



# 2018 Annual Groundwater Monitoring and Corrective Action Report

*CCR Annual Monitoring Report*

*Ash Disposal 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

## Ash Disposal Area

### Big Stone Plant Big Stone City, South Dakota

January 2019

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## Acronyms

<b>Acronym</b>	<b>Description</b>
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
OTP	Otter Tail Power Company
SSI	Statistically Significant Increase

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## 1.0 Introduction

Otter Tail Power Company (OTP) operates Big Stone Plant, a coal-fired generation unit near Big Stone City, South Dakota (Figure 1). Coal combustion residuals (CCR) from plant operations are placed in an on-site landfill, referred to as the Ash Disposal Area. The Ash Disposal Area 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 landfills. The location of the CCR unit (Ash Disposal Area) is shown on Figure 1.

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

### 1.1 Purpose

As stated in Section §257.90(e), 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, Ash Disposal 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 from the CCR Rule 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.

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## 2.0 Groundwater Monitoring and Corrective Action Program

This section documents the status of the groundwater monitoring and corrective action program for the CCR unit 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 Ash Disposal 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 12 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 H2OX, H3OX, H4OX, H6, H8, and H9. In addition to the semiannual samples, one resample was collected from monitoring well H6 for field pH on June 20, 2018.

### 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 reporting period.

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## 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.
- 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).



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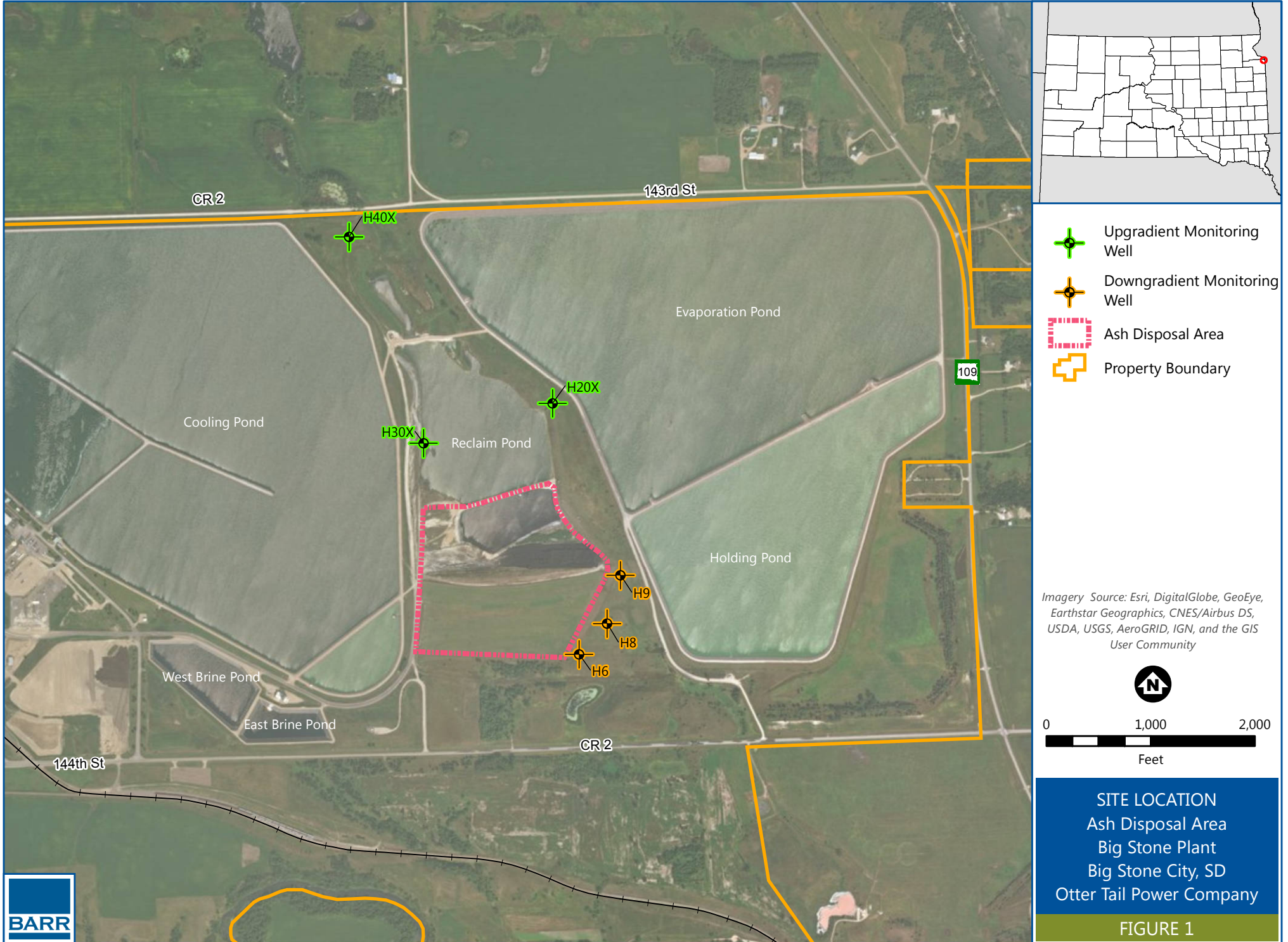
## 3.0 References

Barr, 2018. 2017 Annual Groundwater Monitoring and Corrective Action Report, Big Stone Plant Ash Disposal Area. Prepared for Otter Tail Power Company. January 2018.

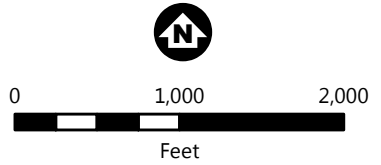
Barr, 2016. Groundwater Monitoring System Report, Big Stone Plant Ash Disposal Area. Prepared for Otter Tail Power Company. December 2016.

Carlson McCain, 2017. CCR Groundwater Sampling and Analysis Plan (Including Statistical Method Selection and Certification), Big Stone Plant Ash Disposal Area. Prepared for Otter Tail Power Company. October 2017.

## Figures



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



**SITE LOCATION**  
Ash Disposal Area  
Big Stone Plant  
Big Stone City, SD  
Otter Tail Power Company

**FIGURE 1**

## Appendices

## Appendix A

### Laboratory Reports and Field Sheets



**MINNESOTA VALLEY TESTING LABORATORIES, INC.**

1126 North Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890  
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1201 Lincoln Hwy. ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885  
www.mvtd.com



FINAL REPORT COMPLETION DATE: 18 May 18 AB

Date Reported: 15 May 2018

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

Work Order #: 31-0151\_ASH  
Account #: 006106  
PO #: 48680

Project Name: BIG STONE PLANT

[Signature] 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-A17810  
 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: WELL H6

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.82	units	1.00	I-1586-85	16 Apr 18 13:08	BS
pH	* 7.3	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	50.6 @	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	3.5	mg/L	3.0	SM 4500 Cl E	20 Apr 18 9:48	KCJ
Solids, Total Dissolved	583	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	50.90	mg/L	0.500	SW6010C	19 Apr 18 16:35	RMV
Boron	3.800	mg/L	0.100	SW6010C	19 Apr 18 16:35	RMV
Fluoride	0.370	mg/L	0.020	EPA 300.0	26 Apr 18 10:45	RMV

\* Holding Time Exceeded

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: 15 May 2018  
Lab Number: 18-A17811  
Work Order #: 31-0151  
Account #: 006106  
Sample Matrix: GROUNDWATER  
Date Sampled: 16 Apr 2018 14:16  
Sampled By: MVTL FIELD PERSONNEL  
Date Received: 16 Apr 2018 19:10  
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: WELL H8

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.83	units	1.00	I-1586-85	16 Apr 18 14:16	BS
pH	* 7.2	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	239 @	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	4.6	mg/L	3.0	SM 4500 Cl E	20 Apr 18 9:48	KCJ
Solids, Total Dissolved	877	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	107.0	mg/L	0.500	SW6010C	19 Apr 18 16:35	RMV
Boron	3.940	mg/L	0.100	SW6010C	19 Apr 18 16:35	RMV
Fluoride	0.540	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-A17812  
Work Order #: 31-0151  
Account #: 006106  
Sample Matrix: GROUNDWATER  
Date Sampled: 16 Apr 2018 15:27  
Sampled By: MVTl FIELD PERSONNEL  
Date Received: 16 Apr 2018 19:10  
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: WELL H9

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.25	units	1.00	I-1586-85	16 Apr 18 15:27	BS
pH	* 6.8	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	1520 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	25.6	mg/L	3.0	SM 4500 Cl E	20 Apr 18 9:48	KCJ
Solids, Total Dissolved	2840	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	604.0 ~	mg/L	0.500	SW6010C	19 Apr 18 17:08	RMV
Boron	1.170	mg/L	0.100	SW6010C	19 Apr 18 17:08	RMV
Fluoride	0.320 @	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.

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: 15 May 2018  
Lab Number: 18-A17813  
Work Order #: 31-0151  
Account #: 006106  
Sample Matrix: GROUNDWATER  
Date Sampled: 16 Apr 2018 15:47  
Sampled By: MVT L FIELD PERSONNEL  
Date Received: 16 Apr 2018 19:10  
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: WELL H2OX

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.09	units	1.00	I-1586-85	16 Apr 18 15:47	MS
pH	* 7.1	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	2390 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	3.7	mg/L	3.0	SM 4500 Cl E	20 Apr 18 9:48	KCJ
Solids, Total Dissolved	3870	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	481.0 ~	mg/L	0.500	SW6010C	24 Apr 18 10:56	RMV
Boron	0.240	mg/L	0.100	SW6010C	19 Apr 18 17:08	RMV
Fluoride	0.310 @	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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## 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-A17814  
 Work Order #: 31-0151  
 Account #: 006106  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 16 Apr 2018 13:03  
 Sampled By: MVTL FIELD PERSONNEL  
 Date Received: 16 Apr 2018 19:10  
 PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: WELL H30X

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	7.14	units	1.00	I-1586-85	16 Apr 18 13:03	BS
pH	* 7.0	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	1910 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	79.7	mg/L	3.0	SM 4500 Cl E	20 Apr 18 9:48	KCJ
Solids, Total Dissolved	3740	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	414.0 ~	mg/L	0.500	SW6010C	24 Apr 18 10:56	RMV
Boron	6.920 ~	mg/L	0.100	SW6010C	24 Apr 18 10:56	RMV
Fluoride	0.290 @	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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## 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-A17815  
Work Order #: 31-0151  
Account #: 006106  
Sample Matrix: GROUNDWATER  
Date Sampled: 16 Apr 2018 14:38  
Sampled By: MVTL FIELD PERSONNEL  
Date Received: 16 Apr 2018 19:10  
PO #: 48680

Project Name: BIG STONE PLANT

Sample Description: WELL H40X

Temp at Receipt: 0.9C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					18 Apr 18	JMS
pH, Field	6.82	units	1.00	I-1586-85	16 Apr 18 14:38	BS
pH	* 6.9	units	1.0	SM 4500 H+ B-2000	17 Apr 18 11:40	MCS
Sulfate	1190 ~	mg/L	5.0	ASTM D516-07	19 Apr 18 9:01	AKF
Chloride	50.1	mg/L	3.0	SM 4500 Cl E	20 Apr 18 9:48	KCJ
Solids, Total Dissolved	2300	mg/L	10	SM 2540 C-97	17 Apr 18 14:25	MCS
Calcium	315.0	mg/L	0.500	SW6010C	19 Apr 18 17:08	RMV
Boron	0.408	mg/L	0.100	SW6010C	19 Apr 18 17:08	RMV
Fluoride	0.340 @	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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**INORGANIC AND METALS ANALYSES:**

No problems were encountered with these analyses.

**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	
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	
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	
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

<b>Project:</b> Otter Tail Power Company	<b>Project Type:</b> Big Stone Plant CCR	<b>Name of Samplers:</b> Jess Hoffmann, DS, BS Matt Stern, Ben Wolf
<b>Report:</b> Otter Tail Power Company	<b>Carbon Copy:</b> Barr Engineering	<b>Quote Number:</b>
<b>Attn:</b> Paul Vukonich	<b>Attn:</b>	<b>Work Order Number:</b>
<b>Address:</b> P.O. Box 496 Fergus Falls, MN 56538-0496	<b>Address:</b>	<b>Lab Numbers:</b>
<b>Phone:</b> 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
ATRB	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 null</i>			Samples Received By: <i>A. Steiner</i>		
Date:	Time: <i>9:10</i>	Temp: <i>4</i>	Date: <i>17 April</i>	Time: <i>8:00</i>	Temp: <i>2-4C</i>
Samples Relinquished into: <input checked="" type="checkbox"/> Fridge <input type="checkbox"/> Log in Cart <input type="checkbox"/> 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:

Ben Stubbs

Site: Otter Tail Power Co./ Big Stone

Facility ID:

Date: 16 Apr 18

Unique Station ID:

Sample ID: Well H6

## 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: 17.92

Constructed Depth: 17.70

Casing Diameter: 2"

Water Level Before Purge: 14.39

Well Volume: 0.57 Gallons

Well Casing Elevation: NA

Static Water Elevation:

Previous Static:

Water Level After Sample: 14.51

Measurement Method: Elec. WLI Steel Tape

## Sampling Information

Weather Conditions: Temp: 36 Wind: N-17 Sky: Fair

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

Dedicated Equipment:  Yes No

Pumping Rate: 0.25 gpm

Well Purged Dry?  Yes No

Time Pump Began 1300 am / pm

Time Purged Dry? 1303

Time of Sampling: 1308 am / pm

Duplicate Sample? Yes  No

Sample EH: 79.5

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:
<u>1303</u>	<u>7.80</u>	<u>1000</u>	<u>6.42</u>	<u>NA</u>	<u>NA</u>	<u>0.75</u>	<u>1</u>	
<u>1308</u>	<u>7.82</u>	<u>1000</u>	<u>6.40</u>				<u>2</u>	<u>recharge</u>
							<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabiliz Yes  No

Amount Water Removed: 0.75 Gallons

Comments:

Exceptions to Protocol:

- List C  
- Extra



# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Sampling Personnel:

Bon Stubbs

Site: Otter Tail Power Co./ Big Stone

Facility ID:

Date: 16 Apr 08

Unique Station ID:

Sample ID: Well H8

## 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: 22.33

Constructed Depth: 22.05

Casing Diameter: 2"

Water Level Before Purge: 6.24

Well Volume: 2.62 Gallons

Well Casing Elevation: 1081.23

Static Water Elevation: 1074.99

Previous Static: 1075.27

Water Level After Sample: 6.63

Measurement Method: Elec. WLI Steel Tape

## Sampling Information

Weather Conditions: Temp: 36

Wind: N-17

Sky: Fair

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

Dedicated Equipment:  Yes No

Pumping Rate: 6.25 gpm

Well Purged Dry?  Yes  No

Time Pump Began: 1343 am  pm

Time Purged Dry?

Time of Sampling: 1416 am  pm

Duplicate Sample? Yes  No

ID: \_\_\_\_\_

Sample EH: 82-7

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:
1354	7.86	1281	6.91	NA	NA	2.75	1	
1405	7.85	1282	6.98			5.5	2	
1416	7.83	1285	7.01			8.25	3	
							4	
							5	

Stabilized?  Yes No

Amount Water Remove 8.25

Gallons

Comments:

Exceptions to Protocol:

List C  
Extra

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 5607

507 354 8517

## Groundwater Assessment

Sampling Personne

Ben Stubbs

Site: Otter Tail Power Co./ Big Stone

Facility ID: \_\_\_\_\_

Date: 16 Apr 18

Unique Station I \_\_\_\_\_

Sample ID: Well H9

## 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: 30-71

Constructed Depth: 30.20

Casing Diameter: 2"

Water Level Before Purge: 10.11

Well Volume: 3.36 Gallons

Well Casing Elevation: 1086.21

Static Water Elevation: 1076.10

Previous Static: 1077.44

Water Level After Sam 10.84

Measurement Method: Elec. WLI Steel Tape

## Sampling Information

Weather Conditions Temp: 36

Wind: N-17

Sky: Fair

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 Beg 1445 am  pm

Time Purged Dry? \_\_\_\_\_

Time of Samplin 1527 am  pm

Duplicate Sample?  Yes  No ID: \_\_\_\_\_

Sample EH: 101-9

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

(14) Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1459	7.30	2970	8.30	NA	NA	3.5	1	
1513	7.27	2997	8.43			7	2	
1527	7.25	2995	8.51			10.5	3	
							4	
							5	

Stabiliz  Yes  No

Amount Water Removed 10.5 Gallons

Comments: \_\_\_\_\_

Exceptions to Protocol: \_\_\_\_\_

List @  
Extra

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Site: Otter Tail Power Co./ Big Stone

Sampling Personnel:

Facility ID:

Matt Sten

Date: 16 Apr 18

Unique Station ID:

Sample ID: Well H2OX

### 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: 32.83

Well Casing Elevation: 1103.91

Constructed Depth: 32.20

Static Water Elevation: 1096.34

Casing Diameter: 2"

Previous Static: 1097.8

Water Level Before Purge: 7.57

Water Level After Sample: Below Pump

Well Volume: 4.12 Gallons

Measurement Method:  Elec. WLI  Steel Tape

### Sampling Information

Weather Conditions: Temp: 46 Wind: NNE @ 16 Sky: Sunny

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

Dedicated Equipment:  Yes  No

Pumping Rate: 0.25 gpm

Well Purged Dry?  Yes  No

Time Pump Began: 1524 am  pm

Time Purged Dry: 1542

Time of Sampling: 1547 am  pm

Duplicate Sample? Yes  No  ID:       

Sample EH: 168.3 166.7

Sample Appearance: General:        Color:        Phase:        Odor:       

1/8 Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>1542</u>	<u>7.05</u>	<u>3452</u>	<u>7.10</u>	<u>und</u>	<u>NA</u>	<u>4.5</u>	<u>1</u>	
<u>1547</u>	<u>7.09</u>	<u>3462</u>	<u>7.77</u>			—	<u>2</u>	<u>recharge</u>
							<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized? Yes  No

Amount Water Removed: 4.5 Gallons

Comments:

Exceptions to Protocol:

- List C  
- Extra

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Sampling Personnel:

Mark Spin

Site: Otter Tail Power Co./ Big Stone

Facility ID: \_\_\_\_\_

Date: 1/6/98

Unique Station ID: \_\_\_\_\_

Sample ID: Well H3OX

## 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: 22.62  
 Constructed Depth: 22.55  
 Casing Diameter: 2"  
 Water Level Before Purge: 5.05  
 Well Volume: 2.8 Gallons

Well Casing Elevation: 1095.19  
 Static Water Elevation: 1089.94  
 Previous Static: 1090.65  
 Water Level After Sample: Below Pump  
 Measurement Method: Elec. WLI Steel Tape

## Sampling Information

Weather Conditions: Temp: 35 Wind: sw @ 17 Sky: Sunny  
 Sampling Method: Grundfos  Bladder S/T  Disp. Bailer  Whale  Grab  Other: \_\_\_\_\_  
 Dedicated Equipment:  Yes  No  
 Well Purged Dry?  Yes  No  
 Time Purged Dry? 1:28  
 Duplicate Sample? Yes  No  ID: \_\_\_\_\_  
 Sample Appearance: General: Clear Color: none Phase: none Odor: none  
 Pumping Rate: 0.25 gpm  
 Time Pump Began: 12:46 am / pm  
 Time of Sampling: 1:30 am / pm  
 Sample EH: 146.6

ID	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1258	7.02	3477	6.89	0.1	0.1	3	1	
1303	7.14	3530	7.60	1	1		2	recharge
							3	
							4	
							5	

Stabilized? Yes  No  Amount Water Removed: 3 Gallons

Comments: \_\_\_\_\_

Exceptions to Protocol: \_\_\_\_\_

- List C  
 - Extra

# 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: 16 April 18

Unique Station ID:

Sample ID: Well H40X

## 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: 27.48

Constructed Depth: 27.20

Casing Diameter: 2"

Water Level Before Purge: 17.38

Well Volume: 1.64 Gallons

Well Casing Elevation: 1108.22

Static Water Elevation: 1090.84

Previous Static: 1091.01

Water Level After Sample: Below Pump

Measurement Method: Elec. WLI Steel Tape

## Sampling Information

Weather Conditions: Temp: 38 Wind: NW @ 17 Sky: Sunny

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

Dedicated Equipment:  Yes  No

Pumping Rate: 0.25 gpm

Well Purged Dry?  Yes  No

Time Pump Began: 1417 am 1 pm

Time Purged Dry?

Time of Sampling: 1438 am 1 pm

Duplicate Sample?  Yes  No ID: ---

Sample E 143.8

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

Time	pH	Specific Cond.	Temp °C	D. O.	Turbidity NTU	Gallons Removed	SE Q #	Comments:
<u>1424</u>	<u>6.79</u>	<u>2327</u>	<u>8.15</u>	<u>nd</u>	<u>nd</u>	<u>1.75</u>	<u>1</u>	
<u>1431</u>	<u>6.82</u>	<u>2325</u>	<u>8.14</u>	<u> </u>	<u> </u>	<u>3.5</u>	<u>2</u>	
<u>1438</u>	<u>6.82</u>	<u>2323</u>	<u>8.16</u>	<u> </u>	<u> </u>	<u>5.25</u>	<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized?  Yes  No Amount Water 5.25 Gallons

Comments:

Exceptions to Protocol:

- List C  
- Extra



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1201 Lincoln Hwy. ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvttl.com



FINAL REPORT COMPLETION DATE: 26 Jun 18 08

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

Handwritten signatures and dates for Field Service Manager, Chemistry Lab Manager, and Quality Assurance Director.

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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www.mvtl.com



## 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-A31220  
Work Order #: 31-0285  
Account #: 006106  
Sample Matrix: GROUNDWATER  
Date Sampled: 20 Jun 2018 11:13  
Sampled By: MVTL FIELD PERSONNEL  
Date Received: 20 Jun 2018 15:00  
PO #: 48680

Project Name: BIG STONE

Sample Description: WELL H8

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
pH, Field	6.80	units	1.00	I-1586-85	20 Jun 18 11:13	MS

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



31-0285

A31219

This is an exact copy of the original document

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

By AK Date 20 Jun 18

Pages 1-5

## Groundwater Assessment

Sampling Personnel: Matt Steen

Site: Otter Tail Power Co./ Big Stone  
Facility ID: \_\_\_\_\_  
Date: 20 June 18  
Unique Station ID: \_\_\_\_\_  
Sample ID: Well H6

### 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: 17.42  
Constructed Depth: 15.00  
Casing Diameter: 2"  
Water Level Before Purge: 13.22  
Well Volume: 0.76 Gallons

Well Casing Elevation: 1097.76  
Static Water Elevation: 1084.54  
Previous Static: NA  
Water Level After Sample: Below Pump  
Measurement Method: Elec. WLI Steel Tape

### Sampling Information

Weather Conditions: Temp: 71 Wind: WNW @ 7 Sky: P. 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: 1026 (am) / pm  
Time Purged Dry? 1030 Time of Sampling: 1030 (am) / pm  
Duplicate Sample? Yes  No ID: \_\_\_\_\_ Sample EH: 201.6  
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>1030</u>	<u>6.76</u>	<u>839</u>	<u>8.11</u>	<u>NA</u>	<u>NA</u>	<u>1</u>	<u>1</u>	
<u>1035</u>	<u>6.83</u>	<u>844</u>	<u>8.17</u>				<u>2</u>	<u>recharge</u>
							<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabiliz Yes  No Amount Water Removed: 1 Gallons

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 Stone  
 Facility ID: \_\_\_\_\_  
 Date: 20 June 18  
 Unique Station ID: \_\_\_\_\_  
 Sample ID: Well H8

## 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: 22.33  
 Constructed Depth: 22.05  
 Casing Diameter: 2"  
 Water Level Before Purge: 7.33  
 Well Volume: 2.44 Gallons

Well Casing Elevation: 1081.23  
 Static Water Elevation: 1073.9  
 Previous Static: 1074.99  
 Water Level After Sample: 7.7  
 Measurement Method:  Elec. WL  Steel Tape

## Sampling Information

Weather Conditions: Temp: 72 Wind: NNE@9 Sky: P. Cloudy  
 Sampling Method:  Grundfos  Bladder SST  Disp. Bailor  Whale  Grab  Other:  
 Dedicated Equipment:  Yes  No  
 Well Purged Dry?  Yes  No  
 Time Purged Dry? \_\_\_\_\_  
 Duplicate Sample?  Yes  No ID: \_\_\_\_\_  
 Sample Appearance: General: clear Color: none Phase: none Odor: none

IO Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1053	6.75	1112	8.08	NA	NA	2.50	1	
1103	6.76	1112	8.09			5	2	
1113	6.80	1116	8.01			7.50	3	
							4	
							5	

Stabilized?  Yes  No Amount Water Remove 7.50 Gallons

Comments:

Exceptions to Protocol:



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www.mvtl.com



FINAL REPORT COMPLETION DATE: 16 Jan 19 dH

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. [Signature] 10 Jan 19  
Field Service Manager/Date Reviewed  
[Signature] 15 Jan 19  
Chemistry Lab Manager/Date Reviewed  
[Signature] for 19 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-A61777  
 Work Order #: 31-0547  
 Account #: 006106  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 6 Nov 2018 13:37  
 Sampled By: MVTL FIELD PERSONNEL  
 Date Received: 7 Nov 2018 12:45  
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: H20X

Temp at Receipt: 0.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					13 Nov 18	JMS
pH, Field	6.90	units	1.00	SM4500-H+-2011	6 Nov 18 13:37	BMW
Sulfate	2240 ~	mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	4.1	mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Solids, Total Dissolved	3870	mg/L	10	SM 2540 C-97	8 Nov 18 11:54	AL
Calcium	540.0 ~	mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Boron	0.256	mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Fluoride	0.500 @	mg/L	0.020	EPA 300.0	12 Nov 18 14:36	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 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-A61778  
 Work Order #: 31-0547  
 Account #: 006106  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 6 Nov 2018 14:05  
 Sampled By: MVTL FIELD PERSONNEL  
 Date Received: 7 Nov 2018 12:45  
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: H30X

Temp at Receipt: 0.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					13 Nov 18	JMS
pH, Field	6.82	units	1.00	SM4500-H+-2011	6 Nov 18 14:05	BMW
Sulfate	1810 ~	mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	76.3	mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Solids, Total Dissolved	3610	mg/L	10	SM 2540 C-97	8 Nov 18 11:54	AL
Calcium	467.0 ~	mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Boron	6.860	mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Fluoride	0.450 @	mg/L	0.020	EPA 300.0	12 Nov 18 14:36	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 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-A61779  
 Work Order #: 31-0547  
 Account #: 006106  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 6 Nov 2018 15:22  
 Sampled By: MVTL FIELD PERSONNEL  
 Date Received: 7 Nov 2018 12:45  
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: H40X

Temp at Receipt: 0.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					13 Nov 18	JMS
pH, Field	6.99	units	1.00	SM4500-H+-2011	6 Nov 18 15:22	BMW
Sulfate	1220 ~	mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	48.1	mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Solids, Total Dissolved	2280	mg/L	10	SM 2540 C-97	8 Nov 18 11:54	AL
Calcium	335.0	mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Boron	0.435	mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Fluoride	0.580 @	mg/L	0.020	EPA 300.0	12 Nov 18 14:36	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 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-A61780  
Work Order #: 31-0547  
Account #: 006106  
Sample Matrix: GROUNDWATER  
Date Sampled: 6 Nov 2018 14:27  
Sampled By: MVTL FIELD PERSONNEL  
Date Received: 7 Nov 2018 12:45  
PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: H6

Temp at Receipt: 0.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					13 Nov 18	JMS
pH, Field	7.57	units	1.00	SM4500-H+-2011	6 Nov 18 14:27	DGF
Sulfate	63.3 @	mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	3.3	mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Solids, Total Dissolved	585	mg/L	10	SM 2540 C-97	8 Nov 18 11:54	AL
Calcium	55.00	mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Boron	4.040	mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Fluoride	0.560 @	mg/L	0.020	EPA 300.0	12 Nov 18 14:36	RMV

\* Holding Time Exceeded

RL = Reporting Limit

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@ = 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-A61781  
 Work Order #: 31-0547  
 Account #: 006106  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 6 Nov 2018 15:07  
 Sampled By: MVTL FIELD PERSONNEL  
 Date Received: 7 Nov 2018 12:45  
 PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: H8

Temp at Receipt: 0.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					13 Nov 18	JMS
pH, Field	7.26	units	1.00	SM4500-H+-2011	6 Nov 18 15:07	DGF
Sulfate	224 @	mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	4.5	mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Solids, Total Dissolved	902	mg/L	10	SM 2540 C-97	8 Nov 18 11:54	AL
Calcium	122.0	mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Boron	4.460	mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Fluoride	0.690 @	mg/L	0.020	EPA 300.0	12 Nov 18 14:36	RMV

\* Holding Time Exceeded

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-A61782  
Work Order #: 31-0547  
Account #: 006106  
Sample Matrix: GROUNDWATER  
Date Sampled: 6 Nov 2018 15:59  
Sampled By: MVTL FIELD PERSONNEL  
Date Received: 7 Nov 2018 12:45  
PO #: 48080

Project Name: BIG STONE PLANT

Sample Description: H9

Temp at Receipt: 0.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					13 Nov 18	JMS
pH, Field	6.71	units	1.00	SM4500-H+-2011	6 Nov 18 15:59	DGF
Sulfate	1590 ~	mg/L	5.0	ASTM D516-07	15 Nov 18 11:28	KCJ
Chloride	35.2	mg/L	3.0	SM 4500 Cl E	15 Nov 18 8:52	AKF
Solids, Total Dissolved	2910	mg/L	10	SM 2540 C-97	8 Nov 18 11:54	AL
Calcium	638.0 ~	mg/L	0.500	SW6010C	15 Nov 18 15:15	KAM
Boron	1.280	mg/L	0.100	SW6010C	15 Nov 18 15:15	KAM
Fluoride	0.400 @	mg/L	0.020	EPA 300.0	12 Nov 18 14:36	RMV

\* Holding Time Exceeded

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

RL = Reporting Limit

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@ = 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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Page: 15 of 15

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.

# 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

<b>Project</b> Otter Tail Power Company	<b>Project Type:</b> Big Stone Plant CCR	<b>Name of Samplers:</b> DF, BW, MS
<b>Report:</b> Otter Tail Power Company	<b>Carbon Copy:</b> Barr Engineering	<b>Quote Number:</b>
<b>Attn:</b> Paul Vukonich	<b>Attn:</b>	<b>Work Order Number:</b>
<b>Address:</b> P.O. Box 496	<b>Address:</b>	<b>Lab Numbers:</b>
Fergus Falls, MN 56538-0496		
<b>Phone:</b> 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
17A	H2OX		6 Nov 18	1337	GW				1	1	N								CCR 3
18	H3OX			1405	GW				1	1	N								CCR 3
19	H4OX			1522	GW				1	1	N								CCR 3
80	H-6			1427	GW				1	1	N								CCR 3
81	H-8			1507	GW				1	1	N								CCR 3
82	H-9			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			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: <i>DF</i>			Samples Received By:		
Date: 7 Nov 18	Time: 1245	Temp: 0, 0174	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		

CCR - Appendix III Detection Monitoring

**Field Parameters**

pH\*

\* Field and Laboratory Measurements

**Total Concentration Parameters**

	<b>Method</b>
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

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

Note: These are non-filtered samples.

1000 none  
500 HNO3  
2-1000 HNO3

Fall 2018

Track  
Track  
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 HNO<sub>3</sub>

List CCR 3+4

2-1000 HNO<sub>3</sub>  
500 NONE  
1000 NONE  
500 HNO<sub>3</sub>

# 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)

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Site: Offer Tail Power Co./ Big Stone

Sampling Personnel:

Ben Wolf

Facility ID: \_\_\_\_\_

Date: 6 NOV 8

Unique Station ID: \_\_\_\_\_

Sample ID: Well H2OX

### 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: 32.83  
 Constructed Depth: 32.20  
 Casing Diameter: 2"  
 Water Level Before Purge: 8.70  
 Well Volume: 3.93 Gallons

Well Casing Elevation: 1103.91  
 Static Water Elevation: 1095.71  
 Previous Static: 1096.36  
 Water Level After Sample: Below pump  
 Measurement Method:  Elec. WL  Steel Tape

### Sampling Information

Weather Conditions: Temp: 34 Wind: W@15 Sky: Cloudy

Sampling Method: Grundfos  Bladder SS  Disp. Baller  Whale  Grab  Other: \_\_\_\_\_

Dedicated Equipment:  Yes  No Pumping Rate: .25 gpm

Well Purged Dry?  Yes  No Time Pump Began: 1316 am / pm

Time Purged Dry: 1332 Time of Sampling: 1337 am / pm

Duplicate Sample? Yes  No ID: - Sample EH: -212.0

Sample Appearance: General: Sl. cloudy Color: Tan Phase: Light sed. Odor: chemical

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>1332</u>	<u>6.82</u>	<u>4597</u>	<u>9.49</u>	<u>NA</u>	<u>NA</u>	<u>4</u>	<u>1</u>	
							<u>2</u>	
<u>1337</u>	<u>6.90</u>	<u>4613</u>	<u>9.51</u>	<u>↓</u>	<u>↓</u>	<u>-</u>	<u>3</u>	<u>Recharge</u>
							<u>4</u>	
							<u>5</u>	

Stabilized? Yes  No  Amount Water Removed: 4 Gallons

Comments: \_\_\_\_\_

Exceptions to Protocol: \_\_\_\_\_



# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Site: Otter Tail Power Co./ Big Stone

Sampling Personnel:

Ben Wolf

Facility ID: \_\_\_\_\_

Date: 6 NOV 18

Unique Station ID: \_\_\_\_\_

Sample ID: Well H3OX

### 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: 22.68  
 Constructed Depth: 22.55  
 Casing Diameter: 2"  
 Water Level Before Purge: 6.03  
 Well Volume: 2.71 Gallons

Well Casing Elevation: 1095.19  
 Static Water Elevation: 1089.16  
 Previous Static: 1090.05  
 Water Level After Sample: Below pump  
 Measurement Method:  Elec. W/L  Steel Tape

### Sampling Information

Weather Conditions: Temp: 32 Wind: W@20 Sky: cloudy  
 Sampling Method: Grundfos  Bladder SS  Disp. Bailor  Whale  Grab  Other:  
 Dedicated Equipment:  Yes  No Pumping Rate: .25 gpm  
 Well Purged Dry?  Yes  No Time Pump Began: 1349 am /  pm  
 Time Purged Dry? 1400 Time of Sampling: 1405 am /  pm  
 Duplicate Sample? Yes  No ID: — Sample EH: 614  
 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:
1400	6.89	4582	11.62	NA	NA	2.75	1	
							2	
1405	6.82	4638	11.38	↓	↓	—	3	Recharge
							4	
							5	

Stabilized? Yes  No  Amount Water Removed: 2.75 Gallons

Comments: \_\_\_\_\_

Exceptions to Protocol: \_\_\_\_\_

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Site: Otter Tail Power Co./ Big Stone

Sampling Personnel:

Ben Wolf

Facility ID: \_\_\_\_\_

Date: 6 NOV 18

Unique Station ID: \_\_\_\_\_

Sample ID: Well H40X

### 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: 27.48

Well Casing Elevation: 1108.22

Constructed Depth: 27.20

Static Water Elevation: 1096.22

Casing Diameter: 2"

Previous Static: 1096.80

Water Level Before Purge: 18.00

Water Level After Sample: 23.29

Well Volume: 1.54 Gallons

Measurement Method:  Elec. WLI  Steel Tape

### Sampling Information

Weather Conditions: Temp: 33 Wind: W@20 Sky: cloudy

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

Dedicated Equipment:  Yes  No Pumping Rate: .25 gpm

Well Purged Dry?  Yes  No Time Pump Began: 1510 am / pm

Time Purged Dry: 1517 Time of Sampling: 1522 am / pm

Duplicate Sample?  Yes  No ID: - Sample EH: -19.4

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>1517</u>	<u>7.40</u>	<u>3157</u>	<u>8.21</u>	<u>NA</u>	<u>NA</u>	<u>1.75</u>	<u>1</u>	
							<u>2</u>	
<u>1522</u>	<u>6.99</u>	<u>3153</u>	<u>8.38</u>			<u>-</u>	<u>3</u>	<u>Recharge</u>
							<u>4</u>	
							<u>5</u>	

Stabilized? Yes  No  Amount Water Removed: 1.75 Gallons

Comments:

Exceptions to Protocol:

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Sampling Personnel:

DF

Site: Otter Tail Power Co./ Big Stone

Facility ID: —

Date: 6 Nov 18

Unique Station ID: —

Sample ID: Well H6

### 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: 17.92  
 Constructed Depth: 17.70  
 Casing Diameter: 2"  
 Water Level Before Purge: 15.85  
 Well Volume: 0.34 Gallons

Well Casing Elevation: NA  
 Static Water Elevation: L  
 Previous Static:  
 Water Level After Sample: Below Pump  
 Measurement Method:  Elec. W/L  Steel Tape

### Sampling Information

Weather Conditions: Temp: 31 Wind: WNW 19 Sky: 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: 1420 am /  pm  
 Time Purged Dry? 1422 Time of Sampling: 1427 am /  pm  
 Duplicate Sample? Yes  No ID: — Sample EH: 192.0  
 Sample Appearance: General: Sl. Cloudy Color: None Phase: None Odor: None

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1422	7.55	1004	8.63	11.56	35.7	0.5	1	
							2	
							3	
							4	
1427	7.57	1010	8.64	10.29	12.2	0.5	5	Recharge

Stabilized? Yes  No Amount Water Removed: 0.5 Gallons

Comments:

Exceptions to Protocol:

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Sampling Personnel:

DF

Site: Otter Tail Power Co./ Big Stone

Facility ID: —

Date: 6 Nov 18

Unique Station ID: —

Sample ID: Well H8

### 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: 22.33  
 Constructed Depth: 22.05  
 Casing Diameter: 2"  
 Water Level Before Purge: 7.23  
 Well Volume: 2.46 Gallons

Well Casing Elevation: 1081.23  
 Static Water Elevation: 1074.00  
 Previous Static: —  
 Water Level After Sample: 8.62  
 Measurement Method: Elec WLI Steel Tape

### Sampling Information

Weather Conditions: Temp: 31 Wind: WNW 19 Sky: 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: 1437 am / pm  
 Time Purged Dry? — Time of Sampling: 1507 am / pm  
 Duplicate Sample? Yes  No ID: — Sample EH: 170.2  
 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:
1447	7.26	1323	10.43	4.15	0.1	2.5	1	
1457	7.26	1323	10.43	4.14	0.0	5	2	
1507	7.26	1323	10.43	4.13	0.0	7.5	3	
							4	
							5	

Stabilized?  Yes No

Amount Water Removed: 7.5 Gallons

Comments:

Exceptions to Protocol:

# Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

## Groundwater Assessment

Sampling Personnel:

DF

Site: Otter Tail Power Co./ Big Stone

Facility ID: \_\_\_\_\_

Date: 6 Nov 18

Unique Station ID: \_\_\_\_\_

Sample ID: Well H9

### 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: 30.71

Well Casing Elevation: 1086.21

Constructed Depth: 30.20

Static Water Elevation: 1075.23

Casing Diameter: 2"

Previous Static: \_\_\_\_\_

Water Level Before Purge: 10.98

Water Level After Sample: 11.95

Well Volume: 3.22 Gallons

Measurement Method: Elec. WLI Steel Tape

### Sampling Information

Weather Conditions: Temp: 31 Wind: WNW 19 Sky: Cloudy

Sampling Method: Grundfos Bladder S&T Disp. Bailor Whale Grab Other:

Dedicated Equipment:  Yes No

Pumping Rate: 0.25 gpm

Well Purged Dry? Yes  No

Time Pump Began: 1520 am (pm)

Time Purged Dry: \_\_\_\_\_

Time of Sampling: 1559 am (pm)

Duplicate Sample? Yes  No ID: \_\_\_\_\_

Sample EH: 182.8

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

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	NA	Turbidity NTU	NA	Gallons Removed	SEQ #	Comments:
1533	6.71	3138	9.39	3.55		13.3		3.25	1	
1546	6.71	3141	9.42	3.35		13.0		6.5	2	
1559	6.71	3142	9.42	3.32		12.3		9.75	3	
									4	
									5	

Stabilized?  Yes No

Amount Water Removed: 9.75 Gallons

Comments:

Exceptions to Protocol:



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## 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	95	90-110	< 20
-	-	-	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



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## 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



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## 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	93	85-115	0.05	18A61780q	< 0.005	0.0486	97	75-125	0.0486	0.0491	98	1.0	10	97	90-110	< 0.005
	0.0500	94	85-115	0.05	18A63263q	< 0.005	0.0478	96	75-125	0.0478	0.0473	95	1.1	10	98	90-110	< 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	3080	-	1.6	7	102	85-115	< 10
	-	-	-	-	-	-	-	-	-	2360	2320	-	1.7	7	105	85-115	< 10
	-	-	-	-	-	-	-	-	-	1950	1950	-	0.0	7			
	-	-	-	-	-	-	-	-	-	3570	3480	-	2.6	7			
Specific Conductance umhos/cm	-	-	-	-	-	-	-	-	-	3484	3462	-	0.6	5	98	90-110	-
	-	-	-	-	-	-	-	-	-	2949	2952	-	0.1	5	99	90-110	-
	-	-	-	-	-	-	-	-	-	3025	2996	-	1.0	5	100	90-110	-
	-	-	-	-	-	-	-	-	-	497.1	504.1	-	1.4	5	97	90-110	-
	-	-	-	-	-	-	-	-	-	459.6	458.6	-	0.2	5	101	90-110	-
	-	-	-	-	-	-	-	-	-	664.3	643.1	-	3.2	5			-
Strontium, Dissolved mg/L	1.000	98	85-115	1.00	18A61780q	0.220	1.200	98	75-125	1.200	1.200	98	0.0	10	97	90-110	< 0.005
	1.000	98	85-115	1.00	18A63263q	< 0.005	0.976	98	75-125	0.976	0.972	97	0.4	10	100	90-110	< 0.005
Sulfate mg/L	-	-	-	500	18-A61786	283	849	113	68-132	849	846	113	0.4	5	107	80-120	< 5
	-	-	-	500	18-A61789	622	1200	116	68-132	1200	1210	118	0.8	5	103	80-120	< 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	97	85-115	1.00	18A61780q	< 0.005	0.992	99	75-125	0.992	1.000	100	0.8	10	102	90-110	< 0.005
	1.000	98	85-115	1.00	18A63263q	< 0.005	0.991	99	75-125	0.991	0.976	98	1.5	10	103	90-110	< 0.005
Zinc, Dissolved mg/L	1.000	93	85-115	1.00	18A61780q	< 0.01	0.969	97	75-125	0.969	0.972	97	0.3	10	94	90-110	< 0.01
	1.000	95	85-115	1.00	18A63263q	< 0.01	0.996	100	75-125	0.996	0.976	98	2.0	10	95	90-110	< 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: 