

2019 Annual Groundwater Monitoring and Corrective Action Report

Ash Disposal Area

Big Stone Plant Big Stone City, South Dakota

Prepared for Otter Tail Power Company

January 2020

2019 CCR Annual Groundwater Monitoring and Corrective Action Report

Ash Disposal Area

Big Stone Plant Big Stone City, South Dakota

January 2020

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Demonstration

Acronyms

Acronym	Description
ADA	Ash Disposal Area
ASD	Alternative Source Demonstration
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
OTP	Otter Tail Power Company
SSI	Statistically Significant Increase

1.0 Introduction

Otter Tail Power Company (OTP) operates the Big Stone Plant (Big Stone), located near Big Stone City, South Dakota. Big Stone is a coal-fired electrical generating plant, operation of which results in coal combustion residuals (CCR) as a by-product. Management of CCR from plant operations includes placing CCR in an on-site landfill, referred to as the Ash Disposal Area (ADA). The ADA 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 ADA is shown on Figure 1.

This 2019 Annual Groundwater Monitoring and Corrective Action Report (Annual Report) describes the monitoring program and results for the ADA at Big Stone. The ADA is currently in detection monitoring as described by §257.94 of the CCR Rule for all wells and constituents.

1.1 Purpose

As stated in Section §257.90(e), the purpose of the Annual Groundwater Monitoring and Corrective Action Report (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

Baseline monitoring was completed in 2017, as documented in the 2017 Annual Groundwater Monitoring and Corrective Action Report, Ash Disposal Area (Barr, 2018). The detection monitoring program, which is the evaluation of groundwater monitoring data for statistically significant increases over background levels for the constituents listed in Appendix III to the CCR Rule, began on October 17, 2017 and continued through 2019.

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 ADA for 2019. 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 2020 are described in Section 2.4.

2.1 Groundwater Monitoring System

2.1.1 Documentation

Figure 1 shows an aerial image of the ADA and all upgradient (background) and downgradient monitoring wells, including the well identification numbers, that are part of the groundwater monitoring system, as required by §257.90(e)(1). Further details on the monitoring system and the ADA monitoring wells can be found in the Groundwater Monitoring System Report, Big Stone Plant Ash Disposal Area (Barr, 2016) on the website maintained by OTP for Big Stone.

2.1.2 Changes to Monitoring System

The groundwater monitoring system was unchanged in 2019.

2.2 Monitoring and Analytical Results

Groundwater samples were collected from monitoring wells H2OX, H4OX, H6, H8, and H9 during two semiannual sampling events. Background monitoring well H3OX was sampled in fall 2019 but was not sampled in spring 2019 due to concerns for worker safety. Slippery conditions restricted access to monitoring well H3OX, which prompted a worker safety concern and the monitoring well was not sampled. A total of 11 groundwater samples were collected and analyzed for the constituents listed in Appendix III (Part 257) in 2019 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 are presented in Appendix A.

Sampling for the fall 2018 monitoring event was conducted on November 6, 2018, and results are included in the 2018 Annual Report (Barr, 2019). Analytical assessment of the results in 2019 indicated elevated concentrations of fluoride at monitoring well H8. Therefore, resampling of fluoride at monitoring well H8 was conducted on February 1, 2019, to verify the analytical results. Based on the results of the resampling, the fluoride SSI was verified on February 11, 2019. An alternative source demonstration (ASD) successfully showed that measurement uncertainty in the analytical results caused the fluoride SSI. The written ASD is provided in Appendix B.

2.3 Key Actions Completed/Problems Encountered

The following key actions were completed for the groundwater monitoring program during 2019:

- Completed semiannual groundwater sampling under the detection monitoring program.
- Background monitoring well H3OX was sampled in fall 2019 but could not be sampled in spring 2019. The monitoring well was not sampled in spring 2019 because the monitoring well could not be accessed due to concerns for worker safety.
- Determined, pursuant to §257.93(h), that a statistically significant increase over background levels occurred for fluoride at downgradient monitoring well H8 during the fall 2018 detection monitoring sampling event. Evaluation of the analytical results determined that measurement uncertainty caused the SSI, forming the basis of an ASD under §257.94(e)(2). Because a successful ASD was completed, the CCR unit can continue in the detection monitoring program as described under §257.94(e)(2). The written ASD is provided in Appendix B.
- 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 during the 2019 detection monitoring sampling events.

Problems other than sampling H3OX were not encountered during the reporting period.

2.4 Key Activities for Upcoming Year

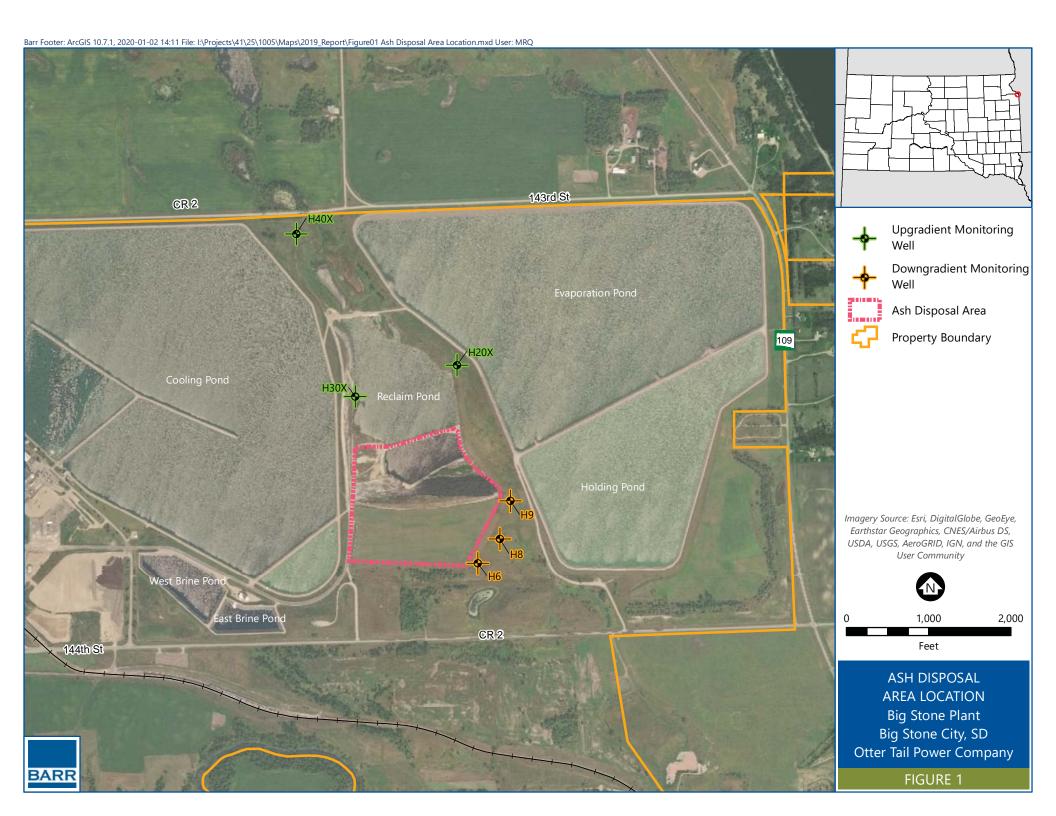
The following key groundwater monitoring program activities are planned for 2020:

- Continue the detection monitoring program in accordance with the CCR Rule.
- Evaluate analytical results from the 2020 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, 2019. 2018 Annual Groundwater Monitoring and Corrective Action Report, Big Stone Plant Ash Disposal Area. Prepared for Otter Tail Power Company. January 2019.
- 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



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 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 2 North German St. ~ New Ulm, MN 56073 ~ N 2616 East Broadway Ave. ~ Bismarck, ND 58501 ~ 800-279-6885 ~ Fax 701-258-9724 1201 Lincoln Hwy. ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885 www.mvtl.com



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FINAL REPORT COMPLETION DATE:

Date Reported: 6 Feb 2019

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

Work Order #: 31-0040 Account #: 006106

PO #: 48680

Project Name: BIG STONE PLANT CCR

Manager/Date Reviewed

Lab Manager/Date Reviewed

08 Feb 2019 Assurance Director/Date Reviewed

RL = Reporting Limits

NQ = Not Present, Qualitative Only

PQ = Present, Qualitative Only

ND = Not Determined



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CERTIFICATE of ANALYSIS - CCR

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

Project Name: BIG STONE PLANT CCR

Sample Description: WELL H8

Report Date: 6 Feb 2019 Lab Number: 19-A3892 Work Order #: 31-0040 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 1 Feb 2019 11:52 Sampled By: MVTL FIELD PERSONNEL Date Received: 1 Feb 2019 15:35

PO #: 48680

Temp at Receipt: 1.1C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
pH, Field	7.17 units	1.00	SM4500-H+-2011	1 Feb 19 11:52	BMW
Fluoride	0.660 @ mg/L	0.020	EPA 300.0	4 Feb 19 14:21	RMV

RL = Reporting Limit Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards. Analyses performed under our minnesota Department of Realth Accreditation conform to the current INI Standards.

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

Q = Due to sample matrix

| = Due to concentration of other analytes

| = Due to sample quantity

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

MINNESOTA VALLEY TESTING LABORATORIES, INC.

MVTL

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MEMBER ACIL

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Quality Control Report

Lab ID: 19-A3892 Project: BIG STONE PLANT CCR

Work Order: 201931-0040

Analyte	LCS Spike Amt	LCS Rec %	% Rec	Matrix Spike Amt	Matrix Spike ID	Matrix Spike Orig Result	Matrix Spike Result	Spike Rec	Spike % Rec	Dup Orig	Dup	Rec	distoración de descripción	Silventon: Silventonia	Rec	% Rec	Method Blank
Fluoride mg/L	-	-	-	2.00	19-A2388	0.800	2.79	100	75-125	2.79	2.77	98	0.7	10	106	90-110	< 0.02

Approved by:

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

Field Service Chain of Custody Record

Project	Otter Tail Power Company	Project Type:	Big Stone Plant CCR	Name of Samplers: Ben Wolf
Report	Otter Tail Power Company	Carbon Copy:	Barr Engineering	Der Wolf
Attn:	Paul Vukonich	Attn:	-	Quote Number:
Address	P.O. Box 496	Address:		Work Order Number: 31-0040
	Fergus Falls, MN 56538-0496			Lab Numbers:
Phone:	218-739-8349			

Sample	Information		Bottle Type	Analysis
Lab Number Sample ID Unique Station		Sample Type Sample Location 1000 HNO3 Inner 500 None	1000 none 500 HNO3 Filler? Y or N 500 H2SO4 Filler? Y or N 1000 Amber none H2SO4 500 NaOH Other: 150 H2S	Other 150 None Analysis Required
A3392 Well H8	243014 1182	GW X		Flouride
Olag & '	17 Feb 19			
Comments				

Comments:

Samples Reline	guished By:	NAN .	WA		Complex Described D	1 8 -		· · · · · · · · · · · · · · · · · · ·
	quisileu by.		MOL		Samples Received By		der	
Date: 1+06	17	Time:	1585		478 Pate: 3 FCh LM		: 400	Temp: 4, 2(
Samples Reline		Fridge	Log in	Cart Oth	er:			
Samples Relind	quished By:				Samples Received By	<i>/</i> :		
Date:		Time:		Temp:	Date:	Time		Temp:
Delivery:	Samplers	Other:			Seal Number(s) - If Us	sed		
Transport:	Ambient	Ice		Other:	Seals Intact?	Yes	No	

Minnesota Valley Testing Laboratories, Inc.New Ulm, MN 56073 507 354 8517

New Ulm, MN 56073

Groundwater Assessment Sampling Personnel: Den Wolf		Site: Facility ID: Date: / Fe		ter Tail P	ower Co./ Big Stone
DOT WOTE		Unique Station			
		Sample ID:	JII 11D.		Well H8
		Campic 15.			7701110
Well Condition					
Well Locked? (es) No		Protective Po	sts? Yes		No
Well Labeled? (es) No		State ID Tag			(NO
Casing Straight? (Yes) No		Grout Seal In			No
Repairs Necessary:		Crout Cour II	itaet: (CS)		
Well Information					
Well Depth: 22.33		Well Casing	Elevation:		1081.23
Constructed Depth: 22.05		Static Water		072.	
Casing Diameter: 2"		Previous Sta			
Water Level Before Purge: 8.40		Water Level	After Sample:	9.12	
Well Volume: 2,25 Gallons	Measurement Method: Elec. W) Steel Ta				
		1			
Sampling Information					
Weather Conditions: Temp: 5	Wind:	5010	Sky:	Fai.	•
Sampling Method: Grundfos Bladder S\$/T	Disp. Baile		Grab Other:		
Dedicated Equipment: (e) No		Pumping Rat	te: , >5		gpm
Well Purged Dry? Yes No		Time Pump I			(am) / pm
Time Purged Dry?		Time of Sam			am / pm
Duplicate Sample? Yes 10 ID:		Sample EH:	170.3		
Sample Appearance: General: [1. Cloudy	Color: 70	γη Phase	None		Odor: Mora
·					
9 Specific Temp	D. O.	Turbidity	Gallons	SEQ	
Time pH Cond. C	mg/L	NTU	Removed	#	Comments:
1134 7.13 1347 8.62	MA	NA	2.25	1	
1143 7.14 1367 8.51			4.60	2	
1152 7.17 1378 8.39	1		6.75	3	
				4	
				5	
Stabilized Yes No	Amount '	Water Remove	<i>6.75</i> €		Gallons
Comments:			-		

Not in Notes

Exceptions to Protocol:



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FINAL REPORT COMPLETION DATE:

Date Reported: 10 May 2019

Work Order #: 31-0140 Account #: 006106

PO #: 48680

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

Project Name: BIG STONE PLANT CCR

Mm 13 Mm y 19 e Manager/Date Reviewed

// /O M > 20/9
Manager/Date Reviewed

Quality Assurance Director/Date Reviewed for

RL = Reporting Limits

NQ = Not Present, Qualitative Only

PQ = Present, Qualitative Only

ND = Not Determined



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CERTIFICATE of ANALYSIS - CCR

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

Project Name: BIG STONE PLANT CCR

Sample Description: H20X

Report Date: 10 May 2019 Lab Number: 19-A15072 Work Order #: 31-0140 Account #: 006106

Sample Matrix: GROUNDWATER
Date Sampled: 15 Apr 2019 11:19
Sampled By: MVTL FIELD PERSONNEL
Date Received: 15 Apr 2019 19:17

PO #: 48680

Temp at Receipt: 0.7C

	As Receiv Result	ed	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions		· · · · · · · · · · · · · · · · · · ·			17 Apr 19	JMS
pH, Field	6.77	units	1.00	SM4500-H+-2011	15 Apr 19 11:19	BMW
pH	* 6.8	units	1.0	SM 4500 H+ B-2000	16 Apr 19 13:06	NB
Sulfate	2310 ~	mq/L	5.0	ASTM D516-07	18 Apr 19 10:24	KCD
Chloride	3.6	mq/L	3.0	SM 4500 Cl E	18 Apr 19 11:07	SS
Solids, Total Dissolved	3900	mg/L	10	SM 2540 C-97	16 Apr 19 14:15	NB
Calcium	517.0 ~	mq/L	0.500	SW6010C	19 Apr 19 14:15	KAM
Boron	< 0.5 #	mg/L	0.1	SW6010C	19 Apr 19 14:15	KAM
Fluoride	0.410 @	mg/L	0.020	EPA 300.0	17 Apr 19 15:37	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

Project Name: BIG STONE PLANT CCR

Sample Description: H40X

Report Date: 10 May 2019 Lab Number: 19-A15073 Work Order #: 31-0140 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 15 Apr 2019 11:56 Sampled By: MVTL FIELD PERSONNEL Date Received: 15 Apr 2019 19:17

PO #: 48680

Temp at Receipt: 0.7C

	As Receiv Result	ed		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					•	17 Apr 19	JMS
pH, Field	6.88	units		1.00	SM4500-H+-2011	15 Apr 19 11:56	BMW
Hq	* 6.8	units		1.0	SM 4500 H+ B-2000	16 Apr 19 13:06	NB
Sulfate	1340 ~	mq/L		5.0	ASTM D516-07	18 Apr 19 10:24	KCD
Chloride	51.3	mq/L		3.0	SM 4500 Cl E	18 Apr 19 11:07	SS
Solids, Total Dissolved	2330	mg/L		10	SM 2540 C-97	16 Apr 19 14:15	NB
Calcium	328.0 @	mg/L	`	0.500	SW6010C	19 Apr 19 14:15	KAM
Boron	< 0.5 @	mg/L		0.1	SW6010C	19 Apr 19 14:15	KAM
Fluoride	0.590 @	mg/L		0.020	EPA 300.0	17 Apr 19 15:37	RMV

^{*} Holding Time Exceeded

RL = Reporting Limit 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

[~] 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

Project Name: BIG STONE PLANT CCR

Sample Description: WELL H6

Report Date: 10 May 2019 Lab Number: 19-A15074 Work Order #: 31-0140 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 15 Apr 2019 12:25 Sampled By: MVTL FIELD PERSONNEL Date Received: 15 Apr 2019 19:17

PO #: 48680

Temp at Receipt: 0.7C

	As Receiv Result	ed	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					17 Apr 19	JMS
pH, Field	7.30	units	1.00	SM4500-H+-2011	15 Apr 19 12:25	JLH
pH	* 7.2	units	1.0	SM 4500 H+ B-2000	16 Apr 19 13:06	NB
Sulfate	121 @	mq/L	5.0	ASTM D516-07	18 Apr 19 10:24	KCD
Chloride	3.9	mg/L	3.0	SM 4500 Cl E	18 Apr 19 11:07	SS
Solids, Total Dissolved	734	mg/L	10	SM 2540 C-97	16 Apr 19 14:15	NB
Calcium	57.60 @	mg/L	0.500	SW6010C	19 Apr 19 14:15	KAM
Boron	4.000 @	mg/L	0.100	SW6010C	19 Apr 19 14:15	KAM
Fluoride	0.460 @	mg/L	0.020	EPA 300.0	17 Apr 19 15:37	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

Project Name: BIG STONE PLANT CCR

Sample Description: WELL H8

Report Date: 10 May 2019 Lab Number: 19-A15075 Work Order #: 31-0140 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 15 Apr 2019 13:14 Sampled By: MVTL FIELD PERSONNEL

Date Received: 15 Apr 2019 19:17 PO #: 48680

Temp at Receipt: 0.7C

	As Receiv Result	ed	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					17 Apr 19	JMS
pH, Field	7.20	units	1.00	SM4500-H+-2011	15 Apr 19 13:14	JLH
pH	* 7.1	units	1.0	SM 4500 H+ B-2000	16 Apr 19 13:20	NB
Sulfate	283 @	mg/L	5.0	ASTM D516-07	18 Apr 19 10:24	KCD
Chloride	4.7	mg/L	3.0	SM 4500 Cl E	18 Apr 19 11:07	SS
Solids, Total Dissolved	963	mg/L	10	SM 2540 C-97	16 Apr 19 16:08	NB
Calcium	125.0 @	mq/L	0.500	SW6010C	19 Apr 19 14:15	KAM
Boron	3.380 @	mg/L	0.100	SW6010C	19 Apr 19 14:15	KAM
Fluoride	0.570 @	mg/L	0.020	EPA 300.0	17 Apr 19 15:37	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

Project Name: BIG STONE PLANT CCR

Sample Description: WELL H9

Report Date: 10 May 2019 Lab Number: 19-A15076 Work Order #: 31-0140 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 15 Apr 2019 14:21 Sampled By: MVTL FIELD PERSONNEL Date Received: 15 Apr 2019 19:17

PO #: 48680

Temp at Receipt: 0.7C

	As Receiv Result	ed	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					17 Apr 19	JMS
pH, Field	6.71	units	1.00	SM4500-H+-2011	15 Apr 19 14:21	JLH
рН	* 6.6	units	1.0	SM 4500 H+ B-2000	16 Apr 19 13:20	NB
Sulfate	1550 ~	mq/L	5.0	ASTM D516-07	18 Apr 19 10:24	KCD
Chloride	19.6	mg/L	3.0	SM 4500 Cl E	18 Apr 19 11:07	SS
Solids, Total Dissolved	2630	mg/L	10	SM 2540 C-97	16 Apr 19 16:08	NB
Calcium	550.0 ~	mq/L	0.500	SW6010C	19 Apr 19 14:15	KAM
Boron	1.030 #	mg/L	0.100	SW6010C	19 Apr 19 14:15	KAM
Fluoride	0.420 @	mg/L	0.020	EPA 300.0	17 Apr 19 15:37	RMV

^{*} Holding Time Exceeded

= Due to concentration of other analytes + = Due to internal standard response # 1013-M ND WW/DW # R-040

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



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7 of 7 Page:

INORGANIC & METALS ANALYSES: No problems were encountered with these analyses.

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Page: 1 of 1

Quality Control Report Lab IDs: 19-A15072 to 19-A15076 Work Order: 201931-0140 Project: BIG STONE PLANT CCR

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	102	85-115	1.00	19A15040q	0.855	1.870	102	75-125	1.870	1.880	102	0.5	10	97	90-110	< 0.1
Calcium mg/L	50.00	110	85-115	50.0	19A15040q	191.0	248.0	114	75-125	248.0	249.0	116	0.4	10	106	90-110	< 0.5
Chloride mg/L	_	-	-	60.0	19-A15402	4.9	63.7	98	86-117	63.7	64.4	99	1.1	5	101	90-110	< 3
Fluoride mg/L	0.20	98	85-115	1.00 0.40	a15072qc 19-A14618	0.410 0.980	1.57 1.39	116 102	75-125 75-125	1.57 1.39	1.59 1.40	118 105	1.3 0.7	10 10	97	90-110	< 0.02
pH units	-	-	-	-	-		-	-	-	7.2 8.3	7.2 8.3	-	0.0	2.5 2.5	101 101	90-110 90-110	1
Solids, Total Dissolved mg/L			-	-			-	-	-	1160 734 650	1190 733 628		2.6 0.1 3.4	7 7 7	102 103	85-115 85-115	
Sulfate mg/L	_	-	-	50.0	19-A15018	17.8	76.6	118	68-132	76.6	75.8	116	1.0	5	111	80-120	< 5



1126 North Front Street

New Ulm, MN 56003

Phone: 800 782 3557

Fax: 507 359 2890

Field Service Chain of Custody Record

This is an exact copy of the original document

By Date 15 Apr 19

Pages 1-7

Project Otter Tail Power Company	Project Type:	Big Stone Plant CCR	Name of Samplers: MS, Buy Jit	
Report Otter Tail Power Company	Carbon Copy:	Barr Engineering		
Attn: Paul Vukonich	Attn:		Quote Number:	
Address P.O. Box 496	Address:		Work Order Number: 31-0140	
Fergus Falls, MN 56538-0496			Lab Numbers:	
Phone: 218-739-8349			L	
Commis Information	•		Rottle Type	Analysis

		Sample In	formati	on						E	Bottle	е Тур	е				An	alysis
Lab Number	Sample ID	Unique Station ID	Date	Time	Sample Type	Sample Location	1000 HNO3 Inner 500 M	1000 none	500 HNO3	Filter? Y or N	\$04	Filter? Y or N	1000 Amber none	42SO4 500 NaOH	Other: 150 U.S.	Other 150 No.	Analysis Required	
A15012			15,Apr 10	7 1119	GW			1	1	N							CCR 3	
77	НЗОХ	1		NS	GW			1	1-1-	N	-				_		CCR 3	
73	H4OX			1156	GW			1	1	N							CCR 3	
	H-6			1225	GW			1	1	N							CCR 3	
	H-8			13/4	GW			1	1	N							CCR 3	
	H-9			1421	GW			1	1	N							CCR 3	
100								1										
									1									

Comments:

		٠)		^	1 .		
Samples Relind	quished By:	16	1/400		Samples Received By: /	1- /	Tude	N	
Date: 15-491	19	Time:	1917	Temp:	Date: 15 Apr 19		Time:	1917	Temp: 0.1C
Samples Relind	quished into:	Fridge	Log in Car	t Other:	1				
Samples Relind	quished 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	3	No	

New Ulm, MN 56073

507 354 8517

Groundwater Assess	ment			Site:	Otter T	ail Powe	er Co./ Big Stone
Sampling Personnel:				Facility ID:		•	
Ber	woif			Date: 15 A	0^19		
				Unique Statio	n ID:		
				Sample ID:		Wel	I H2OX
Well Condition	<u> </u>						
Well Locked?				Protective Po			NO) NO)
Well Labeled?	es No es No			State ID Tag			No
Casing Straight? Repairs Necessary:	55) INO			Ologi Ocal III	taot: (109)		
Well Information							
	32.83			Well Casing	Elevation:		1103.91
Constructed Depth:	32.20			Static Water		198.30	7
Casing Diameter:	2"	•		Previous Sta	1-00	•	
Water Level Before Purge:	5.55	•		Water Level	After Sample:	Below	s pur
Well Volume: 44		Gallons		Measuremen		Elec. V	7
Sampling Information							
· ·	emp: ℓ	45	Wind: Se	¥15	Sky:	Clou	dy
Sampling Method: G	rundfos	Bladder SS/T	Disp. Bailer	Whale	Grab Other:		
Dedicated Equipment: א	es No			Pumping Rat	te: 375		gpm
Well Purged Dry? (Y	eș No	_		Time Pump I	Began: <i>105</i>	6	@m/ pm
Time Purged Dry?	1114	_		Time of Sam	pling: //19		(am) pm
Duplicate Sample? Y	es No	ID:	-	Sample EH:	65-5		
Sample Appearance: G	Seneral: '	Clea-	Color: N	クィー Phase	e: NOYC		Odor: None
iş s	pecific	Temp	D. O.	Turbidity	Gallons	SEQ	
	Cond.	°C	mg/L	NTU	Removed	#	Comments:
1114 6.79	3453	6.63	NH	NH	4.5	1	
		0.00				2	
1119 (0.77	3952	7.04	1/			3	Recharge
						4	
						5	
Stabilized? Yes	16) _	<u> </u>	Amount \\/	ater Removed:	4.5		Gallons
Comments:			, anount 440				
Comments.							

New Ulm, MN 56073

507 354 8517

Groundwat	er Asses	sment			Site:	Otter T	ail Powe	er Co./ Big Stone
Sampling Pers	onnel:				Facility ID:			
	en Wi	oif			Date: 15 /	41 19		
					Unique Statio	n ID:		
					Sample ID:		Well	H4OX
Well Conditi Well Locked? Well Labeled? Casing Straigh Repairs Neces	nt?	(es No Yes No Yes No			Protective Po State ID Tag? Grout Seal In	Yes		NO NO
Well Informa	ation							
Well Depth:		27·48			Well Casing I	Elevation:		1108.22
Constructed D	epth:	27.20			Static Water	Elevation: /C	794-0	9
Casing Diame	ter:	2"			Previous Stat	tic: 1091.	<u>33 </u>	
Water Level B	efore Purg	e: 14.13			Water Level	After Sample:	Belo	is num
Well Volume:	2	.18	Gallons	_	Measuremen	t Method:	Elec. V	Steel Tape
Sampling In	formatio	n ,	1/		045			
Weather Cond	ditions:	Temp:	16	Wind: کو	15 g	Sky: (Novo	ily
Sampling Met		Grundfos	Bladder SS/7	Disp. Bailer	Whale	Grab Other:		
Dedicated Equ	uipment:	Yes No			Pumping Rat			gpm
Well Purged D	Ory?	Yés No	-		Time Pump I		_	(am)/ pm
Time Purged	Dry?	<u> 1151 </u>			Time of Sam		0	am/ pm
Duplicate San	nple?	Yes Mo	ID:	-	Sample EH:	-25 <u>5</u>		
Sample Appe	arance:	General:	Clear	Color: NO)ت Phase	: NO)-		Odor: NOie
Time p	Н	Specific Cond.	Temp ^o C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1151	6.84	2689	7.99	NA	NA	2.25	1	
·							2	
1156	6.88	2690	7.94	1			3	
							4	
							5	
Stabilized? Y	⁄es	€	•	Amount Wa	ter Removed:	2,25		Gallons

Comments:

New Ulm, MN 56073

507 354 8517

Groundwater Assessment		Site:	Otter 7	ail Pow	er Co./	Big Stone
Sampling Personnel:		Facility ID:				
Jeff Holdman		Date: \5 (Apr 19			
		Unique Static	on ID:			
		Sample ID:		V	ell H6	
Well Condition						
Well Locked? (Fes No		Protective Po			No	
Well Labeled? Ces No		State ID Tag			No)	
Casing Straight? (Les No		Grout Seal In	tact? Yes		140	
Repairs Necessary:						
Well Information			- ;	λ.	ıΛ	
Well Depth: 17.92		Well Casing		N	۲	
Constructed Depth: 17.70		Static Water	Elevation:			
Casing Diameter: 2"		Previous Sta	tic:	4		
Water Level Before Purge: كول لو لو		Water Level	After Sample:	フ,	08	
Well Volume: i, ⊗ Ŋ Gallons		Measuremer	nt Method:	Elec. V	VLD_	Steel Tape
Sampling Information						
Weather Conditions: Temp: 40 ³	Wind: SE	10	Sky:	FAIR	<u> </u>	
Sampling Method: Grundfos Bladder S3/ft	Disp. Bailer	Whale	Grab Other:			
Dedicated Equipment: Yes No		Pumping Ra	te: ბან	25	gpm	
Well Purged Dry? Yes 🚳		Time Pump	Began: ኒን	10)		am / Jin
Time Purged Dry?		Time of Sam	pling: 13	.25		am / (pm)
Duplicate Sample? Yes No ID:	_	Sample EH:	86	18		
Sample Appearance: General: Clear	Color: Na	ng Phase	E NONR		Odor:	NONE
				1	1	
名 Specific Temp Time pH Cond. OC	D. O.	Turbidity NTU	Gallons Removed	SEQ #	Comm	ante:
	mg/L			1.	COIIII	icito.
1209 7.30 1248 5.96	MA	MA	2.00	1	-	
1217 7.30 1247 6.03			4,00	2		
1225 730 1248 6.09		<i>†</i>	6.00	3		
				4		
				5	1	
Stabilized? (Yes) No	Amount Wa	ater Removed:	6,00	5	Gallor	ns

New Ulm, MN 56073

507 354 8517

Groundwater Assessment		Site:	Otter Tail Pov	ver Co./ Big Stone
Sampling Personnel:	_	Facility ID:		
Teff Hoffman	<u>-</u>	Date: \5 Rpc	19	A DOLLAR OF THE PARTY OF THE PA
	_	Unique Station ID:		
		Sample ID:	V	Vell H8
Well Condition Well Locked? Well Labeled? Casing Straight? Repairs Necessary:		Protective Posts? State ID Tag? Grout Seal Intact?	Yes Yes Yes	No (No No
Well Information				
Well Depth: 22,33		Well Casing Elevat		1081.23
Constructed Depth: 22.05		Static Water Elevat	ion:	19,550
Casing Diameter: 2"	,	Previous Static:	10	00 14, DO
Water Level Before Purge: 3.32		Water Level After S	Sample: ᡩ	.03
Well Volume: 3.10 Ga	llons	Measurement Meth	nod: Elec.	WLI Steel Tape
Sampling Information				
Weather Conditions: Temp: 40	Wind: くと	10	Sky: FAI	R
	dder SS/T) Disp. Bailer	Whale Grab	Other:	
Dedicated Equipment: Yes No		Pumping Rate:	0.25	gpm
Well Purged Dry? Yes No		Time Pump Began		am /pm
Time Purged Dry?		Time of Sampling:	13 14	am / (cm)
Duplicate Sample? Yes No ID:		Sample EH:	<u> १८, ।</u>	
Sample Appearance: General: Olean	Color: Non	Phase: No.	Ner	Odor: NONR
N3 Specific Te	mp D. O. mg/L	Turbidity Gallo		Comments:
1248 7.20 1413 L	,94 NA	NA 3,	25 1	
	1 89.2	\ Lo.	50 2	
No. 15 and 1	7,00	9.	75 3	
			4	
			5	
	I .	I		

Comments:

not in notes

New Ulm, MN 56073

507 354 8517

Groundwater Assessment			Site:	Otter T	ail Pow	er Co./ Big Stone
Sampling Personnel:			Facility ID:			
Jeff Hollman	\		Date: \5	Apr 19		
			Unique Statio	on ID:		
			Sample ID:		W	/ell H9
Well Condition Well Locked? Well Labeled? Casing Straight? Repairs Necessary:			Protective Po State ID Tag Grout Seal In	? Yes	<	No No No
Well Information						
Well Depth: 36.7/			Well Casing	Elevation:		1086.21
Constructed Depth: 30.20			Static Water	Elevation:	Ö	81-93
Casing Diameter: 2"			Previous Stat	tic:	107	15.23
Water Level Before Purge: ५, ५५	3		Water Level	After Sample:	<u> </u>	、ろ1
Well Volume: 4.31	Gallons		Measuremen	it Method:	Elec. V	VLD Steel Tape
Sampling Information						
Weather Conditions: Temp: 42)	Wind: ≤ ₹	10	Sky:	FNIF	3
Sampling Method: Grundfos	Bladder SS/T	Disp. Bailer	Whale	Grab Other:		
Dedicated Equipment: Yes No			Pumping Rat	re: 0 (3	5	gpm
Well Purged Dry? Yes No			Time Pump I		5. 37	am (pm
Time Purged Dry?			Time of Sam		1:21	am 1/pm
Duplicate Sample? Yes No	ID:	<u> </u>	Sample EH:	119,1		
Sample Appearance: General: 513	ghtly Cloud	Color: NON	و Phase	: NONE		Odor: NOVR
18 Specific Cond.	Temp ^o C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1345 6.71 2857	8.33	MA	NA	4,5	1	
1403 671 2885	8.35	ŀ		9,0	2	
1421 6.71 2887	8,36			13,5	3	
					4	
					5	
Stabilized? Yes No		Amount Wat	ter Removed:	\3.5	1	Gallons

Comments:

New Ulm, MN 56073

507 354 8517

Groundwa	ater Asse	ssment			Site:	Otter T	ail Pow	er Co./ Big Stone
Sampling Pe	ersonnel:				Facility ID:			
	Ber	Molt			Date: 15 7	4,0-19		
			_		Unique Statio	n ID:		
					Sample ID:		We	II НЗОХ
Well Cond		Yes) No			Protective Po			
Well Labele		Yes No	<u>.</u>		State ID Tag? Grout Seal In			<u>NO)</u>
Casing Strain Repairs Nec		(es/ No	-		Glout Seal III	tact: 163		NO
Well Infor								
Well Depth:		22.08			Well Casing E	Elevation:		1095.19
Constructed	Depth:	22.55	-		Static Water	Elevation: 😁		
Casing Diar	neter:	2"	_		Previous Stat	ic: 1096.1	4	WOLLD THE
Water Leve	Before Pur	ge:			Water Level	After Sample:	Belo	w purp
Well Volume	e:		Gallons		Measuremen	t Method:	€lec. V	VLI Steel Tape
Sampling	Informatio	n						
Weather Co	onditions:	Temp:	6	Wind: 56	215	Sky:	C10cd	4
Sampling M	ethod:	Grundfos	Bladder SS/T	Disp. Bailer	Whale	Grab Other:		
Dedicated E	Equipment:	(es No	_		Pumping Rat	e: , 2 <u>5</u>		gpm
Well Purged	d Dry?	Yes No	_		Time Pump E	7 .		am / pm
Time Purge	d Dry?		_		Time of Sam	pling: 16/0	<u> </u>	am / 🍎 💆
Duplicate S	ample?	Yes 😡	_ID:		Sample EH:			· · · · · · · · · · · · · · · · · · ·
Sample App	pearance:	General:		Color: -	- Phase	:		Odor:
Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity	Gaillons Removed	SEQ #	Comments:
		West between the beautiful the second second	in proprietation and the contraction of the contrac	and amount of the same			1	
		grade to grade to	Section and the second section and the second				2	
	mer. r	· · · · · · · · · · · · · · · · · · ·		- Sand Sand Market Sand Sand			3	
	Marketon Statement Statement						4	
							5	The second secon
Stabilized?	Yes	No		Amount Wa	ter Removed:			Gallons
Comment								<u> </u>
		j	rinask	to pe	ige wel	1 due	to f	kesadous contit
			around	Well.				cold t
Exceptions	to Protocol:				Hollard	affored.		

\$ NO Sample!



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Page:

1 of 8

FINAL REPORT COMPLETION DATE:

Date Reported: 22 Oct 2019

Work Order #: 31-0488 Account #: 006106

PO #: 48680

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

Project Name: BIG STONE PLANT CCR

nager/Date

Lab

[necessi Quality Assurance Director/Date Reviewed

RL = Reporting Limits

NQ = Not Present, Qualitative Only

PQ = Present, Qualitative Only

ND = Not Determined



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CERTIFICATE of ANALYSIS - CCR

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

Project Name: BIG STONE PLANT CCR

Sample Description: H2OX

Page: 2 of 8

Report Date: 22 Oct 2019 Lab Number: 19-A52166 Work Order #: 31-0488 Account #: 006106

Sample Matrix: GROUNDWATER
Date Sampled: 14 Oct 2019 11:18
Sampled By: MVTL FIELD PERSONNEL
Date Received: 14 Oct 2019 17:38

PO #: 48680

Temp at Receipt: 0.3C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions pH, Field pH Sulfate Chloride Solids, Total Dissolved Calcium Boron Fluoride	6.66 unit * 6.9 unit 2370 ~ mg/I 4.1 mg/I 3900 mg/I 502.0 ~ mg/I 0.235 mg/I 0.200 mg/I GSee Narrative		SM4500-H+-2011 SM 4500 H+ B-2000 ASTM D516-07 SM 4500 C1 E SM 2540 C-97 SW6010C SW6010C EPA 300.0	17 Oct 19 14 Oct 19 11:18 15 Oct 19 12:20 17 Oct 19 11:26 17 Oct 19 13:43 16 Oct 19 14:40 18 Oct 19 13:25 18 Oct 19 13:25 17 Oct 19 17:56	SS AKF AL KAM KAM

^{*} 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 sample matrix
| = Due to sample quantity
| = Due to sample quantity
| = Due to internal standard response
| = Due to internal standard response | Due to internal standards.

[~] 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

Project Name: BIG STONE PLANT CCR

Sample Description: H3OX

3 of 8 Page:

Report Date: 22 Oct 2019 Lab Number: 19-A52167 Work Order #: 31-0488

Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 14 Oct 2019 11:50 Sampled By: MVTL FIELD PERSONNEL

Date Received: 14 Oct 2019 17:38

PO #: 48680

Temp at Receipt: 0.3C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions pH, Field pH Sulfate Chloride Solids, Total Dissolved Calcium Boron Fluoride	6.74 units * 6.9 units 1770 ~ mg/L 74.6 mg/L 3470 mg/L 432.0 ~ mg/L 5.880 mg/L 0.410 mg/L @See Narrative	1.00 1.0 5.0 3.0 10 0.500 0.100 0.020	SM4500-H+-2011 SM 4500 H+ B-2000 ASTM D516-07 SM 4500 C1 E SM 2540 C-97 SW6010C SW6010C EPA 300.0	17 Oct 19 14 Oct 19 11:50 15 Oct 19 12:38 17 Oct 19 13:43 16 Oct 19 14:40 18 Oct 19 13:25 18 Oct 19 17:56	SS AKF AL KAM KAM

^{*} 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

[~] 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 4.96 MN 56538-0496 FERGUS FALLS

Project Name: BIG STONE PLANT CCR

Sample Description: H4OX

Report Date: 22 Oct 2019 Lab Number: 19-A52168 Work Order #: 31-0488 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 14 Oct 2019 12:43

Sampled By: MVTL FIELD PERSONNEL Date Received: 14 Oct 2019 17:38

PO #: 48680

Temp at Receipt: 0.3C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions pH, Field pH Sulfate Chloride Solids, Total Dissolved Calcium Boron Fluoride	* 7.0 ur 1170 ~ mc 48.3 mc 2300 mc 305.0 mc 0.430 mc	nits 1.00 nits 1.0 g/L 5.0 g/L 3.0 g/L 10 g/L 0.500 g/L 0.100 g/L 0.020 ve	SM4500-H+-2011 SM 4500 H+ B-2000 ASTM D516-07 SM 4500 C1 E SM 2540 C-97 SW6010C SW6010C EPA 300.0	17 Oct 19 14 Oct 19 12:43 15 Oct 19 12:38 17 Oct 19 11:26 17 Oct 19 13:43 16 Oct 19 14:40 18 Oct 19 13:25 18 Oct 19 13:25 17 Oct 19 17:56	SS AKF AL KAM KAM

^{*} 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

Project Name: BIG STONE PLANT CCR

Sample Description: H6

Report Date: 22 Oct 2019 Lab Number: 19-A52169 Work Order #: 31-0488 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 14 Oct 2019 13:45 Sampled By: MVTL FIELD PERSONNEL Date Received: 14 Oct 2019 17:38

PO #: 48680

Temp at Receipt: 0.3C

	As Receiv Result	As Received Result		Method Reference	Date Analyzed	Analyst
Water Digestions pH, Field pH Sulfate Chloride Solids, Total Dissolved Calcium Boron Fluoride	7.23 * 7.4 64.5 3.5 542 45.90 2.810 0.380 @See Nar	units units mg/L mg/L mg/L mg/L mg/L mg/L rative	1.00 1.0 5.0 3.0 10 0.500 0.100 0.020	SM4500-H+-2011 SM 4500 H+ B-2000 ASTM D516-07 SM 4500 C1 E SM 2540 C-97 SW6010C SW6010C EPA 300.0	17 Oct 19 14 Oct 19 13:45 15 Oct 19 12:38 17 Oct 19 11:26 17 Oct 19 14:02 16 Oct 19 14:40 18 Oct 19 13:25 18 Oct 19 17:56	SS AKF AL KAM KAM

* 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:

Q = Due to sample matrix
P = Due to sample quantity
P = Due to sample quantity
P = Due to sample quantity
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

Project Name: BIG STONE PLANT CCR

Sample Description: H8

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Report Date: 22 Oct 2019 Lab Number: 19-A52170 Work Order #: 31-0488 Account #: 006106

Sample Matrix: GROUNDWATER Date Sampled: 14 Oct 2019 14:28 Sampled By: MVTL FIELD PERSONNEL Date Received: 14 Oct 2019 17:38

PO #: 48680

Temp at Receipt: 0.3C

	As Recei Result	As Received Result		Method Method RL Reference		Analyst	
Water Digestions pH, Field pH Sulfate Chloride Solids, Total Dissolved Calcium Boron Fluoride	7.14 * 7.3 193 @ 4.5 830 106.0 3.940 0.550 @See Nar	units units mg/L mg/L mg/L mg/L mg/L mg/L	1.00 1.0 5.0 3.0 10 0.500 0.100	SM4500-H+-2011 SM 4500 H+ B-2000 ASTM D516-07 SM 4500 C1 E SM 2540 C-97 SW6010C SW6010C EPA 300.0	17 Oct 19 14 Oct 19 14:28 15 Oct 19 12:38 17 Oct 19 11:26 17 Oct 19 14:02 16 Oct 19 14:40 18 Oct 19 13:25 18 Oct 19 13:25 17 Oct 19 17:56	SS AKF AL KAM KAM	

^{*} Holding Time Exceeded

RL = Reporting Limit



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CERTIFICATE of ANALYSIS - CCR

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

Project Name: BIG STONE PLANT CCR

Sample Description: H9

Report Date: 22 Oct 2019 Lab Number: 19-A52171 Work Order #: 31-0488 Account #: 006106

Sample Matrix: GROUNDWATER

Date Sampled: 14 Oct 2019 14:27 Sampled By: MVTL FIELD PERSONNEL Date Received: 14 Oct 2019 17:38

PO #: 48680

Temp at Receipt: 0.3C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions pH, Field pH Sulfate Chloride Solids, Total Dissolved Calcium Boron Fluoride	6.66 units * 6.7 units 1510 ~ mg/L 48.0 mg/L 2870 mg/L 598.0 ~ mg/L 1.080 mg/L 0.300 mg/L @See Narrative	1.00 1.0 5.0 3.0 10 0.500 0.100 0.020	SM4500-H+-2011 SM 4500 H+ B-2000 ASTM D516-07 SM 4500 C1 E SM 2540 C-97 SW6010C SW6010C EPA 300.0	17 Oct 19 14 Oct 19 14:27 15 Oct 19 12:38 17 Oct 19 11:26 17 Oct 19 14:02 16 Oct 19 14:40 18 Oct 19 13:25 18 Oct 19 17:56	JMS BMW AL SS AKF AL KAM KAM

^{*} Holding Time Exceeded

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



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INORGANIC ANALYSES:

Due to the high concentration of fluoride in the spiked sample, the recovery of fluoride was outside of acceptance range in the matrix spike for samples 19-A52166 through 19-A52171. The data was reported based on the acceptable recovery of fluoride in the knowns and the relative percent difference between the matrix spikes.

No other problems were encountered.

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Page: 1 of 1

Quality Control Report

ab IDs: 19-A52166 to 19-A	.52171	Pro	oject: BIG	G STONI	E PLANT CCI	ξ.	Work (Order: 20	01931-04	88							
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	96	85-115	1.00	19-A52171	1.080	2.130	105	75-125	2.130	2.220	114	4.1	10	98	90-110	< 0.1
Calcium mg/L	50.00	103	85-115	50.0	19-A52171	598.0	637.0	78	75-125	637.0	643.0	90	0.9	10	101	90-110	< 0.5
Chloride mg/L	-	-	-	60.0 60.0	19-A52168 19-A52310	48.3 28.7	107 86.9	98 97	86-117 86-117	107 86.9	106 85.5	96 95	0.9 1.6	5 5	97 97	90-110 90-110	< 3 < 3
Fluoride mg/L	-	-	-	2.00	19-D3390	5.18	6.70	76	80-120	6.70	6.78	80	1.2	10	93	90-110	< 0.02
pH units	-	-	-	-	-	-	-	-	-	6.9 6.7	6.9 6.7	-	0.0	2.5 2.5	101 101	90-110 90-110	-
Solids, Total Dissolved mg/L	-	-	-	-	-	-	-	-	-	556 1760	568 1750	-	2.1 0.6	7 7	101	85-115	< 10
Sulfate mg/L	-		-	500 500	19-A52171 19-A52133	1510 947	1960 1360	90 83	68-132 68-132	1960 1360	1960 1390	90 89	0.0 2.2	5 5	100	80-120	< 5

'luoride Matrix spike recover outside of limits, see narrative.

Approved by:

Minnesota Valley Testing Laboratories

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

Field Service Chain of Custody Record

This is an exact copy of the original document

By Date 150ct 9

Pages 1-10

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		lls, MN 565	38-0496							Lab	Nun	bers	<u>.</u>								
Phone:	218-739-8															-					ᆜ
		Sample In	formation									3ott			,					Analys	SIS
Lab Number	Sample ID	Unique Station ID	Date	, Time	Sample Type	Sample Location	1000 HNO3 Inno	500 None	1000 none	500 HNO3	Filter? Y or	500 H2SO4	Filter? Y or M	1000 Amber p.c.	1000 Amber	500 NaOH	Other: 150 H2CO	Other 150 No.	Analysis Required	D	
A52166	H2OX		HOCH9	1118	GW				1	1	N								CCR 3		_
67	НЗОХ			1150	GW				1	1	N								CCR _{.3}		_
108	H4OX			1347	GW				1	1	N	4							CCR 3		_
69	H-6			1345	GW				1	1	N					-			CCR 3		_
70	H-8			1425	GW				1	1	N								CCR 3		
71	H-9		4	TEHI	GW				1	1	N								CCR 3		
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Sample	s Relinquis	hed By:///							Rece		Ву:	4.	/ -	ed	4						_
Date:	MUCTIC	1	Time: 17	H	Temp	035018	P ate	: <i>IS</i>	oct	19		د	/ /	Time	e:	330)		Temp:	3.00	
Sample	s Relinquis	hed into:	Fridge	Log in Car	t	Other:	-														
	s Relinquis						Sam	ples	Rece	ived I	Ву:										_
Date:			Time:		Temp		Date	e:						Time	e:				Temp:		
Delivery	<i>/</i> :	Şamplers	Other:				Seal	Nun	nber(s	s) - If	Used	t									
Transpo			/IÇE		Other		Seal	s Inta	act?				Yes			No					

23 Ang 17

Big Stone Sampling - CCR FAIL 2019

Landfill or ADA wells

	010	Danamatan Liat	Well	Diameter	Well	Sample	Dedicated?	Pump Rate	Goes	Sampling
	Site	Parameter List	Depth	(Inches)	Elevation	Equipment	Dedicated:	(ml/minute)	Dry?	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

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

CCR - Apper	ıdix III	Detection	Monitoring

Field Parameters

рН*

* Field and Laboratory Measurements

Total Concentration Pa	rameters
-------------------------------	----------

Method 6010

Boron Calcium

6010

Chloride

SM4500 CL E

Fluoride

EPA 300

рΗ

SM 4500 H+B-96

Sulfate

ASTM D516

Dissolved Solids, Total

SM 2540 C-97

Note: These are non-filtered samples.

1000 None

500 HN03

CCR 4

CCR - Appendix IV - Assessment Monitoring

Total Concentration Parameters	Method
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.

Sampling Information Weather Conditions: Temp: 41 Wind: LUV Sky: Fair Sampling Method: Grundfos Pladder St/T Disp. Bailer Whale Grab Other: Dedicated Equipment: Yes No Well Purged Dry? Yes No Time Purged Dry? Time Pump Began: 10566 mm/l pm Time Purged Dry? Yes No ID: Sample EH: -158-2 Sample Appearance: General: S1-Cloudy Color: Gry Phase: Light Scd Odor: Eartly Time PH Cond. Cond. Turbidity Gallons Removed # Comments: 1113 6.56 3842 10-21 WA WA 4-35 1 1118 6.66 3997 938	Groundwater Assessment		Site:	Otter Tail Pov	ver Co./ Big Stone
Date: Oct	Sampling Personnel:		Facility ID:		
Sample ID: Well H2OX	<i>a</i>		Date: 14 oct	19	
Well Locked? No Well Labeled? No State ID Tag? Yes No State ID Tag? Yes No No State ID Tag? Yes No No State ID Tag? Yes No No No State ID Tag? Yes No No No No No No No N			Unique Station ID:		
Well Locked? Yes No Well Labeled? Yes No Casing Straight? Yes No Grout Seal Intact? Yes No Hell Information Well Depth: 32.20 Casing Diameter: 2" Water Level Before Purge: 7.45 Well Volume: 4.14 Gallons Sampling Information Weather Conditions: Temp: Wind: LV Sky: Fair Sampling Method: Grundfos Gladder Skri Disp. Bailer Male Grab Other: Dedicated Equipment: Yes No Holl Purged Dry? Hes No Time Pump Began: 1 O 5(o fm) pm Time Purged Dry? Hes No Time Pump Began: 1 O 5(o fm) pm Time Purged Dry? Hes No ID: Sample EH: -158-2 Sample Appearance: General: St. Cloudy Color: Gray Phase: Light Seq Odor: Fairty Ill (o. (o, 3997) 9.38 Protective Posts? Yes No State ID Tag? Yes No No The Comments: Interpret No. State ID Tag? Yes No No Time Pump Began: 1 O 5(o fm) pm Time of Sampling: Ill Gallons SEQ No No No. Sample EH: -158-2 Sample Appearance: General: St. Cloudy Color: Gray Phase: Light Seq Odor: Fairty Seq Odor			Sample ID:	· We	ell H2OX
Well Depth: 32.20 Static Water Elevation: 1103.91	Well Locked? Well Labeled? Casing Straight? Well Locked? No No		State ID Tag?	Yes	M
Casing Diameter: 2" Water Level Before Purge: 7.45 Water Level After Sample: Below Fully Well Volume: 4.14 Gallons Sampling Information Weather Conditions: Temp: 44 Wind: 44 A Previous Static: 10 98-36 Wind: 10 98-36 Water Level After Sample: Below Fully Wate	Well Information				
Previous Static: 0 98 36 Water Level Before Purge: 7.45 Water Level After Sample: Below Pulmy Measurement Method: Elec. Wild Steel Tape	Well Depth: 32-83		Well Casing Elevati	on:	1103.91
Water Level Before Purge: 7.45 Well Volume: 4.14 Gallons Measurement Method: Elec. Wild Steel Tape Sampling Information Weather Conditions: Temp: 4 Wind: 2 Wind: 2 Whale Grab Other: Dedicated Equipment: Yes No Well Purged Dry? Yes No Time Purged Dry? Yes No Duplicate Sample? Yes No Sample Appearance: General: \$1. Cloudy Color: Graphy Specific Cond.	Constructed Depth: 32.20		Static Water Elevat	ion: 1096	46
Measurement Method: Elec. W. Steel Tape	Casing Diameter: 2"		Previous Static:	098-36	
Measurement Method: Elec. W. Steel Tape	Water Level Before Purge: 7.45		Water Level After S	Sample: <i>Bel</i>	ow pump
Weather Conditions: Temp: H Wind: LLV Sky: Fair Sampling Method: Grundfos Bladder SS/T Disp. Bailer Whale Grab Other: Dedicated Equipment: Yes No Pumping Rate: 3-5 gpm Well Purged Dry? Yes No Time Pump Began: O 5 (mm) pm Time Purged Dry? Yes No ID: Sample EH: -158-2 Sample Appearance: General: S1. Cloudy Color: Gray Phase: Light Sed Odor: Earthy 1	Well Volume: 4,14 Gallons		Measurement Meth	and the same of th	
Sampling Method: Grundfos Grundfos Grundfos Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Sample Appearance: General: Specific Cond. Time Phase: Cond. Specific Cond. Time Cond. Cond	Sampling Information			7	<
Dedicated Equipment: Yes No Well Purged Dry? Time Purged Dry? Duplicate Sample? Sample Appearance: General: S1- Cloudy Color: Gry Phase: Light Scd. Odor: Earthy Time Phase: Light Sed. Odor: E	Weather Conditions: Temp:	Wind: L	LV	Sky: Fai	
Well Purged Dry? (es) No Time Pump Began: 1056 4m/ pm Time Purged Dry? 11/3 Time of Sampling: 1/8 am / pm Duplicate Sample? Yes No ID: Sample EH: -158-2 Sample Appearance: General: SI. Cloudy Color: Yes Phase: Light Scd. Odor: Earthy Time pH Specific Cond. Temp Oc. D. O. mg/L Turbidity NTU Gallons Removed SEQ Removed Comments: 1113 Co.56 3842 10.21 AA AA 4.35 1 1118 Co.66 3997 9.38 A 3 Recharge 1118 Co.66 3997 9.38 5 5	Sampling Method: Grundfos Bladder S	S/T Disp. Bailer	Whale Grab		
Time Purged Dry? Time of Sampling: //8 am / pm Duplicate Sample? Yes No ID: Sample EH: -/58-2 Sample Appearance: General: SI. Cloudy Color: Gry Phase: Light Scd. Odor: Earthy Time Phase: Light Scd. Odor: Earthy Time ph Cond. °C mg/L NTU Removed # Comments: 1113 Co.56 3842 10.21 NA NA 4.25 1 1118 Co.66 3997 938 - 3 Recharge 4 5	Dedicated Equipment: Yes No		Pumping Rate:		gpm
Duplicate Sample? Yes No ID: Sample EH: -158-2 Sample Appearance: General: SI-Cloudy Color: General: SI-Cloudy Color: General: SI-Cloudy Color: General: SI-Cloudy Color: General: SEQ Comments: SEQ Comments: Comments: Heroved # Comments: Comments: 1113 General: General: SI-Cloudy NTU Removed # Comments: 1113 General:			Time Pump Began:		<u>(afn)</u> / pm
Sample Appearance: General: SI. Cloudy Color: Gry Phase: Light Scd. Odor: Earthy Time pH Specific Cond. PC mg/L NTU Removed # Comments: 1113 6.56 3842 10.21 NA NA 4.25 1 1118 6.66 3997 9.38 5 3 Recharge	Time Purged Dry? 11/3		Time of Sampling:	1118	am / pm
1) Specific Temp D. O. Turbidity Gallons SEQ Removed # Comments: 1113 (6.56 3842 10.21 NA NA 4.25 1	Duplicate Sample? Yes No ID:		Sample EH: -/5	8-2	
Time pH Cond. °C mg/L NTU Removed # Comments: 1113 (0.56) 3842 (0.21 NA NA 4.25 1 2 1118 (0.66) 3997 938 - 3 Recharge 4	Sample Appearance: General: \$1. \(Clo\)	udy Color: 97	Phase: L	14+ Sed.	Odor: Earthy
1118 (o.(olo 3997) 9.38 - 3 Recharge	Time pH Cond. oC		NTU Remo	ved #	Comments:
1118 (o.(olo 3997) 9.38 - 3 Recharge	1113 6.56 3842 10.	21 NA	NA 4.	25 1	
1118 (o.(do 3997) 9.38 - 3 Recharge					
5	1118 (066 3997 93	8	/may-		Recharge
		1		4	
Stabilized? Yes No Amount Water Removed: 4,25 Gallons				5	
	Stabilized? Yes No	Amount Wa	ter Removed: 4	, 2-5	Gallons

Groundwater Assessment	Site: Otter Tail Power Co./ Big Stone
Sampling Personnel:	Facility ID:
Ber Lolf	Date: 14 oct 19
	Unique Station ID:
	Sample ID: Well H3OX
Well Condition	3:
Well Locked? Yes No	Protective Posts? Yes No.
Well Labeled? Yes No Casing Straight? Yes No	State ID Tag? Yes (No.) Grout Seal Intact? Yes (No.)
	Grout ocal fillade: 100
Repairs Necessary: Well Information	
Well Depth: 72.68	Well Casing Elevation: 1095.19
Constructed Depth: 22.55	Static Water Elevation: 1091, 29
Casing Diameter: 2"	Previous Static:
Water Level Before Purge: 3-90	Water Level After Sample: Relow ramp
Well Volume: 3-06 Gallons	Measurement Method: Flec. WL) Steel Tape
Sampling Information	
Weather Conditions: Temp: 44 Wir	nd: LU Sky: Fair
	o. Bailer Whale Grab Other:
Dedicated Equipment: (es) No	Pumping Rate: 25 gpm
Well Purged Dry? (Yes) No	Time Pump Began: //32 am/ pm
Time Purged Dry? 1145	Time of Sampling: 1150 am/ pm
Duplicate Sample? Yes No ID:	Sample EH: 109.5
Sample Appearance: General: Sear Col	lor: NO 7 Phase: NO 7 Odor: No 7
Specific Temp D.	O. Turbidity Gallons SEQ
Time pH Cond. oC mg	J. J
	NA NA 3.25 1
	2
1150 6.74 4017 12.17	3
	4
	5
Stabilized? Yes No Am	nount Water Removed: 3 25 Gallons
Commonte:	

Groundwater Assessment	Site: Otter Tail Power Co./ Big Stone						
Sampling Personn <u>el</u> :	mpling Personnel:			Facility ID:			
Ben worf		Date: 14 OCY 19					
		Unique Statio					
		Sample ID:		We	II H4OX		
Well Condition							
Well Locked? Yes No		Protective Po			No)		
Well Labeled? Yes No Casing Straight? Yes No		State ID Tag? Grout Seal In			No		
Repairs Necessary:		0.000					
Well Information							
Well Depth: 27-48		Well Casing I	Elevation:		1108.22		
Constructed Depth: 27.20		Static Water Elevation: 1090.87					
Casing Diameter: 2"		Previous Static: 1094.09					
Water Level Before Purge: 17.35		Water Level After Sample: Relow pump					
Well Volume: 1.65 Gallons		Measurement Method: Elec. WL) Steel Tape					
Sampling Information					· _		
Weather Conditions: Temp: 47	Wind:	<u>Llu</u>	Sky:	Fai			
Sampling Method: Grundfos Bladder S	S/T Disp. Bailer	Whale	Grab Other:	.,			
Dedicated Equipment: Ves No		Pumping Rate: , 25 gpm					
Well Purged Dry? Yes No		Time Pump Began: 123/ am / pm					
Time Purged Dry? 7238		Time of Sampling: 1243 am / pm					
Duplicate Sample? Yes No ID:		Sample EH: 7/53-8					
Sample Appearance: General: Check	Color: N	♥ ~ Phase	NOW	,	Odor: None		
Specific Temp	D. O.	Turbidity	Gallons	SEQ			
Time pH Cond. OC	mg/L	NTU	Removed	#	Comments:		
12,38 6.78 2810 8.83	2 MH	NA	1.75	1			
				2			
1243 (0.81 2815 8.86			,	3	Recharge		
				4			
				5			
Stabilized? Yes No	Amount Wa	ater Removed:			Gallons		
Comments:							

Groundwater Assessment	Site: Otter Tail Power Co./ Big Stone
Sampling Personnel:	Facility ID:
08	Date: 140019
	Unique Station ID:
	Sample ID: Well H6
Well Condition	
Well Locked? (es No	Protective Posts? (68 No
Well Labeled? Yes No	State ID Tag? Yes (No) Grout Seal Intact? Yes
Casing Straight? (es/ No	Glout Seal Illiact: 1es Was
Repairs Necessary:	
Well Information	~
Well Depth: 17,92	Well Casing Elevation:
Constructed Depth: 17.70	Static Water Elevation:
Casing Diameter: 2"	Previous Static:
Water Level Before Purge: 1159	Water Level After Sample: 2,14
Well Volume: 103 Gallons	Measurement Method: Elec. Wild Steel Tape
Sampling Information	
Weather Conditions: Temp: 39	Wind: SOE 4 Sky: Sunny
Sampling Method: Grundfos Bladder SS	
Dedicated Equipment: (Tes No	Pumping Rate: 0.25 gpm
Well Purged Dry? Yes (No	Time Pump Began: 330 am / 6m
Time Purged Dry?	Time of Sampling: 3号 am / 卿
Duplicate Sample? Yes No ID:	Sample EH: -102.5
Sample Appearance: General: Clean	Color: None Phase: None Odor: None
Specific Temp	D. O. Turbidity Gallons SEQ
Time pH Cond. OC	mg/L NTU Removed # Comments:
1335 7.23 948 11.37	7 NA NA 1.25 1
1340 7,23 949 11.36	
345 7,23 950 11.32	7 3.75 3
	4
	5
Stabilized? (Yes) No	Amount Water Removed: 3.75 Gallons
Comments:	

Groundwater Assessment		Site: Otter Tail Power Co./ Big Stone			
Sampling Personnel:		Facility ID:			
DF		Date: 140019			
		Unique Station ID:			
		Sample ID: Well H8			
Well Condition Well Locked? Well Labeled? Casing Straight? Repairs Necessary:		Protective Posts? (Yes) No State ID Tag? Yes (No) Grout Seal Intact? (Yes) No			
Well Information					
Well Depth: 22.33		Well Casing Elevation: 1081.23			
Constructed Depth: 22.05		Static Water Elevation: 1075,63			
Casing Diameter: 2"		Previous Static: 1677,91			
Water Level Before Purge: 5.60		Water Level After Sample: 6.68			
Well Volume: 2.73 Gallons		Measurement Method: Flec. WI Steel Tape			
Sampling Information	1.	16			
Weather Conditions: Temp: 39	Wind: ケ	SE 4 Sky: Supry			
		·			
Sampling Method: Grundfos Bladder S8/T	Disp. Bailer	Whale Grab Other:			
Dedicated Equipment: Ver No	Disp. Bailer	Pumping Rate: 0.25 gpm			
	Disp. Bailer	Pumping Rate: 0.25 gpm Time Pump Began: 1355 am / pm			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry?	Disp. Bailer	Pumping Rate: 0.25 gpm Time Pump Began: 1355 am / pm Time of Sampling: 1428 am / pm			
Dedicated Equipment: Ves No Well Purged Dry? Yes No	Disp. Bailer	Pumping Rate: 0.25 gpm Time Pump Began: 1355 am / pm Time of Sampling: 1428 am / pm Sample EH: 0.2			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry?	Disp. Bailer Color: No.	Pumping Rate: 0.25 gpm Time Pump Began: 1355 am / pm Time of Sampling: 1928 am / pm Sample EH: 0.2			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Yes No ID: Sample Appearance: General: Ceast Time pH Specific Temp Cond. OC	Color: No.	Pumping Rate: 0.25 gpm Time Pump Began: 355 am / pm Time of Sampling: 1928 am / pm Sample EH: 0.2 Phase: None Odor: None Turbidity Gallons SEQ Removed # Comments:			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Yes No ID: Sample Appearance: General: Cea Time pH Cond. Temp Cond. Vec	Color: No.	Pumping Rate: 0.25 gpm Time Pump Began: 355 am / pm Time of Sampling: 1428 am / pm Sample EH: 0.2 Phase: Nove Odor: Nove Turbidity Gallons SEQ Removed # Comments: NA 2.75 1			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Yes No Sample Appearance: General: Ceal Time pH Cond. Ceal Time pH J304 J033 1417 7.14 J305 J0.33	Color: No.	Pumping Rate: 0.25 gpm Time Pump Began: 355 am / pm Time of Sampling: M28 am / pm Sample EH: 0.2 Phase: None Odor: None Turbidity Gallons SEQ Removed # Comments: NA 2.75 1 5.5 2			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Yes No ID: Sample Appearance: General: Cea Time pH Cond. Temp Cond. Vec	Color: No.	Pumping Rate: 0.25 gpm Time Pump Began: 355 am / pm Time of Sampling: 1428 am / pm Sample EH: 0.2 Phase: Nove Odor: Nove Turbidity Gallons SEQ Removed # Comments: NA 2.75 1			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Yes No Sample Appearance: General: Ceal Time pH Cond. Ceal Time pH J304 J033 1417 7.14 J305 J0.33	Color: No.	Pumping Rate: 0.25 gpm Time Pump Began: 355 am / pm Time of Sampling: 1428 am / pm Sample EH: 0.2 We Phase: None Odor: None Turbidity Gallons SEQ Removed # Comments: NA 2.75 1 5.5 2			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Yes No Sample Appearance: General: Ceal Time pH Cond. Ceal Time pH J304 J033 1417 7.14 J305 J0.33	Color: No.	Pumping Rate: 0.25 gpm Time Pump Began: 355 am / pm Time of Sampling: M28 am / pm Sample EH: 0.2 Phase: None Odor: None Turbidity Gallons SEQ Removed # Comments: NA 2.75 1 5.5 2 8.25 3			
Dedicated Equipment: Ves No Well Purged Dry? Time Purged Dry? Duplicate Sample? Yes No Sample Appearance: General: Ceal Time pH Cond. Ceal Time pH J304 J033 1417 7.14 J305 J0.33	D. O. mg/L	Pumping Rate: 0.25 gpm Time Pump Began: 355 am / (pm) Time of Sampling: M28 am / (pm) Sample EH: 0.2 Phase: None Odor: None Turbidity Gallons Removed # Comments: NA 2.75 1 5.5 2 8.25 3.4			

Groundwater Assessment	,	Site:	Otter	Tail Pow	ver Co./ Big Stone
Sampling Personnel:		Facility ID:			
Ben Wolf		Date: 140C+ 19			
		Unique Statio	on ID:		***************************************
		Sample ID:		V	/ell H9
Well Condition Well Locked? Well Labeled? Casing Straight? Repairs Necessary:		Protective Po State ID Tag Grout Seal In	? Yes		No No
Well Information					
Well Depth: 30.71		Well Casing I	Elevation:		1086.21
Constructed Depth: 30.20		Static Water Elevation: 1077.29			
Casing Diameter: 2"		Previous Static: 108/.93			
Water Level Before Purge: 8.9.		Water Level	After Sample:	9.6	ka
Well Volume: 3-55 Gallons	_	Measuremen	t Method:	Ælec. V	VLI) Steel Tape
Sampling Information					
Weather Conditions: Temp: 56	Wind:	LV	Sky:	Fai	
Sampling Method: Grundfos Bladder SSIT	Disp. Bailer	Whale	Grab Other:		
Dedicated Equipment: (Yes) No		Pumping Rat			gpm
Well Purged Dry? Yes No		Time Pump E	Began: ∫34	2	am / pm
Time Purged Dry?		Time of Sampling: 1427 am / am			
Duplicate Sample? Yes No ID:		Sample EH:	85.5		
Sample Appearance: General: C/ca-	Color: //	アン Phase	: NO 7		Odor: No X
/ភូ Specific Temp	D. O.		Gallons	SEQ	
Time pH Cond. OC	mg/L	NTU ,	Removed	#	Comments:
1357 6.67 3255 9.77	NA	NA	5-15	1	
1412 6.66 3258 9.78			7-50	2	
1927 6.66 3260 9.76	1		11.25	3	
				4	
				5	
Stabilized? (És) No	Amount Wat	er Removed:	11.25	J-	Gallons
Comments:			11 0		

Appendix B

Big Stone Plant, Ash Disposal Area: Coal Combustion Residuals
Alternative Source Demonstration

Technical Memorandum

To: Josh Hollen, Otter Tail Power Company

From: Paul Swenson

Subject: Big Stone Plant, Ash Disposal Area: Coal Combustion Residuals Alternative Source

Demonstration

Date: March 14, 2019

Project: 41251005.05 CR19 001

Introduction

Otter Tail Power Company's (OTP) Big Stone Plant near Big Stone City, SD, has implemented a Detection Monitoring Program in accordance with the U.S. Environmental Protection Agency (EPA) Coal Combustion Residuals (CCR) Rule (40 CFR Parts 257 and 261). As part of the Detection Monitoring Program, a statistically significant increase (SSI) in fluoride concentration was identified at Ash Disposal Area monitoring well H8 during the fall 2018 event.

Sampling for the monitoring event was conducted on November 6, 2018. The laboratory data received from OTP's laboratory (Minnesota Valley Testing Laboratories, Inc. (MVTL)) were reviewed and deemed acceptable on January 11, 2019. The analytical results indicated a potential SSI for fluoride at monitoring well H8, so resampling was conducted on February 1, 2019, to verify the analytical results. Based on the results of the resampling, the fluoride SSI was verified on February 11, 2019, with the determination of the SSI communicated to you by email from Justin Soberaski on that date. The SSI determination occurred within 90 days after completing the fall 2018 sampling and analysis, as required by the CCR Rule (§257.93 (h)(2)).

Purpose

This memorandum was prepared to provide written documentation of an alternative source demonstration (ASD) and certification of accuracy as described in the CCR Rule (§257.94 (e)(2)).

Statistical Significant Increases

The intrawell prediction limit (PL) for fluoride for monitoring well H8 is 0.63 mg/L. The concentration measured in monitoring well H8 during the fall 2018 detection monitoring event was 0.69 mg/L. The verification resample concentration was 0.66 mg/L, which is above the background intrawell PL.

Rule Requirements

The requirements for written documentation and certification of accuracy for an ASD are included in §257.94(e)(2):

To: Josh Hollen, Otter Tail Power Company

From: Paul Swenson

Subject: Big Stone Plant, Ash Disposal Area: Coal Combustion Residuals Alternative Source Demonstration

Date: March 14, 2019

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The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer verifying the accuracy of the information in the report.

Laboratory Methods

- **Hypothesis**: The "error in analysis" supports an ASD for fluoride at monitoring well H8. The "error" in this context refers to uncertainty of the monitoring results, not a mistake in analysis.
- Analysis: Analysis included evaluating laboratory measurement methods for measurement
 uncertainty, and comparing the reported fluoride resample concentration and the background PL
 to determine if they were distinguishable within the calculated measurement uncertainty. The two
 values would be considered not distinguishable if the PL falls within the analytical method
 measurement uncertainty associated with the measured fluoride concentration.

Barr requested that MVTL calculate the measurement uncertainty associated with the fluoride verification resample concentration. MVTL's standard operating procedure for method uncertainty is to use results from a laboratory calibration standard for multiple calibration results, and then to calculate two standard deviations, representing a 95% confidence interval, in percent recovery of the calibration standard. The calculation incorporated the results of the 20 most recent fluoride calibration verification check standards, up to and including the standard measured on the same day as the verification resample. The calibration check standard used for the calculation (0.2 mg/L) was the concentration closest to that measured in the verification resample, accounting for any dilution.

Result: MVTL calculated a measurement uncertainty of 10.33% for the fluoride resample. Based on the resample result of 0.66 mg/L, the lower and upper confidence interval were calculated by MVTL at 0.59 mg/L and 0.73 mg/L, respectively. Figure 1 shows the resample result of 0.66 mg/L with the measurement uncertainty (black error bar). The lower threshold of measurement uncertainty of 0.59 mg/L is below the intrawell PL of 0.63 mg/L. Therefore, the PL falls within the analytical method uncertainty associated with the measured fluoride concentration and the two values are not distinguishable.

To: Josh Hollen, Otter Tail Power Company

From: Paul Swenson

Subject: Big Stone Plant, Ash Disposal Area: Coal Combustion Residuals Alternative Source Demonstration

Date: March 14, 2019

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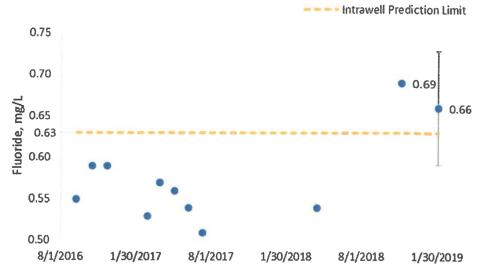


Figure 1 Monitoring Well H8 Fluoride Data with Intrawell Prediction Limit (0.63 mg/L)

Certification

The results described above indicate that the SSI identified from the fall 2018 detection monitoring event for fluoride in monitoring well H8 can be attributed to measurement uncertainty in the analytical results. I certify that the written demonstration provided (above) for fluoride at monitoring well H8 and supported by the data in Figure 1 is consistent with our review of the groundwater data collected to date and as required under the CCR Rule ((§257.94(e)(2)). Furthermore, I certify that the information presented in this memorandum is accurate, based on our records of CCR unit monitoring results and communications with MVTL.



Paul T. Swenson 2019.03.14 15:23:57 -06'00'

Paul T. Swenson, P.E. Vice President