



2020 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 2021

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Acronyms

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

Executive Summary

This summary provides an overview of the Groundwater Monitoring & Corrective Action Program Status as required by §257.94(e)(6). The CCR unit operated under the detection monitoring program described in §257.94 at the start and at the end of the 2020 annual reporting period. The monitoring program did not identify any statistically significant increases (SSIs) over background for any of the constituents listed in appendix III to the CCR Rule; therefore, constituents listed in appendix IV to the CCR Rule were not monitored and the corrective action provisions of the CCR Rule were not triggered.

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, the 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 2020 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.

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

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 SSIs over background levels for the constituents listed in appendix III to the CCR Rule, began on October 17, 2017 and continued through 2020. The monitoring program did not identify any statistically significant increases (SSIs) over background for any of the constituents listed in appendix III to the CCR Rule; therefore, constituents listed in appendix IV to the CCR Rule were not monitored and the corrective action provisions of the CCR Rule were not triggered.

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
§257.90(e)(6)	Overview at beginning of annual report	Executive Summary

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 2020. 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 2021 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).

2.1.2 Changes to Monitoring System

The groundwater monitoring system was unchanged in 2020.

2.2 Monitoring and Analytical Results

Groundwater samples were collected from monitoring wells H2OX, H3OX, H4OX, H8, and H9 during two semiannual sampling events. Downgradient monitoring well H6 was sampled in spring 2020 but was not sampled in fall 2020 due to insufficient volume during the sampling event. A total of 11 groundwater samples were collected and analyzed for the constituents listed in appendix III (Part 257) in 2020 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. Results are summarized in Table 2.

2.3 Key Actions Completed/Problems Encountered

The following key actions were completed for the groundwater monitoring program during 2020:

- Completed semiannual groundwater sampling under the detection monitoring program.
- Downgradient monitoring well H6 was sampled in spring 2020 but could not be sampled in fall 2020 because the monitoring well had insufficient water volume during the sampling event.
- 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 2020 detection monitoring sampling events.

Problems other than insufficient volume during sampling at H6 in fall 2020 were not encountered during the reporting period.

2.4 Key Activities for Upcoming Year

The following key groundwater monitoring program activities are planned for 2021:

- Continue the detection monitoring program in accordance with the CCR Rule.
- Evaluate analytical results from the 2021 semiannual detection monitoring events for SSIs according to the Statistical Analysis Plan, Appendix B of the CCR Groundwater Sampling and Analysis Plan (Carlson McCain, 2017).

Table 2
Groundwater Analytical Data Summary
Big Stone
Otter Tail Power Company

Location			H2OX	H2OX	H3OX	H3OX	H4OX	H4OX	H6	H8	H8	H9	H9
Date			4/01/2020	10/19/2020	4/01/2020	10/19/2020	4/01/2020	10/19/2020	4/01/2020	4/01/2020	10/19/2020	4/01/2020	10/19/2020
Parameter	Analysis Location	Units											
Appendix III Parameters													
Boron	Lab	mg/l	0.281	0.230	6.100	5.930	0.542	< 0.5 U	3.360	3.800	3.730	1.140	1.180
Calcium	Lab	mg/l	512.0	462.0	440.0	407.0	312.0	316.0	51.70	117.0	113.0	581.0	651.0
Chloride	Lab	mg/l	3.6	3.8	75.7	73.6	48.4	45.8	4.1	4.3	3.9	31.9	52.9
Fluoride	Lab	mg/l	0.360	0.310	0.410	0.360	0.540	0.500	0.460	0.580	0.540	0.360	0.310
pH	Field	pH units	6.86	7.10	6.78	7.20	6.75	7.23	7.32	7.21	7.13	6.66	6.54
Solids, total dissolved	Lab	mg/l	3900	3910	3530	3440	2270	2190	592	870	899	2660	2920
Sulfate, as SO4	Lab	mg/l	2440	2210	1900	1680	1250	1050	88.6	248	245	1550	1470

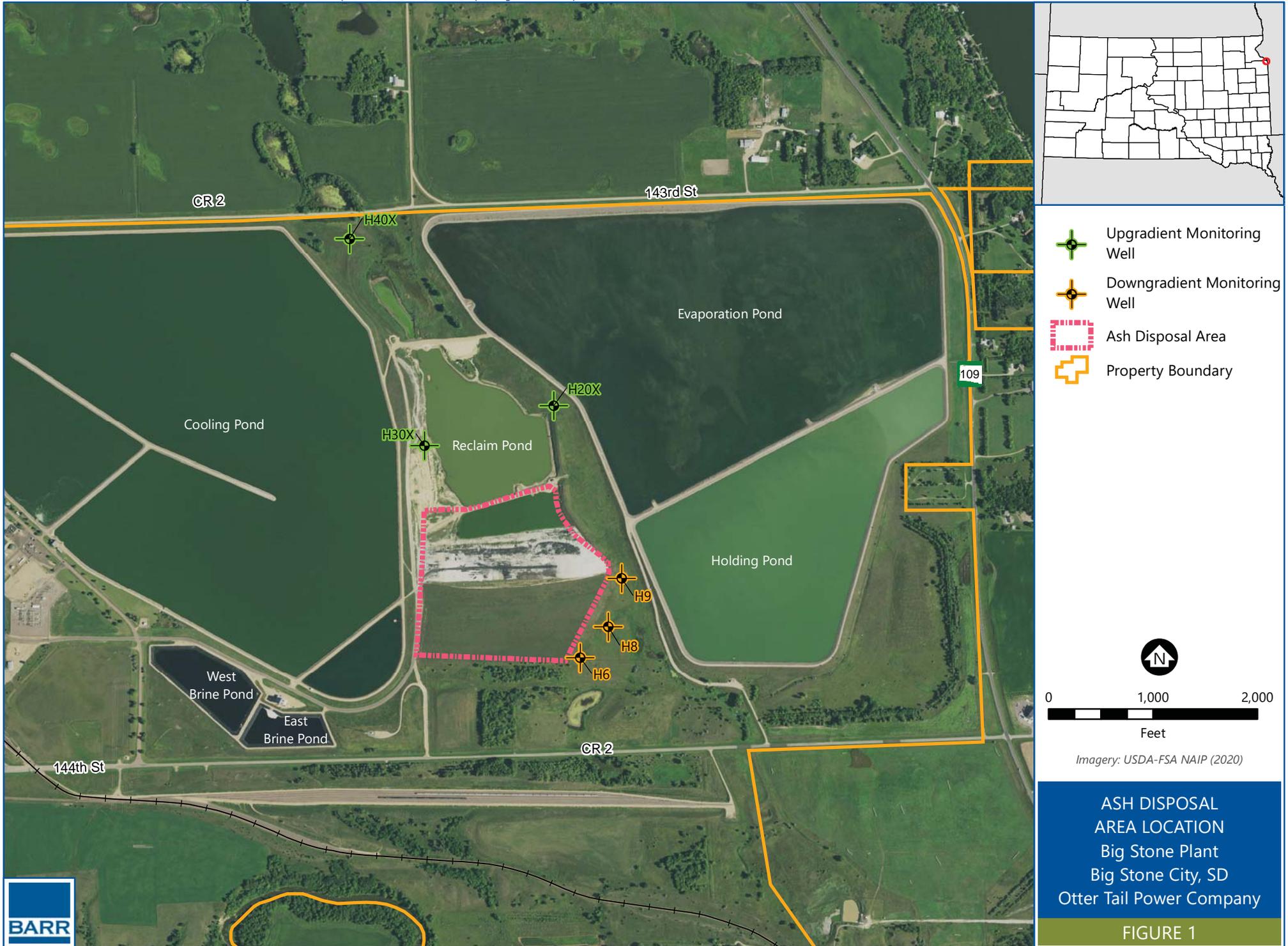
3.0 References

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



- Upgradient Monitoring Well
- Downgradient Monitoring Well
- Ash Disposal Area
- Property Boundary



0 1,000 2,000
Feet

Imagery: USDA-FSA NAIP (2020)

ASH DISPOSAL
AREA LOCATION
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.

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1201 Lincoln Hwy. ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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FINAL REPORT COMPLETION DATE: 23 Apr 2020 A.K

Date Reported: 17 Apr 2020

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

Work Order #: 31-0109
Account #: 006106
PO #: 48680

Project Name: BIG STONE PLANT CCR

[Signature] 21 Apr 2020
Field Service Manager/Date Reviewed

[Signature] 17 Apr 2020
Chemistry Lab Manager/Date Reviewed

[Signature] 20 Apr 2020
Quality Assurance Director/Date Reviewed

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

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

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



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CERTIFICATE of ANALYSIS - CCR

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

Report Date: 17 Apr 2020
Lab Number: 20-A14440
Work Order #: 31-0109
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 1 Apr 2020 13:17
Sampled By: MVTL FIELD PERSONNEL
Date Received: 1 Apr 2020 17:41
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H2OX

Temp at Receipt: 1.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					4 Apr 20	RMV
pH, Field	6.86	units	1.00	SM4500-H+-2011	1 Apr 20 13:17	BMW
pH	* 7.0	units	1.0	SM 4500 H+ B-2000	2 Apr 20 14:46	JFG
Sulfate	2440 ~	mg/L	5.0	ASTM D516-07	9 Apr 20 10:38	AKF
Chloride	3.6	mg/L	3.0	SM 4500 Cl E	9 Apr 20 8:19	SS
Solids, Total Dissolved	3900	mg/L	10	SM 2540 C-97	2 Apr 20 16:27	RLY
Calcium	512.0 ~	mg/L	0.500	SW6010C	7 Apr 20 14:18	KAM
Boron	0.281	mg/L	0.100	SW6010C	7 Apr 20 14:18	KAM
Fluoride	0.360	mg/L	0.020	EPA 300.0	4 Apr 20 13:55	RMV
	@See Narrative					

* 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

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

Report Date: 17 Apr 2020
Lab Number: 20-A14441
Work Order #: 31-0109
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 1 Apr 2020 12:12
Sampled By: MVTL FIELD PERSONNEL
Date Received: 1 Apr 2020 17:41
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H3OX

Temp at Receipt: 1.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					4 Apr 20	RMV
pH, Field	6.78	units	1.00	SM4500-H+-2011	1 Apr 20 12:12	BMW
pH	* 7.0	units	1.0	SM 4500 H+ B-2000	2 Apr 20 14:46	JFG
Sulfate	1900 ~	mg/L	5.0	ASTM D516-07	9 Apr 20 10:38	AKF
Chloride	75.7	mg/L	3.0	SM 4500 Cl E	9 Apr 20 8:19	SS
Solids, Total Dissolved	3530	mg/L	10	SM 2540 C-97	2 Apr 20 16:27	RLY
Calcium	440.0 ~	mg/L	0.500	SW6010C	7 Apr 20 14:18	KAM
Boron	6.100	mg/L	0.100	SW6010C	7 Apr 20 14:18	KAM
Fluoride	0.410	mg/L	0.020	EPA 300.0	4 Apr 20 13:55	RMV
	@See Narrative					

* Holding Time Exceeded

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

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CERTIFICATE of ANALYSIS - CCR

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

Report Date: 17 Apr 2020
Lab Number: 20-A14442
Work Order #: 31-0109
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 1 Apr 2020 11:01
Sampled By: MVTL FIELD PERSONNEL
Date Received: 1 Apr 2020 17:41
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H4OX

Temp at Receipt: 1.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					4 Apr 20	RMV
pH, Field	6.75	units	1.00	SM4500-H+-2011	1 Apr 20 11:01	BMW
pH	* 7.0	units	1.0	SM 4500 H+ B-2000	2 Apr 20 14:46	JFG
Sulfate	1250 ~	mg/L	5.0	ASTM D516-07	9 Apr 20 10:38	AKF
Chloride	48.4	mg/L	3.0	SM 4500 Cl E	9 Apr 20 8:19	SS
Solids, Total Dissolved	2270	mg/L	10	SM 2540 C-97	2 Apr 20 16:27	RLY
Calcium	312.0	mg/L	0.500	SW6010C	7 Apr 20 14:18	KAM
Boron	0.542	mg/L	0.100	SW6010C	7 Apr 20 14:18	KAM
Fluoride	0.540	mg/L	0.020	EPA 300.0	4 Apr 20 13:55	RMV
	@See Narrative					

* Holding Time Exceeded

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

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CERTIFICATE of ANALYSIS - CCR

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

Report Date: 17 Apr 2020
Lab Number: 20-A14443
Work Order #: 31-0109
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 1 Apr 2020 13:40
Sampled By: MVTl FIELD PERSONNEL
Date Received: 1 Apr 2020 17:41
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H-6

Temp at Receipt: 1.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					4 Apr 20	RMV
pH, Field	7.32	units	1.00	SM4500-H+-2011	1 Apr 20 13:40	DGF
pH	* 7.4	units	1.0	SM 4500 H+ B-2000	2 Apr 20 14:46	JFG
Sulfate	88.6 @	mg/L	5.0	ASTM D516-07	9 Apr 20 10:38	AKF
Chloride	4.1	mg/L	3.0	SM 4500 Cl E	9 Apr 20 8:19	SS
Solids, Total Dissolved	592	mg/L	10	SM 2540 C-97	2 Apr 20 16:27	RLY
Calcium	51.70	mg/L	0.500	SW6010C	7 Apr 20 14:18	KAM
Boron	3.360	mg/L	0.100	SW6010C	7 Apr 20 14:18	KAM
Fluoride	0.460	mg/L	0.020	EPA 300.0	4 Apr 20 13:55	RMV
	@See Narrative					

* 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
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CERTIFICATE of ANALYSIS - CCR

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

Report Date: 17 Apr 2020
Lab Number: 20-A14444
Work Order #: 31-0109
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 1 Apr 2020 14:26
Sampled By: MVTL FIELD PERSONNEL
Date Received: 1 Apr 2020 17:41
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H-8

Temp at Receipt: 1.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					4 Apr 20	RMV
pH, Field	7.21	units	1.00	SM4500-H+-2011	1 Apr 20 14:26	DGF
pH	* 7.7	units	1.0	SM 4500 H+ B-2000	2 Apr 20 14:46	JFG
Sulfate	248 @	mg/L	5.0	ASTM D516-07	9 Apr 20 10:38	AKF
Chloride	4.3	mg/L	3.0	SM 4500 Cl E	9 Apr 20 8:19	SS
Solids, Total Dissolved	870	mg/L	10	SM 2540 C-97	2 Apr 20 16:27	RLY
Calcium	117.0	mg/L	0.500	SW6010C	7 Apr 20 14:18	KAM
Boron	3.800	mg/L	0.100	SW6010C	7 Apr 20 14:18	KAM
Fluoride	0.580	mg/L	0.020	EPA 300.0	4 Apr 20 13:55	RMV
	@See Narrative					

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

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CERTIFICATE of ANALYSIS - CCR

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

Report Date: 17 Apr 2020
Lab Number: 20-A14445
Work Order #: 31-0109
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 1 Apr 2020 14:15
Sampled By: MVTL FIELD PERSONNEL
Date Received: 1 Apr 2020 17:41
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H-9

Temp at Receipt: 1.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					4 Apr 20	RMV
pH, Field	6.66	units	1.00	SM4500-H+-2011	1 Apr 20 14:15	BMW
pH	* 6.8	units	1.0	SM 4500 H+ B-2000	2 Apr 20 14:46	JFG
Sulfate	1550 ~	mg/L	5.0	ASTM D516-07	9 Apr 20 10:55	AKF
Chloride	31.9	mg/L	3.0	SM 4500 Cl E	9 Apr 20 8:36	SS
Solids, Total Dissolved	2660	mg/L	10	SM 2540 C-97	2 Apr 20 16:27	RLY
Calcium	581.0 ~	mg/L	0.500	SW6010C	7 Apr 20 15:18	KAM
Boron	1.140	mg/L	0.100	SW6010C	7 Apr 20 15:18	KAM
Fluoride	0.360	mg/L	0.020	EPA 300.0	4 Apr 20 13:55	RMV
	@See Narrative					

* 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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INORGANIC AND METALS ANALYSES:

Fluoride was outside of the linear range in the matrix spike and matrix spike duplicate for samples 20-A14440 through 20-A14444. Data was reported based on the acceptable recovery of fluoride in the matrix spike and matrix spike duplicate.

No other problems were encountered with these analyses.

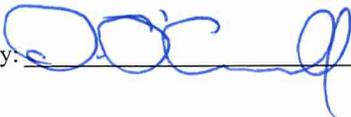
Quality Control Report

Lab IDs: 20-A14440 to 20-A14445

Project: BIG STONE PLANT CCR

Work Order: 202031-0109

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	20A14417q	0.459	1.490	103	75-125	1.490	1.480	102	0.7	10	100	90-110	< 0.1
	1.000	103	85-115	1.00	20A14339q	0.344	1.320	98	75-125	1.320	1.400	106	5.9	10	102	90-110	< 0.1
Calcium mg/L	50.00	107	85-115	50.0	20A14417q	86.50	137.0	101	75-125	137.0	137.0	101	0.0	10	104	90-110	< 0.5
	50.00	106	85-115	50.0	20A14339q	96.60	141.0	89	75-125	141.0	148.0	103	4.8	10	104	90-110	< 0.5
Chloride mg/L	-	-	-	60.0	20-A14441	75.7	138	104	86-117	138	138	104	0.0	5	101	90-110	< 3
	-	-	-	60.0	20-A14572	23.6	87.5	106	86-117	87.5	86.6	105	1.0	5	101	90-110	< 3
Fluoride mg/L	0.200	107	85-115	0.20	a14462qc	1.08	1.26	90	75-125	1.26	1.27	95	0.8	10	104	90-110	< 0.02
pH units	-	-	-	-	-	-	-	-	-	6.8	6.8	-	0.0	2.5	101	90-110	-
Solids, Total Dissolved mg/L	-	-	-	-	-	-	-	-	-	2480	2410	-	2.9	7	100	85-115	< 10
	-	-	-	-	-	-	-	-	-	500	508	-	1.6	7			
Sulfate mg/L	-	-	-	500	20-A14444	248	797	110	68-132	797	802	111	0.6	5	104	80-120	< 5
	-	-	-	50.0	20-A15214	< 5	50.8	102	68-132	50.8	52.5	105	3.3	5	107	80-120	< 5

Approved by: 

This is an exact copy of the original document

By AS Date 1 Apr 2020
pages 1-10

Minnesota Valley Testing Laboratories

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

Field Service Chain of Custody Record

Project Otter Tail Power Company	Project Type: Big Stone Plant CCR	Name of Samplers: DF, BW, MS, DS
Report Otter Tail Power Company	Carbon Copy: Barr Engineering	Quote Number:
Attn: Paul Vukonich	Attn:	Work Order Number: 31-0109
Address P.O. Box 496	Address:	Lab Numbers:
Fergus Falls, MN 56538-0496		
Phone: 218-739-8349		

Sample Information

Bottle Type

Analysis

Lab Number	Sample ID	Unique Station ID	Date	Time	Sample Type	Sample Location	1000 HNO3 Inner Mountain	500 None	1000 none	500 HNO3	Filter? Y or N	500 H2SO4	Filter? Y or N	1000 Amber none	1000 Amber H2SO4	500 NaOH	Other: 150 H2SO4	Other: 150 None	Analysis Required
A14440	ASD16		1 Apr 20	1317	GW			1	1	N									CCR 3
# 41	H3OX			1212	GW			1	1	N									CCR 3
# 42	H4OX			1101	GW			1	1	N									CCR 3
# 43	H-6			1340	GW			1	1	N									CCR 3
# 44	H-8			1426	GW			1	1	N									CCR 3
# 45	H-9			1415	GW			1	1	N									CCR 3
(A) AS	2 Apr 2020																		

Comments:

Samples Relinquished By: <u>DF BW</u>			Samples Received By: <u>A. Rueda</u>		
Date: <u>1 Apr 20</u>	Time: <u>1741</u>	Temp: <u>10.1 M78</u>	Date: <u>1 Apr 2020</u>	Time: <u>1741</u>	Temp: <u>1.0C</u>
Samples Relinquished into: <u>Fridge</u> Log in Cart Other:					
Samples Relinquished By:			Samples Received By:		
Date:	Time:	Temp:	Date:	Time:	Temp:
Delivery: <u>Samplers</u> Other:			Seal Number(s) - If Used		
Transport: Ambient <u>Ice</u> Other:			Seals Intact? Yes No		

2020 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

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 3

CCR - Appendix III Detection Monitoring

Field Parameters

pH*

* Field and Laboratory Measurements

Total Concentration Parameters

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

Note: These are non-filtered samples.

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.

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Bes Wolf

Site: Otter Tail Power Co./ Big Stone

Facility ID: _____

Date: 1 April 20

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: 1098.09

Casing Diameter: 2"

Previous Static: 1096.46

Water Level Before Purge: 5.82

Water Level After Sample: Below pump

Well Volume: 4.41 Gallons

Measurement Method: Elec. WLI Steel Tape

Sampling Information

Weather Conditions: Temp: 44 Wind: E@20 Sky: cloudy

Sampling Method: Grundfos Bladder SSA Disp. Bailer Whale Grab Other: _____

Dedicated Equipment: Yes No Pumping Rate: 25 gpm

Well Purged Dry? Yes No Time Pump Began: 1254 am pm

Time Purged Dry? 1312 Time of Sampling: 1317 am pm

Duplicate Sample? Yes No ID: _____ Sample EH: 43.3

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>1312</u>	<u>6.89</u>	<u>3970</u>	<u>7.60</u>	<u>NA</u>	<u>NA</u>	<u>4.50</u>	<u>1</u>	
							<u>2</u>	
							<u>3</u>	
<u>1317</u>	<u>6.86</u>	<u>3968</u>	<u>8.15</u>	<u>L</u>	<u>L</u>	<u>-</u>	<u>4</u>	<u>Recharge</u>
							<u>5</u>	

Stabilized? Yes No Amount Water Removed: 4.50 Gallons

Comments: _____

Exceptions to Protocol: _____

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Ben Wolf

Site: Otter Tail Power Co./ Big Stone

Facility ID: _____

Date: 1 April 20

Unique Station ID: _____

Sample ID: Well H30X

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

Well Casing Elevation: 1095.19

Constructed Depth: 22.55

Static Water Elevation: 1088.74

Casing Diameter: 2"

Previous Static: 1091.29

Water Level Before Purge: 6.45

Water Level After Sample: Below pump

Well Volume: 2.65 Gallons

Measurement Method: Elec. WL Steel Tape

Sampling Information

Weather Conditions: Temp: 44 Wind: E@15 Sky: Clear

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

Dedicated Equipment: Yes No Pumping Rate: 25 gpm

Well Purged Dry? Yes No Time Pump Began: 1156 am/pm

Time Purged Dry? 1207 Time of Sampling: 1212 am/pm

Duplicate Sample? Yes No ID: - Sample EH: 89.2

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:
1207	6.89	3922	8.34	NA	NA	2.75	1	
							2	
							3	
1212	6.78	3885	9.21			-	4	Recharge
							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

Sampling Personnel:

Ben Wolf

Site: Otter Tail Power Co./ Big Stone

Facility ID: _____

Date: 1 April 20

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: 1092.31

Casing Diameter: 2"

Previous Static: 1090.57

Water Level Before Purge: 15.91

Water Level After Sample: Below pump

Well Volume: 1.89 Gallons

Measurement Method: Elec. WLI Steel Tape

Sampling Information

Weather Conditions: Temp: 44 Wind: E@15 Sky: Clear

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: 1048 am pm

Time Purged Dry? 1056 Time of Sampling: 1101 am pm

Duplicate Sample? Yes No ID: _____ Sample EH: -67.3

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>1056</u>	<u>6.92</u>	<u>2687</u>	<u>8.47</u>	<u>NA</u>	<u>NA</u>	<u>2</u>	<u>1</u>	
				<u>I</u>	<u>I</u>		<u>2</u>	
				<u>I</u>	<u>I</u>		<u>3</u>	
<u>1101</u>	<u>6.75</u>	<u>2681</u>	<u>8.54</u>	<u>I</u>	<u>I</u>	<u>-</u>	<u>4</u>	<u>Recharge</u>
							<u>5</u>	

Stabilized? Yes No Amount Water Removed: 2 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: 1 Apr 20

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

Well Casing Elevation: NA

Constructed Depth: 17.70

Static Water Elevation: 1

Casing Diameter: 2"

Previous Static: 1

Water Level Before Purge: 7.45

Water Level After Sample: 8.25

Well Volume: 1.71 Gallons

Measurement Method: Elec. W/L Steel Tape

Sampling Information

Weather Conditions: Temp: 54 Wind: SE 20 Sky: PHy. Cloudy

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

Dedicated Equipment: Yes No

Pumping Rate: 0.25 gpm

Well Purged Dry? Yes No

Time Pump Began: 1319 am / (pm)

Time Purged Dry? —

Time of Sampling: 1340 am / (pm)

Duplicate Sample? Yes No ID: —

Sample EH: 45.2

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

1 Apr 20
DF

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1326	7.33	1116	6.73	NA	NA	1.75	1	
1333	7.33	1117	6.73			3.5	2	
1340	7.32	1117	6.78			5.25	3	
							4	
							5	

Stabilized? Yes No

Amount Water Removed: 5.25 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: 1 Apr 20

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

Well Casing Elevation: 1081.23

Constructed Depth: 22.05

Static Water Elevation: 1077.08

Casing Diameter: 2"

Previous Static: 1075.63

Water Level Before Purge: 4.15

Water Level After Sample: 6.00

Well Volume: 2.97 Gallons

Measurement Method: Elec. WLI Steel Tape

Sampling Information

Weather Conditions: Temp: 54 Wind: SE 20 Sky: Ptlly. Cloudy

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

Dedicated Equipment: Yes No

Pumping Rate: 0.25 gpm

Well Purged Dry? Yes No

Time Pump Began: 1350 am / pm

Time Purged Dry? —

Time of Sampling: 1426 am / pm

Duplicate Sample? Yes No ID: —

Sample EH: 62.1

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:
1402	7.22	1396	7.76	NA	NA	3	1	
1414	7.21	1395	7.78			6	2	
1426	7.21	1397	7.80			9	3	
							4	
							5	

Stabilized? Yes No

Amount Water Removed: 9 Gallons

Comments:

Exceptions to Protocol:

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Ben Wolf

Site: Otter Tail Power Co./ Big Stone

Facility ID: _____

Date: 1 April 20

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: 1079.40

Casing Diameter: 2"

Previous Static: 1077.29

Water Level Before Purge: 6.81

Water Level After Sample: 7.12

Well Volume: 3.90 Gallons

Measurement Method: Elec. WL Steel Tape

Sampling Information

Weather Conditions: Temp: 45 Wind: Boro Sky: Cloudy

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

Dedicated Equipment: Yes No

Pumping Rate: 25 gpm

Well Purged Dry? Yes No

Time Pump Began: 1327 am / pm

Time Purged Dry? _____

Time of Sampling: 1415 am / pm

Duplicate Sample? Yes No ID: _____

Sample EH: 50.8

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>1343</u>	<u>6.65</u>	<u>2984</u>	<u>9.03</u>	<u>NA</u>	<u>NA</u>	<u>4</u>	<u>1</u>	
<u>1359</u>	<u>6.65</u>	<u>2985</u>	<u>9.05</u>	<u>I</u>	<u>I</u>	<u>8</u>	<u>2</u>	
<u>1415</u>	<u>6.66</u>	<u>2983</u>	<u>9.08</u>	<u>I</u>	<u>I</u>	<u>12</u>	<u>3</u>	
							<u>4</u>	
							<u>5</u>	

Stabilized? Yes No

Amount Water Removed: 12 Gallons

Comments: _____

Exceptions to Protocol: _____



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.mvttl.com



FINAL REPORT COMPLETION DATE: 11 Nov 20 20

Date Reported: 11 Nov 2020

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

Work Order #: 31-0472
Account #: 006106
PO #: 48680

Project Name: BIG STONE PLANT CCR

Handwritten signatures and dates for Field Service Manager, Chemistry Lab Manager, and Quality Assurance Director, all dated 11 Nov 2020.

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



CERTIFICATE of ANALYSIS - CCR

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

Report Date: 11 Nov 2020
Lab Number: 20-A51602
Work Order #: 31-0472
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 19 Oct 2020 12:16
Sampled By: MVTL FIELD PERSONNEL
Date Received: 20 Oct 2020 9:15
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H2OX

Temp at Receipt: 2.1C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					21 Oct 20	JMS
pH, Field	7.10	units	1.00	SM4500-H+-2011	19 Oct 20 12:16	BMW
pH	* 6.9	units	1.0	SM 4500 H+ B-2000	20 Oct 20 14:25	HO
Sulfate	2210 ~	mg/L	5.0	ASTM D516-07	22 Oct 20 9:12	SS
Chloride	3.8	mg/L	3.0	SM 4500 Cl E	22 Oct 20 9:11	AKF
Solids, Total Dissolved	3910	mg/L	10	SM 2540 C-97	21 Oct 20 14:00	HO
Calcium	462.0 ~	mg/L	0.500	SW6010C	23 Oct 20 12:07	RMV
Boron	0.230	mg/L	0.100	SW6010C	23 Oct 20 12:07	RMV
Fluoride	0.310 @	mg/L	0.020	EPA 300.0	22 Oct 20 12:42	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 # 99447680 ND MICRO # 1013-M ND WW/DW # R-040



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Page: 3 of 7

CERTIFICATE of ANALYSIS - CCR

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

Report Date: 11 Nov 2020
 Lab Number: 20-A51603
 Work Order #: 31-0472
 Account #: 006106
 Sample Matrix: GROUNDWATER
 Date Sampled: 19 Oct 2020 11:24
 Sampled By: MVTL FIELD PERSONNEL
 Date Received: 20 Oct 2020 9:15
 PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H30X

Temp at Receipt: 2.1C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					21 Oct 20	JMS
pH, Field	7.20	units	1.00	SM4500-H+-2011	19 Oct 20 11:24	BMW
pH	* 7.1	units	1.0	SM 4500 H+ B-2000	20 Oct 20 14:25	HO
Sulfate	1680 ~	mg/L	5.0	ASTM D516-07	22 Oct 20 9:12	SS
Chloride	73.6	mg/L	3.0	SM 4500 Cl E	22 Oct 20 9:11	AKF
Solids, Total Dissolved	3440	mg/L	10	SM 2540 C-97	21 Oct 20 14:00	HO
Calcium	407.0 ~	mg/L	0.500	SW6010C	23 Oct 20 12:07	RMV
Boron	5.930	mg/L	0.100	SW6010C	23 Oct 20 12:07	RMV
Fluoride	0.360 @	mg/L	0.020	EPA 300.0	22 Oct 20 12:42	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 # 99-447680 ND MICRO # 1013-M ND WW/DW # R-040

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



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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CERTIFICATE of ANALYSIS -- CCR

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

Report Date: 11 Nov 2020
Lab Number: 20-A51604
Work Order #: 31-0472
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 19 Oct 2020 10:27
Sampled By: MVTL FIELD PERSONNEL
Date Received: 20 Oct 2020 9:15
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: H40X

Temp at Receipt: 2.1C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					26 Oct 20	JMS
pH, Field	7.23	units	1.00	SM4500-H+-2011	19 Oct 20 10:27	BMW
pH	* 7.1	units	1.0	SM 4500 H+ B-2000	20 Oct 20 14:25	HO
Sulfate	1050 ~	mg/L	5.0	ASTM D516-07	22 Oct 20 9:12	SS
Chloride	45.8	mg/L	3.0	SM 4500 Cl E	22 Oct 20 9:11	AKF
Solids, Total Dissolved	2190	mg/L	10	SM 2540 C-97	21 Oct 20 14:00	HO
Calcium	316.0 @	mg/L	0.500	SW6010C	30 Oct 20 11:46	RMV
Boron	< 0.5 @	mg/L	0.1	SW6010C	30 Oct 20 11:46	RMV
Fluoride	0.500 @	mg/L	0.020	EPA 300.0	22 Oct 20 12:42	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.

1126 North Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890
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.mvttl.com



CERTIFICATE of ANALYSIS - CCR

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

Report Date: 11 Nov 2020
Lab Number: 20-A51605
Work Order #: 31-0472
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 19 Oct 2020 12:11
Sampled By: MVTL FIELD PERSONNEL
Date Received: 20 Oct 2020 9:15
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: WELL H8

Temp at Receipt: 2.1C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					26 Oct 20	JMS
pH, Field	7.13	units	1.00	SM4500-H+-2011	19 Oct 20 12:11	DGF
pH	* 7.2	units	1.0	SM 4500 H+ B-2000	20 Oct 20 14:25	HO
Sulfate	245	mg/L	5.0	ASTM D516-07	22 Oct 20 9:12	SS
Chloride	3.9	mg/L	3.0	SM 4500 Cl E	22 Oct 20 9:11	AKF
Solids, Total Dissolved	899	mg/L	10	SM 2540 C-97	21 Oct 20 14:00	HO
Calcium	113.0	mg/L	0.500	SW6010C	30 Oct 20 11:46	RMV
Boron	3.730	mg/L	0.100	SW6010C	30 Oct 20 11:46	RMV
Fluoride	0.540 @	mg/L	0.020	EPA 300.0	22 Oct 20 12:42	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 # 447680 ND MICRO # 1013-M ND WW/DW # R-040



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www.mvttl.com



CERTIFICATE of ANALYSIS - CCR

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

Report Date: 11 Nov 2020
Lab Number: 20-A51606
Work Order #: 31-0472
Account #: 006106
Sample Matrix: GROUNDWATER
Date Sampled: 19 Oct 2020 13:16
Sampled By: MVTL FIELD PERSONNEL
Date Received: 20 Oct 2020 9:15
PO #: 48680

Project Name: BIG STONE PLANT CCR

Sample Description: WELL H9

Temp at Receipt: 2.1C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Water Digestions					26 Oct 20	JMS
pH, Field	6.54	units	1.00	SM4500-H+-2011	19 Oct 20 13:16	DGF
pH	* 6.8	units	1.0	SM 4500 H+ B-2000	20 Oct 20 14:25	HO
Sulfate	1470 ~	mg/L	5.0	ASTM D516-07	22 Oct 20 9:12	SS
Chloride	52.9	mg/L	3.0	SM 4500 Cl E	22 Oct 20 9:11	AKF
Solids, Total Dissolved	2920	mg/L	10	SM 2540 C-97	21 Oct 20 14:00	HO
Calcium	651.0 ~	mg/L	0.500	SW6010C	30 Oct 20 11:46	RMV
Boron	1.180 #	mg/L	0.100	SW6010C	30 Oct 20 11:46	RMV
Fluoride	0.310 @	mg/L	0.020	EPA 300.0	22 Oct 20 12:42	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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INORGANIC & METALS ANALYSES:

No problems were encountered with these analyses.

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Page: 1 of 1

Quality Control Report

Lab IDs: 20-A51602 to 20-A51606

Project: BIG STONE PLANT CCR

Work Order: 202031-0472

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 1.000	93 105	85-115 85-115	1.00 1.00	20A50833q 20A51570q	<0.1 1.020	0.983 2.070	98 105	75-125 75-125	0.983 2.070	0.997 2.060	100 104	1.4 0.5	10 10	94 103	90-110 90-110	< 0.1 < 0.1
Calcium mg/L	50.00 50.00	101 108	85-115 85-115	50.0 50.0	20A50833q 20A51570q	32.80 185.0	84.00 236.0	102 102	75-125 75-125	84.00 236.0	85.40 231.0	105 92	1.7 2.1	10 10	101 105	90-110 90-110	< 0.5 < 0.5
Chloride mg/L	-	-	-	60.0	20-A51753	54.2	116	103	86-117	116	115	101	0.9	5	102	90-110	< 3
Fluoride mg/L				1.00	20-A51124	1.15	2.07	92	75-125	2.07	2.08	93	0.5	10	100	90-110	< 0.02
pH units	-	-	-	-	-	-	-	-	-	8.7	8.7	-	0.0	2.5	101	90-110	-
Solids, Total Dissolved mg/L	-	-	-	-	-	-	-	-	-	1660 704	1660 700	-	0.0 0.6	7 7	105	85-115	< 10
Sulfate mg/L	-	-	-	50.0	20-A51122	68.6	122	107	68-132	122	122	107	0.0	5	93	80-120	< 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

This is an exact copy of the original document
 By AS Date 19 Oct 20
 pages 1-9

Project Otter Tail Power Company	Project Type: Big Stone Plant CCR	Name of Samplers: DF, BW, MS, DS
Report: Otter Tail Power Company	Carbon Copy: Barr Engineering	Quote Number:
Attn: Paul Vukonich	Attn:	Work Order Number: 31-472
Address P.O. Box 496	Address:	Lab Numbers:
Fergus Falls, MN 56538-0496		
Phone: 218-739-8349		

Sample Information					Bottle Type										Analysis				
Lab Number	Sample ID	Unique Station ID	Date	Time	Sample Type	Sample Location	1000 HNO3 Inner	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
A51602	H2OX		19 Oct 20	1216	GW				1	1	N								CCR 3
03	H3OX		I	1127	GW				1	1	N								CCR 3
04	H4OX			1027	GW				1	1	N								CCR 3
	H-6			1231 NS	GW				1	1	N								CCR 3
05	H-8			1211	GW				1	1	N								CCR 3
06	H-9			1316	GW				1	1	N								CCR 3

Comments: CCR

Samples Relinquished By: <u>DFB</u>	Samples Received By: <u>A. Ruder</u>
Date: <u>19 Oct 20</u> Time: _____ Temp: _____	Date: <u>19 Oct 20</u> Time: <u>9:15</u> Temp: <u>2-10</u>
Samples Relinquished into: <input 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: <input checked="" type="checkbox"/> Samplers <input type="checkbox"/> Other:	Seal Number(s) - If Used
Transport: <input checked="" type="checkbox"/> Ambient <input type="checkbox"/> Ice <input type="checkbox"/> Other:	Seals Intact? Yes <input type="checkbox"/> No <input type="checkbox"/>

CCR 3

CCR - Appendix III Detection Monitoring

Field Parameters

pH*

* Field and Laboratory Measurements

Total Concentration Parameters

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

Note: These are non-filtered samples.



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.

Minnesota Valley Testing Laboratories, Inc.

New Ulm, MN 56073

507 354 8517

Groundwater Assessment

Sampling Personnel:

Ben Wolf

Site: Otter Tail Power Co./ Big Stone

Facility ID: _____

Date: 19 Oct 20

Unique Station ID: _____

Sample ID: Well H2OX

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: 32.83

Constructed Depth: 32.20

Casing Diameter: 2"

Water Level Before Purge: 9.19

Well Volume: 3.86 Gallons

Well Casing Elevation: 1103.91

Static Water Elevation: 1094.72

Previous Static: 1098.09

Water Level After Sample: Below Pump

Measurement Method: Elec. W/L Steel Tape

Sampling Information

Weather Conditions: Temp: 33 Wind: LLW Sky: Fair

Sampling Method: Grundfos Bladder SSA Disp. Bailer Whale Grab Other: _____

Dedicated Equipment: Yes No

Pumping Rate: .25 gpm

Well Purged Dry? Yes No

Time Pump Began: 1155 am pm

Time Purged Dry? 1211

Time of Sampling: 1216 am pm

Duplicate Sample? Yes No ID: _____

Sample EH: -239.2

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

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments
<u>1211</u>	<u>7.09</u>	<u>3904</u>	<u>9.17</u>	<u>NA</u>	<u>NA</u>	<u>4</u>	<u>1</u>	
							<u>2</u>	
<u>1216</u>	<u>7.10</u>	<u>3906</u>	<u>9.29</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

Sampling Personnel:

Ben Wroff

Site: Otter Tail Power Co./ Big Stone

Facility ID: _____

Date: 19 OCT 20

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

Well Casing Elevation: 1095.19

Constructed Depth: 22.55

Static Water Elevation: 1085.47

Casing Diameter: 2"

Previous Static: 1088.74

Water Level Before Purge: 9.72

Water Level After Sample: Below pump

Well Volume: 2.11 Gallons

Measurement Method: Elec. WL Steel Tape

Sampling Information

Weather Conditions: Temp: 34 Wind: LLU Sky: Fair

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

Dedicated Equipment: Yes No

Pumping Rate: .25 gpm

Well Purged Dry? Yes No

Time Pump Began: 1110 am pm

Time Purged Dry? 1119

Time of Sampling: 1124 am pm

Duplicate Sample? Yes No ID: —

Sample EH: 73.0

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

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1119	7.21	3780	12.67	NA	NA	2.25	1	
				↓	↓		2	
1124	7.20	3792	11.95	↓	↓	—	3	Recharge
							4	
							5	

Stabilized? Yes No

Amount Water Removed: 2.26 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: 19 OCT 20

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: 1088.39

Casing Diameter: 2"

Previous Static: 1092.31

Water Level Before Purge: 19.83

Water Level After Sample: Below pump

Well Volume: 1.25 Gallons

Measurement Method: Elec. WLI Steel Tape

Sampling Information

Weather Conditions: Temp: 33 Wind: LLW Sky: Fair

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

Dedicated Equipment: Yes No

Pumping Rate: .25 gpm

Well Purged Dry? Yes No

Time Pump Began: 1017 am pm

Time Purged Dry? 1022

Time of Sampling: 1027 am pm

Duplicate Sample? Yes No ID: _____

Sample EH: -135.7

Sample Appearance: General: Sl. cloudy Color: Tan Phase: NOX Odor: NOX

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
<u>5</u> 1022	<u>7.29</u>	<u>2630</u>	<u>8.64</u>	<u>NA</u>	<u>NA</u>	<u>1.25</u>	1	
							2	
1027	<u>7.23</u>	<u>2618</u>	<u>8.69</u>	<u>I</u>	<u>I</u>	<u>-</u>	3	<u>Recharge</u>
							4	
							5	

Stabilized? Yes No

Amount Water Removed: 1.25 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: 190420

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

Well Casing Elevation: 1081.23

Constructed Depth: 22.05

Static Water Elevation: 1069.68

Casing Diameter: 2"

Previous Static: 1077.08

Water Level Before Purge: 11.55

Water Level After Sample: 12.60

Well Volume: 1.76 Gallons

Measurement Method: Elec. W/L Steel Tape

Sampling Information

Weather Conditions: Temp: 30 Wind: L+V Sky: Snow

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: 1147 am / pm

Time Purged Dry? —

Time of Sampling: 1211 am / pm

Duplicate Sample? Yes No ID: —

Sample EH: 7.7

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:
1155	7.15	1343	10.31	NA	NA	2	1	
1203	7.14	1343	10.30			4	2	
1211	7.13	1344	10.31			6	3	
							4	
							5	

Stabilized? Yes No

Amount Water Removed: 6 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: 19 Oct 20

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: 1071.84

Casing Diameter: 2"

Previous Static: 1079.40

Water Level Before Purge: 14.37

Water Level After Sample: 16.20

Well Volume: 2.67 Gallons

Measurement Method: Elec. WPI Steel Tape

Sampling Information

Weather Conditions: Temp: 30 Wind: LHV Sky: Snow

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: 1243 am / pm

Time Purged Dry? — Time of Sampling: 1316 am / pm

Duplicate Sample? Yes No ID: — Sample EH: 72.6

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:
1254	6.54	3249	9.39	NA	NA	2.75	1	
1305	6.54	3251	9.39			5.5	2	
1316	6.54	3250	9.38			8.25	3	
							4	
							5	

Stabilized? Yes No

Amount Water Removed: 8.25 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: 19oct19

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

Well Casing Elevation: NA

Constructed Depth: 17.70

Static Water Elevation: _____

Casing Diameter: 2"

Previous Static: _____

Water Level Before Purge: 17.40

Water Level After Sample: Dry

Well Volume: 0.08 Gallons

Measurement Method: Elec. W/L Steel Tape

Sampling Information

Weather Conditions: Temp: 30 Wind: L+V Sky: Snow

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: 1225 am / pm

Time Purged Dry? 1226

Time of Sampling: 1231 am / pm

Duplicate Sample? Yes No ID: _____

Sample EH: _____

Sample Appearance: General: Cloudy Color: Brown Phase: Sediment Odor: Earthy

Time	pH	Specific Cond.	Temp °C	D. O. mg/L	Turbidity NTU	Gallons Removed	SEQ #	Comments:
1226				NA	NA	0.08	1	
							2	
							3	
							4	
1231						-	5	Recharge

Stabilized? Yes No

Amount Water Removed: 0.08 Gallons

Comments:

- No field readings
- Limited sample - only 1000 None
- Was told per Josh to pull dedicated pump and sample with bailer because water level was below pump

Exceptions to Protocol: