18 22:49	RMV

* Holding Time Exceeded

Radium 226 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

Radium 228 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

~ Sample diluted due to result above calibration of linear range.

^ The reporting limit (RL) was elevated due to instrument performance at the lower limit of quantitation (LLOQ). This will only impact results that are found to be below the elevated RL. Results above the elevated RL are unaffected.

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.

The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix # = Due to concentration of other analytes
 ! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 19 Dec 2018
 Lab Number: 18-A61788
 Work Order #: 31-0547
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 6 Nov 2018 13:25
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 7 Nov 2018 12:45
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: SLAG 9

Temp at Receipt: 0.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
MS Water Digestions				14 Nov 18	JMS
Water Digestions				13 Nov 18	JMS
Radium 226	See Attached			19 Dec 18 7:27	ABL
Radium 228	See Attached		EPA M9320	19 Dec 18 7:27	ABL
pH, Field	6.74 units	1.00	SM4500-H+-2011	6 Nov 18 13:25	MS
Sulfate	1130 ~ mg/L	5.0	ASTM D516-07	15 Nov 18 11:47	KCJ
Chloride	11.8 mg/L	3.0	SM 4500 Cl E	21 Nov 18 9:12	KCJ
Mercury	< 0.005 ug/L	0.005	EPA 245.7	14 Nov 18 11:44	RMB
	See Narrative				
Solids, Total Dissolved	2070 mg/L	10	SM 2540 C-97	12 Nov 18 10:50	AL
Calcium	421.0 ~ mg/L	0.500	SW6010C	16 Nov 18 12:06	KAM
Lithium	0.140 mg/L	0.020	SW6010C	16 Nov 18 12:06	KAM
Barium	0.038 mg/L	0.005	SW6010C	16 Nov 18 12:06	KAM
Chromium	< 0.01 mg/L	0.01	SW6010C	16 Nov 18 12:06	KAM
Cobalt	< 0.005 mg/L	0.005	SW6010C	16 Nov 18 12:06	KAM
Boron	0.210 mg/L	0.100	SW6010C	16 Nov 18 12:06	KAM
	See Narrative				
Antimony	< 5 @^ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Arsenic	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Beryllium	< 0.25 @ ug/L	0.05	SW6020A	19 Nov 18 13:29	RMV
Cadmium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Lead	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Molybdenum	8.42 @ ug/L	0.50	SW6020A	19 Nov 18 13:29	RMV
Selenium	< 5 ug/L	0.5	SW6020A	21 Nov 18 12:38	RMV
	^See Narrative				
Thallium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Fluoride	0.420 @ mg/L	0.020	EPA 300.0	13 Nov 18 22:49	RMV

* Holding Time Exceeded

Radium 226 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

Radium 228 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

~ Sample diluted due to result above calibration of linear range.

^ The reporting limit (RL) was elevated due to instrument performance at the lower limit of quantitation (LLOQ). This will only impact results that are found to be below the elevated RL. Results above the elevated RL are unaffected.

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.

The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix

= Due to concentration of other analytes

! = Due to sample quantity

+ = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



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CERTIFICATE of ANALYSIS - CCR

MEGAN LISBURG
 OTTER TAIL POWER CO
 PO BOX 496
 FERGUS FALLS MN 56538-0496

Report Date: 19 Dec 2018
 Lab Number: 18-A61789
 Work Order #: 31-0547
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 7 Nov 2018 9:33
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 7 Nov 2018 12:45
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: SLAG 2B

Temp at Receipt: 0.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
MS Water Digestions				14 Nov 18	JMS
Water Digestions				13 Nov 18	JMS
Radium 226	See Attached			19 Dec 18 7:25	ABL
Radium 228	See Attached		EPA M9320	19 Dec 18 7:25	ABL
pH, Field	7.29 units	1.00	SM4500-H+-2011	7 Nov 18 9:28	MS
Sulfate	622 ~ mg/L	5.0	ASTM D516-07	15 Nov 18 11:47	KCJ
Chloride	25.9 mg/L	3.0	SM 4500 Cl E	21 Nov 18 9:12	KCJ
Mercury	< 0.005 ug/L	0.005	EPA 245.7	14 Nov 18 11:44	RMB
	See Narrative				
Solids, Total Dissolved	1430 mg/L	10	SM 2540 C-97	12 Nov 18 10:50	AL
Calcium	198.0 mg/L	0.500	SW6010C	16 Nov 18 12:06	KAM
Lithium	0.076 mg/L	0.020	SW6010C	16 Nov 18 12:06	KAM
Barium	0.080 mg/L	0.005	SW6010C	16 Nov 18 12:06	KAM
Chromium	< 0.01 mg/L	0.01	SW6010C	16 Nov 18 12:06	KAM
Cobalt	< 0.005 mg/L	0.005	SW6010C	16 Nov 18 12:06	KAM
Boron	3.160 mg/L	0.100	SW6010C	16 Nov 18 12:06	KAM
	See Narrative				
Antimony	< 5 @^ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Arsenic	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Beryllium	< 0.25 @ ug/L	0.05	SW6020A	19 Nov 18 13:29	RMV
Cadmium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Lead	< 2.5 @ ug/L	0.5	SW6020A	19 Nov 18 13:29	RMV
Molybdenum	6.18 @ ug/L	0.50	SW6020A	19 Nov 18 13:29	RMV
Selenium	< 5 ug/L	0.5	SW6020A	21 Nov 18 12:38	RMV
	^See Narrative				
Thallium	< 0.5 @ ug/L	0.1	SW6020A	19 Nov 18 13:29	RMV
Fluoride	0.260 @ mg/L	0.020	EPA 300.0	13 Nov 18 22:49	RMV

* Holding Time Exceeded

Radium 226 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

Radium 228 subcontracted to:
 Inter-Mountain Labs
 1673 Terra Ave
 Sheridan, WY 82801

~ Sample diluted due to result above calibration of linear range.

^ The reporting limit (RL) was elevated due to instrument performance at the lower limit of quantitation (LLOQ). This will only impact results that are found to be below the elevated RL. Results above the elevated RL are unaffected.

RL = Reporting Limit

Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
 The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix # = Due to concentration of other analytes
 ! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Date Reported: 19 Dec 2018

MEGAN LISBURG
OTTER TAIL POWER CO
PO BOX 496
FERGUS FALLS MN 56538-0496

Work Order #: 201831-0547
Account Number: 006106
PO #: 48080

Project Name: BIG STONE PLANT

LABORATORY NARRATIVE

INORGANIC & METALS ANALYSES:

The percent recovery of the mercury matrix spike duplicate for samples 18-A61783 through 18-A61789 was outside of acceptable range. Data was reported based on the acceptable recovery of the matrix spike and acceptable relative percent difference between the matrix spikes.

Due to high concentration, percent recovery of boron was outside acceptable range in the matrix spike and duplicate for samples 18-A61787 through 18-A61789. Data was reported based on acceptable laboratory control spike recovery and relative percent difference between matrix spike and duplicate.

The internal standard associated with selenium was suppressed in the laboratory reagent blank for samples 18-A61783 through 18-A61789. This could cause elevation of the blank concentrations. Data was reported based on all blank values being below the reporting limit.

No other problems were encountered with these analyses.

Amended report 15 January 2019:

The magnesium results were deleted from samples 18-A61777 through 18-A61789.



Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Date: 12/18/2018

CLIENT: MVTL Inc
Project: Ottertail Power Big Stone CCR WO 31-0547
Lab Order: S1811163

CASE NARRATIVE
Report ID: S1811163001

Samples Slag-2B A61789, Slag-4 A61783, Slag-5 A61784, Slag-6 A61785, Slag-7 A61786, Slag-8 A61787 and Slag-9 A61788 were received on November 12, 2018.

All samples were received and analyzed within the EPA recommended holding times, except those noted below in this case narrative. Samples were analyzed using the methods outlined in the following references:

"Standard Methods For The Examination of Water and Wastewater", approved method versions
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition
40 CFR Parts 136 and 141
40 CFR Part 50, Appendices B, J, L, and O
Methods indicated in the Methods Update Rule published in the Federal Register Friday, May 18, 2012
ASTM approved and recognized standards

All Quality Control parameters met the acceptance criteria defined by EPA and Inter-Mountain Laboratories except as indicated in this case narrative.

Reviewed by:

Wade Nieuwsma, Assistant Laboratory Manager

Page 1 of 1



Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Sample Analysis Report

Company: MVTI Inc
1126 N Front St
New Ulm, MN 56073

Date Reported 12/18/2018
Report ID S1811163001

ProjectName: Ottetail Power Big Stone CCR WO 31-0547
Lab ID: S1811163-001
ClientSample ID: Slag-2B A61789
COC: WEB
PWS ID:
Comments

WorkOrder: S1811163
CollectionDate: 11/7/2018 9:33:00 AM
DateReceived: 11/12/2018 10:20:00 AM
FieldSampler:
Matrix: Water

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	ND	pCi/L		1	SM 7500 Ra-B	12/12/2018 813	AA
Radium 226 Precision (±)	NA	pCi/L			SM 7500 Ra-B	12/12/2018 813	AA
Radium 228	ND	pCi/L		2	Ga-Tech	12/03/2018 223	AA
Radium 228 Precision (±)	NA	pCi/L			Ga-Tech	12/03/2018 223	AA

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits
X Matrix Effect

C Calculated Value
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL or is less than LCL
O Outside the Range of Dilutions
U Analysis reported under the reporting limit

Reviewed by: Wade Nieuwsma
Wade Nieuwsma, Assistant Laboratory Manager

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Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Sample Analysis Report

Company: MVTI Inc
1126 N Front St
New Ulm, MN 56073

Date Reported 12/18/2018
Report ID S1811163001

ProjectName: Ottertail Power Big Stone CCR WO 31-0547
Lab ID: S1811163-002
ClientSample ID: Slag-4 A61783
COC: WEB
PWS ID:
Comments

WorkOrder: S1811163
CollectionDate: 11/7/2018 9:07:00 AM
DateReceived: 11/12/2018 10:20:00 AM
FieldSampler:
Matrix: Water

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
Radionuclides - Total						
Radium 226	ND	pCi/L		1	SM 7500 Ra-B	12/12/2018 813 AA
Radium 226 Precision (±)	NA	pCi/L			SM 7500 Ra-B	12/12/2018 813 AA
Radium 228	ND	pCi/L		2	Ga-Tech	12/03/2018 526 AA
Radium 228 Precision (±)	NA	pCi/L			Ga-Tech	12/03/2018 526 AA

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits
X Matrix Effect

C Calculated Value
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL or is less than LCL
O Outside the Range of Dilutions
U Analysis reported under the reporting limit

Reviewed by: Wade Nieuwsma
Wade Nieuwsma, Assistant Laboratory Manager



Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Sample Analysis Report

Company: MVTI Inc
1126 N Front St
New Ulm, MN 56073

Date Reported 12/18/2018
Report ID S1811163001

ProjectName: Ottertail Power Big Stone CCR WO 31-0547
Lab ID: S1811163-003
ClientSample ID: Slag-5 A61784
COC: WEB
PWS ID:
Comments

WorkOrder: S1811163
CollectionDate: 11/7/2018 9:58:00 AM
DateReceived: 11/12/2018 10:20:00 AM
FieldSampler:
Matrix: Water

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
Radionuclides - Total						
Radium 226	ND	pCi/L		1	SM 7500 Ra-B	12/12/2018 813 AA
Radium 226 Precision (±)	NA	pCi/L			SM 7500 Ra-B	12/12/2018 813 AA
Radium 228	ND	pCi/L		2	Ga-Tech	12/03/2018 829 AA
Radium 228 Precision (±)	NA	pCi/L			Ga-Tech	12/03/2018 829 AA

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits
X Matrix Effect

C Calculated Value
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL or is less than LCL
O Outside the Range of Dilutions
U Analysis reported under the reporting limit

Reviewed by: Wade Nieuwsma
Wade Nieuwsma, Assistant Laboratory Manager



Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Sample Analysis Report

Company: MVTL Inc
1126 N Front St
New Ulm, MN 56073

Date Reported 12/18/2018
Report ID S1811163001

ProjectName: Ottetail Power Big Stone CCR WO 31-0547
Lab ID: S1811163-004
ClientSample ID: Slag-6 A61785
COC: WEB
PWS ID:
Comments

WorkOrder: S1811163
CollectionDate: 11/6/2018 1:59:00 PM
DateReceived: 11/12/2018 10:20:00 AM
FieldSampler:
Matrix: Water

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	ND	pCi/L		1	SM 7500 Ra-B	12/12/2018 813	AA
Radium 226 Precision (±)	NA	pCi/L			SM 7500 Ra-B	12/12/2018 813	AA
Radium 228	ND	pCi/L		2	Ga-Tech	12/03/2018 1132	AA
Radium 228 Precision (±)	NA	pCi/L			Ga-Tech	12/03/2018 1132	AA

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits
X Matrix Effect

C Calculated Value
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL or is less than LCL
O Outside the Range of Dilutions
U Analysis reported under the reporting limit

Reviewed by: Wade Nieuwsma
Wade Nieuwsma, Assistant Laboratory Manager



Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Sample Analysis Report

Company: MVTL Inc
1126 N Front St
New Ulm, MN 56073

Date Reported 12/18/2018
Report ID S1811163001

ProjectName: Ottetail Power Big Stone CCR WO 31-0547
Lab ID: S1811163-005
ClientSample ID: Slag-7 A61786
COC: WEB
PWS ID:
Comments

WorkOrder: S1811163
CollectionDate: 11/7/2018 8:21:00 AM
DateReceived: 11/12/2018 10:20:00 AM
FieldSampler:
Matrix: Water

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
Radionuclides - Total						
Radium 226	ND	pCi/L		1	SM 7500 Ra-B	12/12/2018 813 AA
Radium 226 Precision (±)	NA	pCi/L			SM 7500 Ra-B	12/12/2018 813 AA
Radium 228	ND	pCi/L		2	Ga-Tech	12/08/2018 013 AA
Radium 228 Precision (±)	NA	pCi/L			Ga-Tech	12/08/2018 013 AA

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits
X Matrix Effect

C Calculated Value
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL or is less than LCL
O Outside the Range of Dilutions
U Analysis reported under the reporting limit

Reviewed by: Wade Nieuwsma
Wade Nieuwsma, Assistant Laboratory Manager



Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Sample Analysis Report

Company: MVTL Inc
1126 N Front St
New Ulm, MN 56073

Date Reported 12/18/2018
Report ID S1811163001

ProjectName: Ottertail Power Big Stone CCR WO 31-0547
Lab ID: S1811163-006
ClientSample ID: Slag-8 A61787
COC: WEB
PWS ID:
Comments

WorkOrder: S1811163
CollectionDate: 11/6/2018 12:03:00 PM
DateReceived: 11/12/2018 10:20:00 AM
FieldSampler:
Matrix: Water

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
Radionuclides - Total						
Radium 226	ND	pCi/L		1	SM 7500 Ra-B	12/12/2018 813 AA
Radium 226 Precision (±)	NA	pCi/L			SM 7500 Ra-B	12/12/2018 813 AA
Radium 228	ND	pCi/L		2	Ga-Tech	12/08/2018 316 AA
Radium 228 Precision (±)	NA	pCi/L			Ga-Tech	12/08/2018 316 AA

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits
X Matrix Effect

C Calculated Value
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL or is less than LCL
O Outside the Range of Dilutions
U Analysis reported under the reporting limit

Reviewed by: Wade Nieuwsma
Wade Nieuwsma, Assistant Laboratory Manager

Page 6 of 7



Inter-Mountain Labs

Your Environmental Monitoring Partner

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Sample Analysis Report

Company: MVTI Inc
1126 N Front St
New Ulm, MN 56073

Date Reported 12/18/2018
Report ID S1811163001

ProjectName: Ottertail Power Big Stone CCR WO 31-0547
Lab ID: S1811163-007
ClientSample ID: Slag-9 A61788
COC: WEB
PWS ID:
Comments

WorkOrder: S1811163
CollectionDate: 11/6/2018 1:25:00 PM
DateReceived: 11/12/2018 10:20:00 AM
FieldSampler:
Matrix: Water

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
Radionuclides - Total							
Radium 226	ND	pCi/L		1	SM 7500 Ra-B	12/12/2018 813	AA
Radium 226 Precision (±)	NA	pCi/L			SM 7500 Ra-B	12/12/2018 813	AA
Radium 228	ND	pCi/L		2	Ga-Tech	12/08/2018 619	AA
Radium 228 Precision (±)	NA	pCi/L			Ga-Tech	12/08/2018 619	AA

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits
X Matrix Effect

C Calculated Value
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL or is less than LCL
O Outside the Range of Dilutions
U Analysis reported under the reporting limit

Reviewed by: Wade Nieuwsma
Wade Nieuwsma, Assistant Laboratory Manager

Page 7 of 7



Inter-Mountain Labs

Your Environmental Monitoring Partner

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT**CLIENT:** MVTI Inc**Date:** 12/18/2018**Work Order:** S1811163**Report ID:** S1811163001**Project:** Ottetail Power Big Stone CCR WO 31-0547**Radium 228 by Ga/Tech**Sample Type **MBLK**

Units: pCi/L

MB-539 (12/01/18 10:47)	RunNo: 163687	PrepDate: 11/19/18 0:00	BatchID 15312					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Total Radium 228

ND

1

MB-540 (12/07/18 08:58)	RunNo: 163898	PrepDate: 11/27/18 0:00	BatchID 15349					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Total Radium 228

ND

1

Radium 228 by Ga/TechSample Type **LCS**

Units: pCi/L

LCS-539 (12/01/18 13:50)	RunNo: 163687	PrepDate: 11/19/18 0:00	BatchID 15312					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Total Radium 228

36

1

39

91.9

65.9 - 132

LCS-540 (12/07/18 12:01)	RunNo: 163898	PrepDate: 11/27/18 0:00	BatchID 15349					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Total Radium 228

36

1

39

91.7

65.9 - 132

Radium 228 by Ga/TechSample Type **MS**

Units: pCi/L

MS-539 (12/01/18 19:55)	RunNo: 163687	PrepDate: 11/19/18 0:00	BatchID 15312					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Total Radium 228

33

1

39

ND

83.4 50 - 139

MS-540 (12/07/18 18:07)	RunNo: 163898	PrepDate: 11/27/18 0:00	BatchID 15349					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Total Radium 228

36

1

39

3

86.4 50 - 139

Radium 228 by Ga/TechSample Type **MSD**

Units: pCi/L

MSD-539 (12/01/18 22:58)	RunNo: 163687	PrepDate: 11/19/18 0:00	BatchID 15312					
Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual	

Total Radium 228

33

1

33

0.699

83.9

20

MSD-540 (12/07/18 21:10)	RunNo: 163898	PrepDate: 11/27/18 0:00	BatchID 15349					
Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual	

Total Radium 228

41

1

36

11.2

97.4

20

Qualifiers:

B Analyte detected in the associated Method Blank

G Analyzed at IML Gillette laboratory

J Analyte detected below quantitation limits

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

X Matrix Effect

E Value above quantitation range

H Holding times for preparation or analysis exceeded

L Analyzed by another laboratory

O Outside the Range of Dilutions

S Spike Recovery outside accepted recovery limits



Inter-Mountain Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

ANALYTICAL QC SUMMARY REPORT**CLIENT:** MVTI Inc**Date:** 12/18/2018**Work Order:** S1811163**Report ID:** S1811163001**Project:** Ottertail Power Big Stone CCR WO 31-0547**Radium 226 In Water -**

Sample Type MBLK

Units: pCi/L

MB-1941 (12/12/18 08:13)	RunNo: 163956	PrepDate: 12/05/18 0:00	BatchID 15356				
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual

Radium 226

ND

0.2

Radium 226 In Water -

Sample Type LCS

Units: pCi/L

LCS-1941 (12/12/18 08:13)	RunNo: 163956	PrepDate: 12/05/18 0:00	BatchID 15356				
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual

Radium 226

5.5

0.2

5.98

92.4

67.1 - 122

Radium 226 In Water -

Sample Type LCSD

Units: pCi/L

LCSD-1941 (12/12/18 08:13)	RunNo: 163956	PrepDate: 12/05/18 0:00	BatchID 15356				
Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual

Radium 226

5.1

0.2

5.5

7.27

85.9

20

Radium 226 In Water -

Sample Type MS

Units: pCi/L

S1811163-001AMS (12/12/18 08:13)	RunNo: 163956	PrepDate: 12/05/18 0:00	BatchID 15356				
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual

Radium 226

11

1

12

ND

88.4

65 - 131

Qualifiers:

B Analyte detected in the associated Method Blank
G Analyzed at IML Gillette laboratory
J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
X Matrix Effect

E Value above quantitation range
H Holding times for preparation or analysis exceeded
L Analyzed by another laboratory
O Outside the Range of Dilutions
S Spike Recovery outside accepted recovery limits

Minnesota Valley Testing Laboratories

1126 North Front Street New Ulm, MN 56003

Phone: 800 782 3557 Fax: 507 359 2890

Field Service Chain of Custody Record

Project Otter Tail Power Company	Project Type: Big Stone Plant CCR	Name of Samplers: DF, BW, MS
Report: Otter Tail Power Company	Carbon Copy: Barr Engineering	Quote Number:
Attn: Paul Vukonich	Attn:	Work Order Number:
Address: P.O. Box 496	Address:	Lab Numbers:
Fergus Falls, MN 56538-0496		
Phone: 218-739-8349		

Sample Information						Bottle Type												Analysis	
Lab Number	Sample ID	Unique Station ID	Date	Time	Sample Type	Sample Location	1000 HNO3 Inner Mountain	500 None	1000 none	500 HNO3	Filter? Y or N	500 H2SO4	Filter? Y or N	1000 Amber none	1000 Amber H2SO4	500 NaOH	Other: 150 H2SO4	Other: 150 None	Analysis Required
A1777	H2OX		6 Nov 18	1337	GW				1	1	N								CCR 3
18	H3OX		I	1405	GW				1	1	N								CCR 3
19	H4OX		I	1522	GW				1	1	N								CCR 3
80	H-6		I	1427	GW				1	1	N								CCR 3
81	H-8		I	1507	GW				1	1	N								CCR 3
82	H-9		I	1559	GW				1	1	N								CCR 3
83	Slag 4		7 Nov 18	907	GW		2	1	1	1	N								CCR 3, 4
84	Slag 5		I	958	GW		2	1	1	1	N								CCR 3, 4
85	Slag 6		6 Nov 18	1359	GW		2	1	1	1	N								CCR 3, 4
86	Slag 7		7 Nov 18	821	GW		2	1	1	1	N								CCR 3, 4

Comments:

Samples Relinquished By: [Signature]			Samples Received By:		
Date: 7 Nov 18	Time: 1245	Temp: 0.07M 70	Date:	Time:	Temp:
Samples Relinquished into: Fridge Log in Cart Other:					
Samples Relinquished By:			Samples Received By:		
Date:	Time:	Temp:	Date:	Time:	Temp:
Delivery: Samplers Other:			Seal Number(s) - If Used		
Transport: Ambient [initials] Other:			Seals Intact? Yes No		

Minnesota Valley Testing Laboratories

1126 North Front Street New Ulm, MN 56003

Phone: 800 782 3557 Fax: 507 359 2890

Field Service Chain of Custody Record

Project Otter Tail Power Company	Project Type: Big Stone Plant CCR	Name of Samplers: DF, BW, MS
Report Otter Tail Power Company	Carbon Copy: Barr Engineering	Quote Number:
Attn: Paul Vukonich	Attn:	Work Order Number:
Address P.O. Box 496	Address:	Lab Numbers:
Fergus Falls, MN 56538-0496		
Phone: 218-739-8349		

Sample Information					Bottle Type												Analysis		
Lab Number	Sample ID	Unique Station ID	Date	Time	Sample Type	Sample Location	1000 HNO3 Inner Mountain	500 None	1000 none	500 HNO3	Filter? Y or N	500 H2SO4	Filter? Y or N	1000 Amber none	1000 Amber H2SO4	500 NaOH	Other: 150 H2SO4	Other: 150 None	Analysis Required
	Slag 8		6 Nov 18	1203	GW		2	1	1	1	N								CCR 3, 4
	Slag 9		1	1325	GW		2	1	1	1	N								CCR 3, 4
	Slag 2B		7 Nov 18	933	GW		2	1	1	1	N								CCR 3, 4
															</				

Comments:

Samples Relinquished By: <i>DF</i>			Samples Received By:		
Date: 7 Nov 18	Time: 1245	Temp: 0.07M	Date:	Time:	Temp:
Samples Relinquished into: Fridge			Log in Cart Other:		
Samples Relinquished By:			Samples Received By:		
Date:	Time:	Temp:	Date:	Time:	Temp:
Delivery: Samplers			Seal Number(s) - If Used		
Transport: Ambient			Seals Intact? Yes No		

Fall 2018

Truck
Truck
Ranger

Big Stone Sampling - CCR

Landfill or ADA wells

Site	Parameter List	Well Depth	Diameter (Inches)	Well Elevation	Sample Equipment	Dedicated?	Pump Rate (ml/minute)	Goes Dry?	Sampling Seasons**
H2OX	CCR 3	32.20	2	1103.91	Bladder	Yes	100	Yes	April & Oct
H3OX	CCR 3	22.55	2	1095.19	Bladder	Yes	100	Yes	April & Oct
H4OX	CCR 3	27.20	2	1108.22	Bladder	Yes	100	No	April & Oct
H6	CCR 3	15.00	2	1097.76	Bladder	Yes	100	Yes	April & Oct
H8	CCR 3	22.05	2	1081.23	Bladder	Yes	100	No	April & Oct
H9	CCR 3	30.20	2	1086.21	Bladder	Yes	100	No	April & Oct

Slag Pond wells

SLAG4	CCR 3 and CCR 4	39.00	2	1110.20	LOW FLOW	No	100	No	April & Oct
SLAG5	CCR 3 and CCR 4	38.80	2	1107.30	LOW FLOW	No	100	Yes	April & Oct
SLAG6	CCR 3 and CCR 4	37.30	2	1111.51	LOW FLOW	No	100	Yes	April & Oct
SLAG7	CCR 3 and CCR 4	48.70	2	1114.39	LOW FLOW	No	100	Yes	April & Oct
SLAG8	CCR 3 and CCR 4	52.09	2	1127.26	LOW FLOW	No	100	No	April & Oct
SLAG9	CCR 3 and CCR 4	49.80	2	1122.35	LOW FLOW	No	100	No	April & Oct
SLAG2B	CCR 3 and CCR 4	40.80	2	1111.26	LOW FLOW	No	100	Yes	April & Oct

sample CCR 3 first and then CCR 4

Note: CCR sampling is for total recoverable metals. They are not filtered in the field.

CCR 3 & 4 see the first two tabs labeled CCR 3 and CCR 4

List CCR 3

1000 NONE
500 HNO₃

List CCR 3+4

2-1000 HNO₃
500 NONE
1000 NONE
500 HNO₃

CCR - Appendix III Detection Monitoring

Field Parameters

pH*

* Field and Laboratory Measurements

Total Concentration Parameters

	Method
Boron	6010
Calcium	6010
Chloride	SM4500 CL E
Fluoride	EPA 300
pH	SM 4500 H+B-96
Sulfate	ASTM D516
Dissolved Solids, Total	SM 2540 C-97

Note: These are non-filtered samples.

1000 none
500 H2O2

4

CCR - Appendix IV - Assessment Monitoring

Total Concentration Parameters	Method
Antimony	SW6020A
Arsenic	SW602A
Barium	SW6010C
Beryllium	SW6020A
Cadmium	SW6020A
Chromium, Total	SW6020A
14 Cobalt	SW6010C
14 Fluoride	EPA 300
Lead	SW6020A
Lithium	SW6010C
Mercury	EPA 245.7
Molybdenum	SW6020A
Selenium	SW6020A
Thallium	SW6020A
14 Radium 226 + 228	

Note: These are non-filtered samples.

1000 none
500 HNO₃
2-1000 HNO₃

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Matt Stein

Site:

Otter Tail Power Co./ Big Stone

Facility ID:

Date: 7 Nov 18

Unique Station ID:

Sample ID:

Slag 4

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary:

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☒ Yes ☐ No

Grout Seal Intact? ☒ Yes ☐ No

Well Information

Well Depth: 39.23

Constructed Depth: 39.00

Casing Diameter: 2"

Water Level Before Purge: 14.43

Well Volume: 3.23 Gallons

Well Casing Elevation: NA

Static Water Elevation: 1

Previous Static:

Water Level After Sample: 25.34

Measurement Method: ☒ Elec. WLI ☐ Steel Tape

Sampling Information

Weather Conditions: Temp: 24

Wind: NW-16

Sky: Cloudy

Sampling Method: Grundfos ☐ Bladder SS/T ☐ Disp. Bailer ☒ Whale ☐ Grab ☐ Other:

Dedicated Equipment: Yes ☒ No ☐

Pumping Rate: 0.25 gpm

Well Purged Dry? Yes ☒ No ☐

Time Pump Began: 8:28 am / pm

Time Purged Dry?

Time of Sampling: 9:07 am / pm

Duplicate Sample? Yes ☒ No ☐ ID: —

Sample EH: 179.7

Sample Appearance: General: Slightly cldy Color: none Phase: none Odor: none

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>8:41</u>	<u>6.75</u>	<u>2690</u>	<u>9.13</u>	<u>NA</u>	<u>NA</u>	<u>3.25</u>	<u>1</u>	
<u>8:54</u>	<u>6.74</u>	<u>2653</u>	<u>9.12</u>	<u>1</u>	<u>1</u>	<u>6.5</u>	<u>2</u>	
<u>9:07</u>	<u>6.72</u>	<u>2659</u>	<u>9.11</u>	<u>1</u>	<u>1</u>	<u>9.75</u>	<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized? ☒ Yes ☐ No

Amount Water Removed: 9.75 Gallons

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Matt Stein

Site: Otter Tail Power Co./ Big Sl

Facility ID: _____

Date: 7 Nov 18

Unique Station ID: _____

Sample ID: Slag 5

Well Condition

Well Locked? ☒ Yes ☐ No
Well Labeled? ☒ Yes ☐ No
Casing Straight? ☒ Yes ☐ No

Protective Posts? ☒ Yes
State ID Tag? ☒ Yes
Grout Seal Intact? ☒ Yes

Repairs Necessary: _____

Well Information

Well Depth: 39.02
Constructed Depth: 38.80
Casing Diameter: 2"
Water Level Before Purge: 23.28
Well Volume: 256 Gallons

Well Casing Elevation: 1107.30
Static Water Elevation: 1084.02
Previous Static: 1083.99
Water Level After Sample: _____
Measurement Method: ☒ Elec. V Steel Tape

Sampling Information

Weather Conditions: Temp: 27 Wind: NW - 15 to 20 Sky: cloudy
Sampling Method: Grundfos ☒ Bladder SS/T ☐ Disp. Bailer ☒ Whale ☐ Grab ☐ Other: _____
Dedicated Equipment: Yes ☒ No ☐
Well Purged Dry? ☒ Yes ☐ No
Time Purged Dry? 953
Duplicate Sample? Yes ☒ No ☐ ID: _____
Sample Appearance: General: Clear Color: None Phase: None odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
9:53	7.45	856	7.60	NA	NA	2.75	1	
9:58	7.36	837	9.14				2	Rehse
							3	
							4	
							5	

Stabilized? Yes ☒ No ☐

Amount Water Removed: 2.75

Comments: _____

Exceptions to Protocol: _____

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Matt Stern

Site: Otter Tail Power Co./ Big Sto

Facility ID: _____

Date: 6 Nov 18

Unique Station ID: _____

Sample ID: Slag 6

Well Condition

Well Locked? ☒ Yes ☐ No
Well Labeled? ☒ Yes ☐ No
Casing Straight? ☒ Yes ☐ No

Protective Posts? ☒ Yes ☐ No
State ID Tag? ☒ Yes ☐ No
Grout Seal Intact? ☒ Yes ☐ No

Repairs Necessary: _____

Well Information

Well Depth: 37.45

Constructed Depth: 37.30

Casing Diameter: 2"

Water Level Before Purge: 22.23

Well Volume: 2.48 Gallons

Well Casing Elevation: 1111.51

Static Water Elevation: 1089.28

Previous Static: 1087.31

Water Level After Sample: 30.75

Measurement Method: ☒ Elec ☐ W Steel Tape

Sampling Information

Weather Conditions: Temp: 31 Wind: 16 Sky: Cloudy

Sampling Method: Grundfos ☒ Bladder SS/T ☐ Disp. Bailor ☒ Whale ☐ Grab ☐ Other: _____

Dedicated Equipment: Yes ☒ No ☐

Well Purged Dry? ☒ Yes ☐ No

Time Purged Dry? 1354

Duplicate Sample? Yes ☒ No ☐ ID: _____

Pumping Rate: 0.25 gpm

Time Pump Began: 1334 am ☒ pm

Time of Sampling: 1357 am ☒ pm

Sample EH: 273.0

Sample Appearance: General: Slightly cloudy Color: None Phase: None Odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>1344</u>	<u>6.99</u>	<u>1209</u>	<u>11.26</u>	<u>NA</u>	<u>NA</u>	<u>2.5</u>	<u>1</u>	
<u>1354</u>	<u>6.96</u>	<u>1214.30</u>	<u>11.30</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>2</u>	
<u>1357</u>	<u>7.11</u>	<u>1250</u>	<u>11.06</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>3</u>	<u>recharge</u>
							<u>4</u>	
							<u>5</u>	

Stabilized? Yes ☒ No ☐ Amount Water Removed: 5.0 Gallons

Comments:

*Good recharge

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Matt Strick

Site: Otter Tail Power Co./ Big Sto

Facility ID:

Date: *7 Nov 8*

Unique Station ID:

Sample ID: Slag 7

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Protective Posts? ☒ Yes

State ID Tag? Yes *NO*

Grout Seal Intact? Yes *NO*

Repairs Necessary:

Well Information

Well Depth: *49.65*

Constructed Depth: 48.70

Casing Diameter: 2"

Water Level Before Purge: *15.60*

Well Volume: *5.45* Gallons

Well Casing Elevation: *1114.39*

Static Water Elevation: *1098.79*

Previous Static: *1105.71*

Water Level After Sample: *48.88*

Measurement Method: *Elec. V Steel Tape*

Sampling Information

Weather Conditions: Temp: *24* Wind: *NW 15* Sky: *Cloudy*

Sampling Method: Grundfos Bladder SS/T Disp. Bailor *Whale* Grab Other:

Dedicated Equipment: Yes *No*

Pumping Rate: *0.25*

Well Purged Dry? *Yes* No

Time Pump Began: *754* *am* / pm ⁶

Time Purged Dry? *816*

Time of Sampling: *821* *am* / pm

Duplicate Sample? Yes *No* ID: *-*

Sample EH: *158.8*

Sample Appearance: General: *cloudy* Color: *none* Phase: *none* *none*

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<i>22</i>								
<i>816</i>	<i>6.81</i>	<i>1386</i>	<i>9.27</i>	<i>NA</i>	<i>NA</i>	<i>5.50</i>	<i>1</i>	
<i>821</i>	<i>7.26</i>	<i>1369</i>	<i>9.56</i>				<i>2</i>	<i>Recharge</i>
							<i>3</i>	
							<i>4</i>	
							<i>5</i>	

Stabilized? Yes *No*

Amount Water Removed: *5.50*

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Matt Stein

Site: Otter Tail Power Co./ Big Sto

Facility ID: _____

Date: 6 Nov 18

Unique Station ID: _____

Sample ID: Slag 8

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Repairs Necessary: _____

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☒ Yes ☐ No

Grout Seal Intact? ☒ Yes ☐ No

Well Information

Well Depth: 52.25

Constructed Depth: 52.09

Casing Diameter: 2"

Water Level Before Purge: 18.10

Well Volume: 5.57 Gallons

Well Casing Elevation: 1127.26

Static Water Elevation: 1109.16

Previous Static: 1109.74

Water Level After Sample: 32.01

Measurement Method: ☒ Rec. Well ☐ Steel Tap

Sampling Information

Weather Conditions: Temp: 31 Wind: 1W @ 20-25 Sky: Light Snow

Sampling Method: Grundfos ☒ Bladder SS/T ☐ Disp. Bailer ☒ Whale ☐ Grab ☐ Other: _____

Dedicated Equipment: Yes ☒ No ☐

Well Purged Dry? Yes ☒ No ☐

Time Purged Dry? _____

Duplicate Sample? Yes ☒ No ☐ ID: _____

Pumping Rate: 0.25 gpm

Time Pump Began: 1054 am / pm

Time of Sampling: 1203 am / pm

Sample EH: 274.6

Sample Appearance: General: clear Color: none Phase: none Odor: Sulfur

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>1117</u>	<u>6.94</u>	<u>1350</u>	<u>10.67</u>	<u>NA</u>	<u>NA</u>	<u>5.75</u>	<u>1</u>	
<u>1140</u>	<u>6.91</u>	<u>1352</u>	<u>10.57</u>			<u>11.5</u>	<u>2</u>	
<u>1203</u>	<u>6.87</u>	<u>1354</u>	<u>10.66</u>			<u>17.25</u>	<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized? Yes ☒ No ☐ Amount Water Removed: 17.25 Gallons

Comments: _____

Exceptions to Protocol: _____

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Matt Stein

Site: Otter Tail Power Co./ Big Sto

Facility ID:

Date: 6 Nov 18

Unique Station ID:

Sample ID: Slag 9

Well Condition

Well Locked? ☒ Yes ☐ No

Well Labeled? ☒ Yes ☐ No

Casing Straight? ☒ Yes ☐ No

Protective Posts? ☒ Yes ☐ No

State ID Tag? ☒ Yes ☐ No

Grout Seal Intact? ☒ Yes ☐ No

Repairs Necessary:

Well Information

Well Depth: 51.27

Constructed Depth: 49.80

Casing Diameter: 2"

Water Level Before Purge: 13.99

Well Volume: 6.08 Gallons

Well Casing Elevation: 1122.35

Static Water Elevation: 1102.36

Previous Static: 1106.75

Water Level After Sample: 35.67

Measurement Method: Elec / Steel Tape

Sampling Information

Weather Conditions: Temp: 31 Wind: 11W20-25 Sky: Cloudy

Sampling Method: Grundfos ☒ Bladder SS/T ☐ Disp. Bailer ☒ Whale ☐ Grab ☐ Other:

Dedicated Equipment: Yes ☒ No ☐

Well Purged Dry? Yes ☒ No ☐

Time Purged Dry? ☒

Duplicate Sample? Yes ☒ No ☐ ID:

Pumping Rate: 0.25

Time Pump Began: 1210 am / pm

Time of Sampling: 1325 am / pm

Sample EH: 258.0

Sample Appearance: General: Cloudy Color: tan Phase: 21 sed. / Flakes odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>1236</u>	<u>6.75</u>	<u>2328</u>	<u>9.70</u>	<u>NA</u>	<u>NA</u>	<u>6.25</u>	<u>1</u>	
<u>1300</u>	<u>6.83</u>	<u>2281</u>	<u>9.56</u>	<u>/</u>	<u>/</u>	<u>12.5</u>	<u>2</u>	
<u>1325</u>	<u>6.74</u>	<u>2250</u>	<u>9.56</u>	<u>/</u>	<u>/</u>	<u>18.75</u>	<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized? ☒ Yes ☐ No

Amount Water Removed: 18.75

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

matth stein

Site: Otter Tail Power Co./

Facility ID: _____

Date: 7 Nov 18

Unique Station ID: _____

Sample ID: Slag 2B

Well Condition

Well Locked? Yes ☒ No ☐
Well Labeled? ☒ Yes ☐ No
Casing Straight? ☒ Yes ☐ No

Protective Posts? ☒ Yes ☐ No
State ID Tag? Yes ☐ No ☒
Grout Seal Intact? Yes ☐ No ☒

Repairs Necessary: _____

Well Information

Well Depth: 410.93

Constructed Depth: 40.80

Casing Diameter: 2"

Water Level Before Purge: 19.45

Well Volume: 3.50 Gallons

Well Casing Elevation: 111.26

Static Water Elevation: 1091.81

Previous Static: 1092.37

Water Level After Sample: 39.99

Measurement Method: Elec. WLI

Sampling Information

Weather Conditions: Temp: 21 Wind: NW-17 Sky: cloudy

Sampling Method: Grundfos Bladder SS/T Disp. Bailer ☒ Whale Grab Other: _____

Dedicated Equipment: Yes ☐ No ☒

Well Purged Dry? ☒ Yes ☐ No

Time Purged Dry? 925

Duplicate Sample? Yes ☐ No ☒ ID: _____

Pumping Rate: .25 gpm

Time Pump Began: 914 am

Time of Sampling: 933 am

Sample EH: _____

Sample Appearance: General: clear Color: none Phase: none Odor: none

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comm
<u>928</u>	<u>7.29</u>	<u>1755</u>	<u>3.37</u>	<u>NA</u>	<u>NA</u>	<u>3.50</u>	<u>1</u>	
<u>933</u>							<u>2</u>	<u>recharge</u>
							<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized? Yes ☐ No ☒ Amount Water Removed: 3.50 Gallon

Comments:

* Insufficient volume for recharge reading -
* Very slow recharge

Exceptions to Protocol:

Big Stone Plant Notes

- 1 Advance notice must be given to Josh Hollen, Otter Tail Power Company - Environmental Services prior to sampling at (218) 739-8314 or jhollen@otpc.com
- 2 There is no routine summer round of sampling at Big Stone after CCR background is complete
- 3 Three additional monitoring wells will be installed in the summer of 2016 that are not indicated on this sampling plan.
The three new wells will be analyzed for the Big Stone Plant "C" Parameter List
- 4 A new site will be sampled for CCR parameters. The Plant's Slag Pond and associated temporary slag stockpile area are covered under the EPA's CCR rule. There will be 8 new wells at this site that will require CCR sampling
- 5 Please separate the Chain of Custody and associated field and lab reports for the Ash Disposal Area ("H" series wells) from the other sites. DENR is requiring us to file separate reports.
- 6 The CCR-related sampling and reporting should be in its own report aside from the State sampling
- 7 We will need 8 CCR sampling events conducted and reported by September 2017 for Appendix III and Appendix IV CCR parameters
A few of those can be tied with State-Required sampling events; otherwise they'll need to be separate runs.
- 8 The Spring Water Monitoring Report must be submitted by June 30 each year
- 9 The Fall Water Monitoring Report must be submitted by January 31 of the following year
- 10 The surface water samples are UNFILTERED
- 11 Wells 11 & 12 have dedicated pumps that require a portable generator be used in order to operate the pumps
- 12 Access is generally good to most wells. Samplers in the past have used an ATV or have walked into 2 or 3 sites
- 13 Please remove all reference of "ASH RUNOFF POND" and replace with "RECLAIM POND"; Please review site names.
Please use site names as indicated - including ALL CAPS and elimination of hyphens and spaces in order to facilitate efficient database management.
- 14 One MS/MSD per event
- 15 Please send a copy of all reports to Barr Engineering (including CoCRs, Field, QA/QC and Lab)

Quality Control Report

Lab IDs: 18-A61777 to 18-A61789

Project: BIG STONE PLANT CCR

Work Order: 201831-0547

Analyte	LCS Spike Amt	LCS Rec %	LCS % Rec Limits	Matrix Spike Amt	Matrix Spike ID	Matrix Spike Orig Result	Matrix Spike Result	Matrix Spike Rec %	Matrix Spike % Rec Limits	MSD/ Dup Orig Result	MSD/ Dup Result	MSD Rec %	MSD/ Dup RPD	MSD/ Dup RPD Limit (<=)	Known Rec (%)	Known % Rec Limits	Method Blank
Alkalinity, Total mg/L CaCO3	-	-	-	82.0	18-A61765	409	484	91	77-115	484	483	90	0.2	5	93	90-110	< 20
	-	-	-	82.0	18-A61771	397	472	91	77-115	472	473	93	0.2	5	94	90-110	< 20
	-	-	-	82.0	18-A61782	505	579	90	77-115	579	580	91	0.2	5	94	90-110	< 20
	-	-	-	82.0	18-A62213	223	297	90	77-115	297	297	90	0.0	5	95	90-110	< 20
	-	-	-	82.0	18-A62221	193	267	90	77-115	267	266	89	0.4	5	95	90-110	< 20
	-	-	-	82.0	18-A62227	200	273	89	77-115	273	270	85	1.1	5			
	-	-	-	82.0	18-A61651	398	478	98	77-115	478	477	96	0.2	5			
Antimony ug/L	25.0	106	85-115	25.0	18-A61788	< 5	26.7	107	75-125	26.7	27.7	111	3.7	10	100	90-110	< 0.5
Arsenic ug/L	25.0	106	85-115	25.0	18-A61788	< 2.5	28.2	113	75-125	28.2	28.7	115	1.8	10	97	90-110	< 0.5
Arsenic, Dissolved ug/L	-	-	-	50.0	18A61782q	1.54	60.2	117	75-125	60.2	59.6	116	1.0	10	108	90-110	< 0.5
Barium mg/L	1.000	99	85-115	1.00	18A61786q	0.019	1.020	100	75-125	1.020	1.020	100	0.0	10	102	90-110	< 0.005
	1.000	99	85-115	1.00	18A61776q	0.065	1.050	98	75-125	1.050	1.060	99	0.9	10	102	90-110	< 0.005
Barium, Dissolved mg/L	1.000	97	85-115	1.00	18A61780q	0.082	1.060	98	75-125	1.060	1.060	98	0.0	10	98	90-110	< 0.005
	1.000	98	85-115	1.00	18A63263q	< 0.005	0.973	97	75-125	0.973	0.966	97	0.7	10	103	90-110	< 0.005
Beryllium ug/L	2.50	110	85-115	2.50	18-A61788	< 0.25	2.65	106	75-125	2.65	2.62	105	1.1	10	104	90-110	< 0.05
Boron mg/L	1.000	100	85-115	1.00	18A61786q	1.400	2.470	107	75-125	2.470	2.520	112	2.0	10	102	90-110	< 0.1
	1.000	98	85-115	1.00	18A61776q	46.40	45.20	-120	75-125	45.20	46.20	-20	2.2	10	101	90-110	< 0.1
Boron, Dissolved mg/L	1.00	93	85-115	1.00	18A61780q	3.88	4.91	103	75-125	4.91	4.96	108	1.0	10	97	90-110	< 0.1
	1.00	95	85-115	1.00	18A63263q	< 0.1	0.97	97	75-125	0.97	0.96	96	1.0	10	99	90-110	< 0.1
Cadmium ug/L	5.00	111	85-115	5.00	18-A61788	< 0.5	5.79	116	75-125	5.79	5.68	114	1.9	10	103	90-110	< 0.1
Cadmium, Dissolved ug/L	-	-	-	10.0	18A61782q	< 0.2	10.6	106	75-125	10.6	9.82	98	7.6	10	105	90-110	< 0.1
Calcium mg/L	50.00	103	85-115	50.0	18A61786q	121.0	174.0	106	75-125	174.0	175.0	108	0.6	10	106	90-110	< 0.5
	50.00	102	85-115	50.0	18A61776q	177.0	220.0	86	75-125	220.0	225.0	96	2.2	10	106	90-110	< 0.5
Chloride mg/L	-	-	-	60.0	18-A61786	5.7	63.9	97	86-117	63.9	62.6	95	2.1	5	94	90-110	< 3
	-	-	-	60.0	18-A62204	9.6	74.1	108	86-117	74.1	71.2	103	4.0	5	95	90-110	< 3
Chromium mg/L	1.000	102	85-115	1.00	18A61786q	< 0.01	1.020	102	75-125	1.020	1.020	102	0.0	10	102	90-110	< 0.01
	1.000	102	85-115	1.00	18A61776q	< 0.1	0.977	98	75-125	0.977	1.000	100	2.3	10	104	90-110	< 0.01

Quality Control Report

Lab IDs: 18-A61777 to 18-A61789

Project: BIG STONE PLANT

Work Order: 201831-0547

Analyte	LCS Spike Amt	LCS Rec %	LCS % Rec Limits	Matrix Spike Amt	Matrix Spike ID	Matrix Spike Orig Result	Matrix Spike Result	Matrix Spike Rec %	Matrix Spike % Rec Limits	MSD/ Dup Orig Result	MSD/ Dup Result	MSD Rec %	MSD/ Dup RPD	MSD/ Dup RPD Limit (<)	Known Rec (%)	Known % Rec Limits	Method Blank
Chromium, Dissolved mg/L	1.000	94	85-115	1.00	18A61780q	< 0.01	0.976	98	75-125	0.976	0.984	98	0.8	10	97	90-110	< 0.01
	1.000	96	85-115	1.00	18A63263q	< 0.01	0.984	98	75-125	0.984	0.968	97	1.6	10	97	90-110	< 0.01
Cobalt mg/L	1.000	103	85-115	1.00	18A61786q	< 0.005	0.997	100	75-125	0.997	1.000	100	0.3	10	104	90-110	< 0.005
	1.000	101	85-115	1.00	18A61776q	< 0.05	0.966	97	75-125	0.966	0.992	99	2.7	10	104	90-110	< 0.005
Copper, Dissolved ug/L	-	-	-	50.0	18A61782q	1.82	48.6	94	75-125	48.6	47.1	91	3.1	10	102	90-110	< 0.5
Fluoride mg/L □	-	-	-	1.00	a61785qc	0.920	1.87	95	75-125	1.87	1.84	92	1.6	10	104	90-110	< 0.02
	-	-	-	1.00	a61800qc	0.720	1.75	103	75-125	1.75	1.70	98	2.9	10	100	90-110	< 0.02
Lead ug/L	25.0	108	85-115	25.0	18-A61788	< 2.5	28.0	112	75-125	28.0	27.1	108	3.3	10	102	90-110	< 0.5
Lead, Dissolved ug/L	-	-	-	50.0	18A61782q	< 1	51.3	103	75-125	51.3	50.8	102	1.0	10	103	90-110	< 0.5
Lithium mg/L	1.000	98	85-115	1.00	18-A61786	0.166	1.190	102	75-125	1.190	1.200	103	0.8	10	100	90-110	< 0.02
	1.000	97	85-115	1.00	18A61776qc	0.718	1.720	100	75-125	1.720	1.740	102	1.2	10	100	90-110	< 0.02
Magnesium mg/L	50.00	101	85-115	50.0	18A61786q	62.10	114.0	104	75-125	114.0	115.0	106	0.9	10	103	90-110	< 0.5
Manganese, Dissolved mg/L	1.000	94	85-115	1.00	18A61780q	< 0.005	0.988	99	75-125	0.988	0.981	98	0.7	10	97	90-110	< 0.005
	1.000	97	85-115	1.00	18A63263q	< 0.005	0.986	99	75-125	0.986	0.977	98	0.9	10	96	90-110	< 0.005
Mercury ug/L	-	-	-	0.10	18-A61789	< 0.005	0.109	109	63-111	0.109	0.112	112	2.7	18	95	76-113	< 0.005
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.005
Mercury, Dissolved ug/L	-	-	-	0.10	18-A61779	< 0.005	0.083	83	63-111	0.083	0.080	80	3.7	18	97	76-113	< 0.005
	-	-	-	0.10	18-A62207	< 0.005	0.098	98	63-111	0.098	0.096	96	2.1	18	97	76-113	< 0.005
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.005
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.005
Molybdenum ug/L	25.0	109	85-115	25.0	18-A61788	8.42	35.7	109	75-125	35.7	34.9	106	2.3	10	104	90-110	< 0.5
Nitrate+Nitrite mg/L as N	-	-	-	2.00	18-A61754	0.26	2.12	93	76-116	2.12	2.15	95	1.4	5	94	90-110	< 0.05
pH units	-	-	-	-	-	-	-	-	-	7.0	7.0	-	0.0	2.5	101	90-110	-
	-	-	-	-	-	-	-	-	-	7.4	7.4	-	0.0	2.5	101	90-110	-
Potassium mg/L	50.00	97	85-115	50.0	18A61786q	108.0	164.0	112	75-125	164.0	166.0	116	1.2	10	100	90-110	< 0.5
Selenium ug/L	25.0	107	85-115	25.0	18A61788q	< 5	25.9	104	75-125	25.9	26.2	105	1.2	10	100	90-110	< 0.5

Quality Control Report

Lab IDs: 18-A61777 to 18-A61789

Project: BIG STONE PLANT

Work Order: 201831-0547

Analyte	LCS Spike Amt	LCS Rec %	LCS % Rec Limits	Matrix Spike Amt	Matrix Spike ID	Matrix Spike Orig Result	Matrix Spike Result	Matrix Spike Rec %	Matrix Spike % Rec Limits	MSD/ Dup Orig Result	MSD/ Dup Result	MSD Rec %	MSD/ Dup RPD	MSD/ Dup RPD Limit (<)	Known Rec (%)	Known % Rec Limits	Method Blank
Selenium, Dissolved ug/L	-	-	-	125	18A63258q	< 2.5	131	105	75-125	131	136	109	3.7	10	95	90-110	< 0.5 < 0.5
Silver, Dissolved mg/L	0.0500 0.0500	93 94	85-115 85-115	0.05 0.05	18A61780q 18A63263q	< 0.005 < 0.005	0.0486 0.0478	97 96	75-125 75-125	0.0486 0.0478	0.0491 0.0473	98 95	1.0 1.1	10 10	97 98	90-110 90-110	< 0.005 < 0.005
Sodium mg/L	50.00	99	85-115	50.0	18A61786q	45.70	98.70	106	75-125	98.70	99.30	107	0.6	10	101	90-110	< 0.5
Solids, Total Dissolved mg/L	-	-	-	-	-	-	-	-	-	3130 2360 1950 3570	3080 2320 1950 3480	- - - -	1.6 1.7 0.0 2.6	7 7 7 7	102 105	85-115 85-115	< 10 < 10
Specific Conductance umhos/cm	-	-	-	-	-	-	-	-	-	3484 2949 3025 497.1 459.6 664.3 1573	3462 2952 2996 504.1 458.6 643.1 1594	- - - - - -	0.6 0.1 1.0 1.4 0.2 3.2 1.3	5 5 5 5 5 5 5	98 99 100 97 101	90-110 90-110 90-110 90-110 90-110	- - - - - -
Strontium, Dissolved mg/L	1.000 1.000	98 98	85-115 85-115	1.00 1.00	18A61780q 18A63263q	0.220 < 0.005	1.200 0.976	98 98	75-125 75-125	1.200 0.976	1.200 0.972	98 97	0.0 0.4	10 10	97 100	90-110 90-110	< 0.005 < 0.005
Sulfate mg/L	-	-	-	500 500	18-A61786 18-A61789	283 622	849 1200	113 116	68-132 68-132	849 1200	846 1210	113 118	0.4 0.8	5 5	107 103	80-120 80-120	< 5 < 5
Thallium ug/L	5.00	107	85-115	5.00	18-A61788	< 0.5	5.58	112	75-125	5.58	5.51	110	1.3	10	102	90-110	< 0.1
Vanadium, Dissolved mg/L	1.000 1.000	97 98	85-115 85-115	1.00 1.00	18A61780q 18A63263q	< 0.005 < 0.005	0.992 0.991	99 99	75-125 75-125	0.992 0.991	1.000 0.976	100 98	0.8 1.5	10 10	102 103	90-110 90-110	< 0.005 < 0.005
Zinc, Dissolved mg/L	1.000 1.000	93 95	85-115 85-115	1.00 1.00	18A61780q 18A63263q	< 0.01 < 0.01	0.969 0.996	97 100	75-125 75-125	0.969 0.996	0.972 0.976	97 98	0.3 2.0	10 10	94 95	90-110 90-110	< 0.01 < 0.01

The boron matrix spike and spike duplicate recoveries were outside the acceptance limits, see narrative.

The mercury matrix spike duplicate recovery was outside the acceptance limits, see narrative.

Approved by:

