



2022 Annual Groundwater Monitoring and Corrective Action Report (v2)

CCR Landfill

***R.M. Heskett Station
Mandan, North Dakota***

Prepared for
Montana-Dakota Utilities Co.

January 2023 (w/Updates through February 2023)

2022 Annual Groundwater Monitoring and Corrective Action Report (v2)

CCR Landfill
R.M. Heskett Station
Mandan, North Dakota

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Acronyms

Acronym	Description
ASD	Alternative Source Demonstration
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
MDU	Montana Dakota Utilities Co.
NDAC	North Dakota Administrative Code
NDDEQ	North Dakota Department of Environmental Quality
SSI	Statistically Significant Increase
TDF	Tire-Derived Fuel
TDS	Total Dissolved Solids

Executive Summary

This 2022 Annual Groundwater Monitoring and Corrective Action Report (Annual Report) describes the monitoring program and results for the CCR landfill at MDU's R.M. Heskett Station (Site). The permitted landfill is the only CCR Unit at this Site. Content of this report is to satisfy requirements of the federal CCR rule and the State of North Dakota Permit Number 0087.

At the beginning, end, and throughout 2022, the CCR Unit was operating under a detection monitoring program as described in 40 CFR 257.94 and NDAC 33.1-20-08-06-04. Pursuant to §257.94 and NDAC 33.1-20-08-06-04, statistically significant increases (SSIs) were determined for:

- August 2021: fluoride at MW2-90, chloride at MW-105, sulfate at MW-104, and total dissolved solids at MW-104
- May 2022: calcium at MW2-90 and MW3-90, chloride at MW-80R, and fluoride and total dissolved solids at MW1-90

Evaluation of the fall 2022 data is ongoing as required by the CCR Rules. Subsequent determinations and actions (if any) will be addressed in the 2023 Annual Report. Successful alternative source demonstrations (ASDs) were completed for the August 2021 and May 2022 SSIs. The ASD documentation is included in this report under Appendix B. Statistical evaluation of the August 2022 detection monitoring data is underway, and results are anticipated in 2023. Therefore, no assessment monitoring program (§257.95 and NDAC 33.1-20-08-06-04) or related corrective or remedial measures (§§257.96, 257.97, and 257.98; NDAC 33.1-20-08-06-06, -07, and -08) were necessary.

1.0 Introduction

Montana-Dakota Utilities Co. (MDU) owns and operated R.M. Heskett Station (Site), a coal-fired generating station and a gas-fired turbine located in Mandan, Morton County, North Dakota (Figure 1). Coal unit operations at the Site ended in March 2022, and the generating station is now undergoing decommissioning that is anticipated to be completed in 2023. One CCR (coal combustion residual) unit, as defined by 40 CFR 257.53 and North Dakota Administrative Code (NDAC) 33.1-20-08-01, is located on the property. The CCR unit contains coal combustion by-products, asbestos wastes generated from construction activity associated with MDU-owned facilities, and ash derived from burning tire-derived fuel (TDF) at the facility. The CCR unit 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) and the North Dakota Department of Environmental Quality (NDDEQ) CCR Rule (NDAC Title 33.1, Article 20, Chapter 8).

This 2022 Annual Groundwater Monitoring and Corrective Action Report (Annual Report) describes the monitoring program and results for the CCR landfill at MDU's R.M. Heskett Station (Site).

1.1 Purpose

As stated in §257.90(e) and NDAC 33.1-20-08-06-01(e), the Annual Report must:

- Document the status of groundwater monitoring and any corrective action programs for the CCR unit,
- Summarize key actions completed,
- Describe any problems encountered,
- Discuss actions to resolve the problems, and
- Project key activities for the upcoming year.

1.2 CCR Rule Requirements

Additional requirements for the Annual Report, as outlined in §257.90(e) and NDAC 33.1-20-08-06-01(e), and this Site's compliance with the CCR Rules, are summarized in Table 1.

Table 1 CCR Rule Requirements and Compliance

EPA CCR Rule Reference (40 CFR)	NDDEQ CCR Rule Reference (NDAC)	Content Required in Report	Location
§257.90(e)(1)	§33.1-20-08-06-01(e)(1)	Monitoring System Figure: A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit.	Section 2.1 Groundwater Monitoring System; see Figure 1
§257.90(e)(2)	§33.1-20-08-06-01(e)(2)	Monitoring System Adjustments: Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.	Section 2.1.1 Changes to Groundwater Monitoring System
§257.90(e)(3)	§33.1-20-08-06-01(e)(3)	Data and Collection Summary: In addition to all the monitoring data obtained under §257.90 through §257.98 and §33.1-20-08-06, a summary including the number of groundwater samples that were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs.	Section 2.3 Data and Collection Summary; monitoring data included in Table 2, Appendix A, and Appendix C
§257.90(e)(4)	§33.1-20-08-06-01(e)(4)	Monitoring Program: A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels).	Not applicable – No transition between monitoring programs was necessary
§257.90(e)(5)	§33.1-20-08-06-01(e)(5)	Other Information: Other information required, if applicable, to be included in the annual report as specified in §257.90 through §257.98 and §33.1-20-08-06.	Section 2.2 Actions Completed/Problems Encountered; Appendix B
§257.90(e)(6)	n/a	Executive Summary: A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit.	Executive Summary

2.0 Groundwater Monitoring Program

This section documents the status of the groundwater monitoring and corrective action program for the CCR unit in 2022. A description of the groundwater monitoring system is included in Section 2.1, key actions completed and problems encountered are described in Section 2.2, the monitoring and analytical results are described in Section 2.3, and key activities planned for 2023 are described in Section 2.4.

2.1 Groundwater Monitoring System

The certified groundwater monitoring well network around the CCR unit consists of one upgradient well (MW-13) and four downgradient wells (MW-80R, MW1-90, MW2-90, and MW3-90). Well locations are shown on Figure 1.

2.1.1 Changes to Groundwater Monitoring System

In 2021, MDU applied for a modification to Permit 0087 from NDDEQ. The permit application included an updated groundwater monitoring network for the CCR unit. The modified permit was issued on February 14, 2022. The system described in Section 2.1 and shown on Figure 1 supplanted the groundwater monitoring system described in the Groundwater Monitoring System Certification (Barr, 2017a).

2.2 Actions Completed/Problems Encountered

The following actions were completed in 2022:

- **Detection Monitoring Sampling:** Groundwater samples were collected from each well in the groundwater monitoring system on May 2-3, 2022, and from two of the five wells in the groundwater monitoring system on October 17, 2022. Downgradient monitoring wells MW1-90, MW2-90, and MW3-90 could not be sampled in October 2022 due to insufficient volume. Groundwater samples were analyzed for Appendix III constituents, per the detection monitoring program of the CCR Rules (§257.94 and NDAC 33.1-20-08-06-04).
- **SSI Evaluation:** SSI evaluations were conducted in accordance with the Groundwater Statistical Method Selection Certification (Statistical Certification; Barr, 2017b) for the May 2022 and October 2022 detection monitoring events, both of which resulted in potential SSIs.
- **Verification Retesting:** Verification resampling was conducted on August 8 and 11, 2022, and confirmed the potential SSIs identified in the May 2022 event SSI evaluation.
- **Alternative Source Demonstration (ASD):** ASDs were conducted on the verified SSIs for the August 2021 and May 2022 detection monitoring events. Both ASDs demonstrated an alternative source, as allowed by the CCR Rules (§257.94(e)(2) and NDAC 33.1-20-08-06-04(e)(2)). More details are provided in Section 2.3.

The following problems were encountered in 2022:

- **Damage to MW1-90:** MW1-90 was damaged in a motor vehicle accident between the May detection monitoring event and the August resampling event. The riser was bent in a way that prevented sampling.
- **Dry Wells:** During the October 2022 detection monitoring event, the water levels in monitoring wells MW1-90, MW2-90, and MW3-90 were below the installed pumps. The samplers concluded that there was an insufficient volume of water in the well for sampling. Therefore, no samples were collected from three of the five monitoring wells during the August 2022 detection monitoring event. These wells have historically undergone dry periods lasting for multiple sampling events.

The following steps were taken to resolve the problems encountered in 2022:

- **Repair of damaged well:** Repairs were made to the well casing. The well was redeveloped and sampled (Appendix A).
- **Planning for new well(s):** Water levels are being evaluated to determine a location for one or more wells to be constructed or reconstructed in the area where monitoring wells were dry in October 2022. If water levels do not recover to levels that will allow for representative samples to be collected, additional wells will be installed by the end of 2023 and described in the 2023 annual report.

2.3 Data and Collection Summary

2.3.1 August 2021 Detection Monitoring Event

As mentioned in the 2021 Annual Report (Barr, 2022), an SSI evaluation was conducted on the results of the August 2021 detection monitoring event. Four potential SSIs (fluoride at MW2-90, chloride at MW-105, sulfate at MW-104, and TDS at MW-104) were identified.

An Appendix III ASD was conducted on the verified SSIs and was able to successfully demonstrate that a natural variation in groundwater quality resulted in the SSIs, as allowed by §257.94(e)(2) and NDAC 33.1-20-08-06-04(e)(2). The Alternative Source Demonstration: August 2021 Event Report is included in Appendix B.

2.3.2 May 2022 Detection Monitoring Event

Groundwater samples were collected from the five groundwater monitoring network wells at the Site on May 2-3, 2022. Five potential SSIs (calcium at MW2-90 and MW3-90, chloride at MW80R, and fluoride and total dissolved solids at MW1-90) were identified. Verification resampling was conducted on August 8 and 11, 2022, and confirmed the five potential SSIs. A summary of results is included in Table 2. Field data sheets and analytical laboratory reports for detection monitoring sampling and verification resampling are included in Appendix A. Water level contours are shown on Figure 2, and flow calculations are included in Appendix C.

An Appendix III ASD was conducted on the verified SSIs and was able to successfully demonstrate that a natural variation in groundwater quality and/or “a source other than the CCR unit” resulted in the SSIs, as allowed by §257.94(e)(2) and NDAC 33.1-20-08-06-04(e)(2). The Alternative Source Demonstration: May 2022 Event is included in Appendix B.

2.3.3 October 2022 Detection Monitoring Event

Groundwater samples were collected from two groundwater monitoring network wells at the Site on October 17, 2022. Downgradient monitoring wells MW1-90, MW2-90, and MW3-90 could not be sampled due to insufficient volume. A summary of results is included in Table 2. Field data sheets and analytical laboratory reports for detection monitoring sampling are included in Appendix A. Water level contours are shown on Figure 3, and flow calculations are included in Appendix C.

Statistical analysis of the results was ongoing at the end of 2022. If the analysis identifies any SSIs, appropriate actions will be initiated per the CCR Rules as applicable.

2.4 Activities for Upcoming Year

The following key activities for analytical results and statistical evaluations are planned for 2023:

- Complete SSI and, if necessary, ASD or assessment monitoring determination for the October 2022 detection monitoring event in accordance with the Statistical Certification (Barr, 2017b).
- Evaluate analytical results from 2023 semi-annual detection monitoring events for SSIs according to the Statistical Certification (Barr, 2017b).

3.0 Operational Activity

The following information summarizes operational activities at the CCR Landfill in 2022. A total of 891 tons of limestone along with 1,043 tons of sand were used in the Unit #2 fluidized bed. Below are the total tons hauled to Landfill Slot 10.

Slot ID	Fly Ash	Sand Ash	Coarse Ash	Total
Slot 10	351 tons	70 tons	33 tons	454 tons

3.1 Asbestos Disposal and Other Materials

No asbestos was disposed of in the Landfill in 2022.

The coal units came offline earlier than expected. With the unanticipated shut down there were 400 tons of unused TDF that did not go into Unit #1. This was placed in the ash slot and used for dust suppression. There was a total of 3,000 cubic yards of sludge and some timbers from the dredging of the Low Volume Waste Pond placed in the ash slot.

Heskett Station allows bottom ash to be hauled offsite if the outside entity has received a letter of approval from the NDDEQ. No ash was hauled off site.

3.2 Inspections and Maintenance

On occasion, small amounts of ash were spilled on the road during hauling. It was cleaned up the same day by sweeping into a shovel or bucket and then transported to the landfill. No major amounts of ash were spilled on the ash haul road. Ash slot dust control is achieved by the placement of Unit 2 bottom sand ash over the leveled fly ash. A water truck provides additional dust control.

If excessive winds occurred, ash hauling was either delayed until wind speeds dropped, ash was placed in the slot to eliminate dust at the facility boundaries, dust was suppressed by water truck, or a combination of these processes. The ash haul road remains in good condition.

Phase I and II leachate systems were each flushed with approximately 2,000 gallons of water in August 2022 and October 2022. The system was flushed from the standpipes to the Evaporation Pond. There were no obstructions of flow.

The Ash Landfill cover was inspected for erosion during 2022. No erosion was observed on the seeded areas, and vegetation is well established around Phases I and II. The covers of the ash disposal site are in good condition on all closed slots. The ash slot expansion area has good coverage. Hay was not farmed on the final cover area in 2022.

The banks of the Evaporation Pond were observed on each inspection and found to be in good condition with no erosion.

3.3 Leachate Sampling

No water samples were taken from the Evaporation Pond in 2022. There was no level of water for a sample to be taken. Typically, leachate samples are collected semi-annually from the leachate pipe, or from the pond if no flow is observed through the pipe.

3.4 Financial Assurance Correspondence with NDDEQ

The following is a summary of recent CCR Landfill-related correspondence between MDU and the NDDEQ:

- NDDEQ sent a financial assurance Letter of Non-Compliance (LOAN) dated January 12, 2022 for the 2021 Financial Assurance submittal. MDU responded to the LOAN dated January 21, 2022. NDDEQ sent a close-out letter dated February 28, 2022.
- NDDEQ requested permit fees for a surface impoundment as well as a special waste landfill (the CCR Landfill) in June 2022. MDU sent a check for the special waste landfill permit fee to NDDEQ in July 2022.
- NDDEQ sent a letter requesting financial assurance documentation on June 9, 2022. Financial assurance documentation was sent to the NDDEQ by the due date.

NDDEQ conducted routine inspections of the CCR Landfill and Non-CCR Surface Impoundment on March 8, 2022, May 17, 2022, August 22, 2022, and November 9, 2022. At the time of the November inspection, it was documented that the Facility appeared to be well maintained and no issues were found.

4.0 References

- Barr Engineering Co. (Barr), 2017a. Groundwater Monitoring System Certification, R.M. Heskett Station. Prepared for Montana-Dakota Utilities Co. October 2017.
- Barr, 2017b. Statistical Method Selection Certification, R.M. Heskett Station. Prepared for Montana-Dakota Utilities Co. October 2017.
- Barr, 2022. 2021 Annual Groundwater Monitoring and Corrective Action Report: CCR Landfill, R.M. Heskett Station. Prepared for Montana-Dakota Utilities Co. January 2022.

Tables

**Table 2
Water Quality Analytical Data Summary
2022 Annual Monitoring Report
Heskett CCR Groundwater Compliance**

Location Date Sample Type			MW13		MW13		MW1-90	MW1-90	MW2-90	MW2-90	MW3-90	MW3-90	MW80R	MW80R	MW80R
			5/02/2022		10/17/2022		5/03/2022	8/11/2022	5/03/2022	8/08/2022	5/03/2022	8/08/2022	5/02/2022	8/08/2022	10/17/2022
			N	FD	N	FD	N	Resample	N	Resample	N	Resample	N	Resample	N
Parameter	Analysis Location	Units													
Appendix III															
Boron, total	Lab	mg/l	0.66	0.63	0.57	0.62	< 0.5 U	0.29	< 0.5 U	--	0.14	--	< 0.5 U	--	< 0.5 U
Calcium, total	Lab	mg/l	401	396	397	409	392	370	451	508	506	501	409	--	418
Chloride	Lab	mg/l	79.2	79.1	71.5	71.8	90.7	97.0	86.6	--	36.5	--	162	154	149
Fluoride	Lab	mg/l	0.76	0.77	0.84	0.84	1.12	1.14	1.01	--	0.11	--	0.21	--	0.23
pH	Field	pH units	6.94	6.94	7.03	--	6.85	6.78	6.94	7.00	6.91	6.92	6.93	7.00	7.05
Solids, total dissolved	Lab	mg/l	10600	10700	10600	10500	11600	12700	8670	--	4900	--	6140	--	6310
Sulfate, as SO4	Lab	mg/l	6190	6190	6890	6700	6490	7280	4830	--	2470	--	2910	--	3460

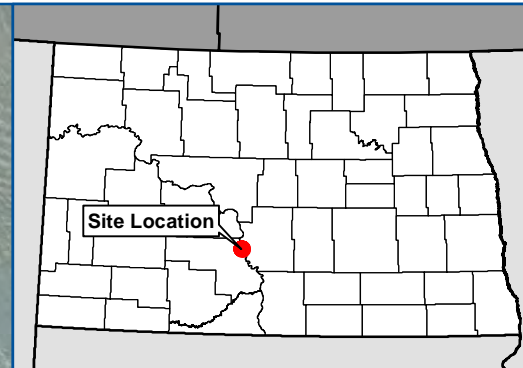
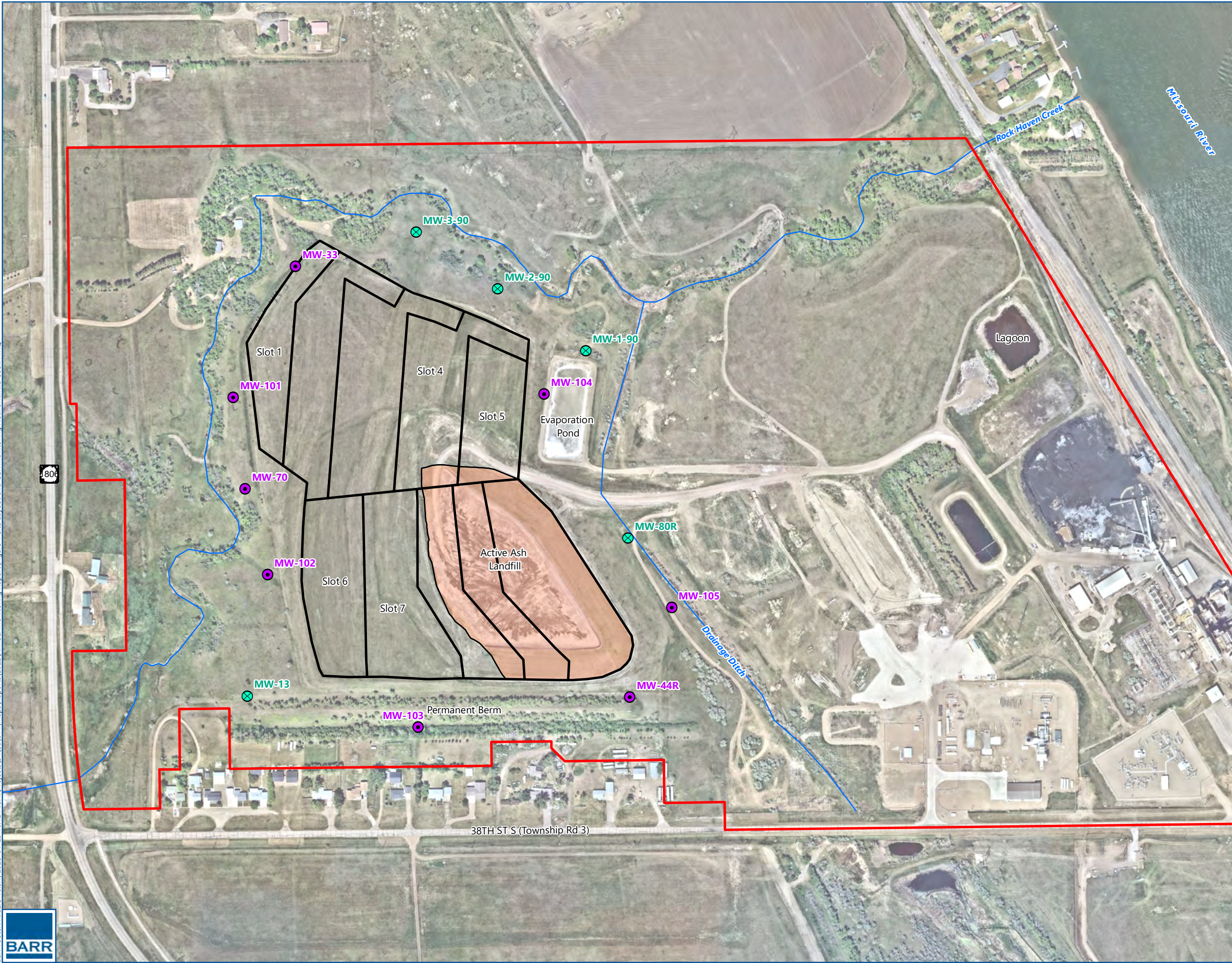
-- Not analyzed/Not available.

N Sample Type: Normal

FD: Sample Type: Field Duplicate

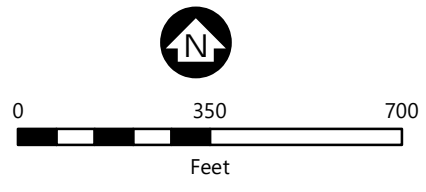
U: The analyte was analyzed for, but was not detected.

Figures



- ✕ Monitoring Well Location
- Monitoring Well Location - Water Level Only
- Property Boundary
- Existing Slot Boundaries
- Active Portion of Landfill

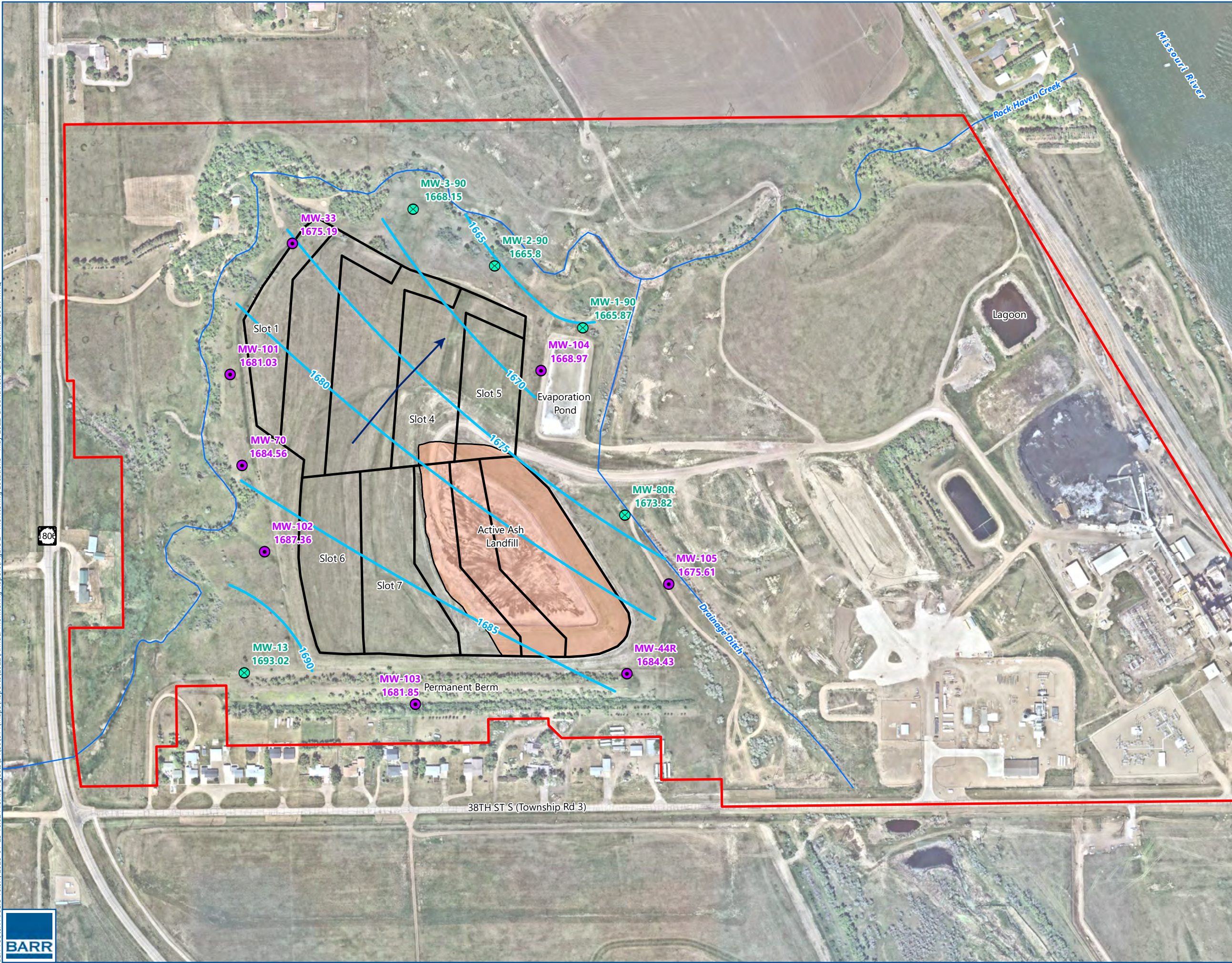
Image Source: NearMap June 2022



**SITE LAYOUT AND
 CCR MONITORING NETWORK**
 Heskett Station
 2022 Annual Monitoring Report
 Montana Dakota Utilities
 Mandan, North Dakota

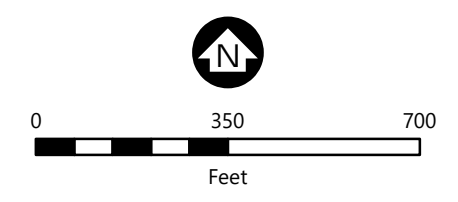
FIGURE 1





- ✕ Monitoring Well Location
- Monitoring Well Location - Water Level Only
- ~ Groundwater Elevation Contours (ft MSL)
- ➔ Groundwater Flow Direction
- Property Boundary
- Existing Slot Boundaries
- Active Portion of Landfill

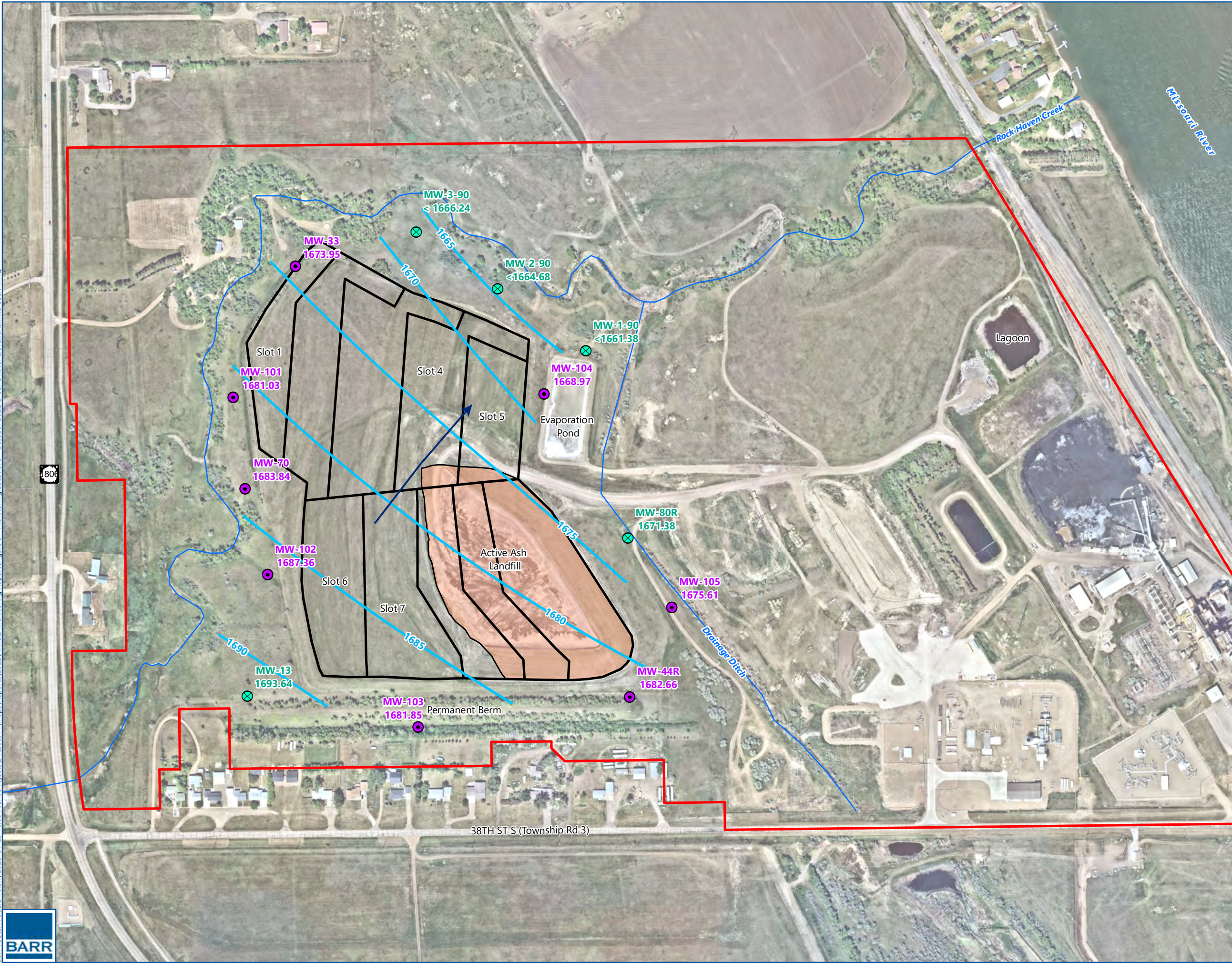
Image Source: NearMap June 2022



MAY 2022 GROUNDWATER ELEVATIONS
 Heskett Station
 2022 Annual Monitoring Report
 Montana Dakota Utilities
 Mandan, North Dakota

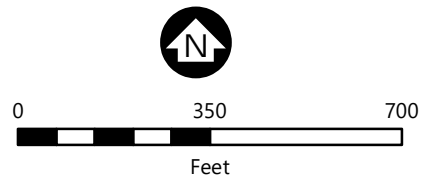
FIGURE 2





- ✕ Monitoring Well Location
- Monitoring Well Location - Water Level Only
- Groundwater Elevation Contour (ft MSL)
- Groundwater Flow Direction
- Property Boundary
- Existing Slot Boundaries
- Active Portion of Landfill

Image Source: NearMap June 2022



OCTOBER 2022 GROUNDWATER ELEVATIONS
 Heskett Station
 2022 Annual Monitoring Report
 Montana Dakota Utilities
 Mandan, North Dakota

FIGURE 3



Appendices

Appendix A

Laboratory Reports and Field Sheets

Laboratory Reports and Field Sheets: 2022
Laboratory Reports and Field Sheets: MW1-90

Laboratory Reports and Field Sheets: 2022



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2616 East Broadway Ave. ~ Bismarck, ND 58501 ~ 800-279-6885 ~ Fax 701-258-9724
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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

Sample Comments

908002 (MW1-90) - Paying sample

Total and dissolved selenium results have been rechecked.

Analysis Results Comments

908001 (MW13)

Sample analyzed beyond holding time.(pH)

908002 (MW1-90)

Sample analyzed beyond holding time.(pH)

908003 (MW2-90)

Sample analyzed beyond holding time.(pH)

908004 (MW3-90)

Sample analyzed beyond holding time.(pH)

908005 (MW80R)

Sample analyzed beyond holding time.(pH)

908006 (Dup 1)

Sample analyzed beyond holding time.(pH)

908007 (Field Blank)

Sample analyzed beyond holding time.(pH)

MVTTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTTL 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 MVTTL. 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.

Report Date: Wednesday, June 29, 2022 10:06:58 AM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908001 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	9688	umhos/cm	1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.94	units	0.01	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	7.47	degrees C		1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6190	mg/L	250	50	05/05/2022 12:31	05/05/2022 12:31	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	0.66	mg/L	0.5	5	05/05/2022 08:13	05/11/2022 13:18	SLZ	MA,NDA	
Calcium	401	mg/L	5	5	05/05/2022 08:13	05/10/2022 09:56	MDE	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.3	units	0.1	1	05/04/2022 13:39	05/04/2022 13:39	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	79.2	mg/L	2	1	05/09/2022 09:08	05/09/2022 09:08	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.76	mg/L	0.1	1	05/04/2022 13:39	05/04/2022 13:39	RAA		

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.

Report Date: Wednesday, June 29, 2022 10:06:58 AM



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 908001 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	10600	mg/L	10	1	05/05/2022 10:00	05/05/2022 10:00	AMC	MA,NDA	

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.

Report Date: Wednesday, June 29, 2022 10:06:58 AM

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 www.MVTL.com

**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908002 **Date Collected:** 05/03/2022 13:45 **Matrix:** Groundwater
Sample ID: MW1-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	7558	umhos/cm	1	1	05/03/2022 13:45	05/03/2022 13:45	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.85	units	0.01	1	05/03/2022 13:45	05/03/2022 13:45	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	6.77	degrees C		1	05/03/2022 13:45	05/03/2022 13:45	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6490	mg/L	250	50	05/05/2022 12:32	05/05/2022 12:32	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	<0.5	mg/L	0.5	5	05/05/2022 08:13	05/11/2022 13:23	SLZ	MA,NDA	
Calcium	392	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:02	MDE	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.4	units	0.1	1	05/04/2022 14:15	05/04/2022 14:15	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	90.7	mg/L	2	1	05/09/2022 09:09	05/09/2022 09:09	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	1.12	mg/L	0.1	1	05/04/2022 14:15	05/04/2022 14:15	RAA		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 908002 **Date Collected:** 05/03/2022 13:45 **Matrix:** Groundwater
Sample ID: MW1-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	11600	mg/L	10	1	05/05/2022 10:00	05/05/2022 10:00	AMC	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908003 **Date Collected:** 05/03/2022 11:50 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	7294	umhos/cm	1	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.94	units	0.01	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	7.84	degrees C		1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	4830	mg/L	100	20	05/05/2022 12:19	05/05/2022 12:19	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	<0.5	mg/L	0.5	5	05/05/2022 08:13	05/11/2022 13:25	SLZ	MA,NDA	
Calcium	451	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:04	MDE	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.4	units	0.1	1	05/04/2022 14:44	05/04/2022 14:44	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	86.6	mg/L	2	1	05/09/2022 09:10	05/09/2022 09:10	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	1.01	mg/L	0.1	1	05/04/2022 14:44	05/04/2022 14:44	RAA		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 908003 **Date Collected:** 05/03/2022 11:50 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	8670	mg/L	10	1	05/05/2022 10:00	05/05/2022 10:00	AMC	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908004 **Date Collected:** 05/03/2022 09:18 **Matrix:** Groundwater
Sample ID: MW3-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	4775	umhos/cm	1	1	05/03/2022 09:18	05/03/2022 09:18	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.91	units	0.01	1	05/03/2022 09:18	05/03/2022 09:18	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	6.03	degrees C		1	05/03/2022 09:18	05/03/2022 09:18	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	2470	mg/L	100	20	05/05/2022 12:20	05/05/2022 12:20	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	0.14	mg/L	0.1	1	05/05/2022 08:13	05/11/2022 13:27	SLZ	MA,NDA	
Calcium	506	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:06	MDE	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.3	units	0.1	1	05/04/2022 15:49	05/04/2022 15:49	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	36.5	mg/L	2	1	05/09/2022 09:11	05/09/2022 09:11	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.11	mg/L	0.1	1	05/04/2022 15:49	05/04/2022 15:49	RAA		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 908004 **Date Collected:** 05/03/2022 09:18 **Matrix:** Groundwater
Sample ID: MW3-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	4900	mg/L	10	1	05/05/2022 10:00	05/05/2022 10:00	AMC	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908005 **Date Collected:** 05/02/2022 12:57 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	4784	umhos/cm	1	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.93	units	0.01	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	8.3	degrees C		1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	2910	mg/L	100	20	05/05/2022 12:21	05/05/2022 12:21	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	<0.5	mg/L	0.5	5	05/05/2022 08:13	05/11/2022 13:29	SLZ	MA,NDA	
Calcium	409	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:08	MDE	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.5	units	0.1	1	05/04/2022 15:32	05/04/2022 15:32	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	162	mg/L	2	1	05/09/2022 09:13	05/09/2022 09:13	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.21	mg/L	0.1	1	05/04/2022 15:32	05/04/2022 15:32	RAA		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 908005 **Date Collected:** 05/02/2022 12:57 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	6140	mg/L	10	1	05/05/2022 10:00	05/05/2022 10:00	AMC	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908006 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	9688	umhos/cm	1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.94	units	0.01	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	7.47	degrees C		1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6190	mg/L	250	50	05/05/2022 12:34	05/05/2022 12:34	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	0.63	mg/L	0.5	5	05/05/2022 08:13	05/11/2022 13:31	SLZ	MA,NDA	
Calcium	396	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:10	MDE	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.3	units	0.1	1	05/04/2022 16:06	05/04/2022 16:06	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	79.1	mg/L	2	1	05/09/2022 09:14	05/09/2022 09:14	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.77	mg/L	0.1	1	05/04/2022 16:06	05/04/2022 16:06	RAA		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 908006 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	10700	mg/L	10	1	05/05/2022 10:00	05/05/2022 10:00	AMC	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908007 **Date Collected:** 05/03/2022 12:50 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	<5	mg/L	5	1	05/05/2022 12:23	05/05/2022 12:23	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	<0.1	mg/L	0.1	1	05/05/2022 08:13	05/11/2022 13:32	SLZ	MA,NDA	
Calcium	<1	mg/L	1	1	05/05/2022 08:13	05/10/2022 10:12	MDE	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.0	units	0.1	1	05/04/2022 13:13	05/04/2022 13:13	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	<2	mg/L	2	1	05/09/2022 09:23	05/09/2022 09:23	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	<0.1	mg/L	0.1	1	05/04/2022 13:13	05/04/2022 13:13	RAA		

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	<10	mg/L	10	1	05/05/2022 10:00	05/05/2022 10:00	AMC	MA,NDA	

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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



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



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May 6, 2022

Montana-Dakota Utilities
Todd Peterson
400 N. 4th St
Bismarck, ND 58501

RE: MDU Heskett Groundwater Sampling

Dear Mr. Peterson,

From May 2-3, 2022, MVTL Field Services division collected ground water samples at the MDU Heskett Station near Mandan, ND. Samples were collected from 5 wells. A Duplicate sample was collected from well MW13. Samples collected were placed on ice and transported to MVTL in Bismarck, ND for analysis.

Thank you for your trust and support of our services. If you have any questions, please call me at (701) 391-4900.

Sincerely,

Jeremy Meyer
MVTL Field Services Manager

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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Report Date: Wednesday, June 29, 2022 10:06:58 AM



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Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis WO: 908 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com		Project Name: MDU Heskett Event: Spring 2022 Sampled By: <i>Jeremy Meyer</i>

Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Spring 2022 Sampled By: <i>Jeremy Meyer</i>
---	-----	--

Lab Number	Sample ID	Sample Information		Sample Type	Sample Containers				Field Readings				Analysis Required		
		Date	Time		1 Liter Raw	500 mL HNO3	500 mL HNO3 (filtered)	250 mL H2SO4	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)			
001	MW13	2 May 22	0900	GW	X	X	X	X			7.47	9688	6.94	3.00	MDU Heskett List
002	MW1-90	3 May 22	1345	GW	X	X	X	X			6.77	7558	6.85	0.12	
003	MW2-90	3 May 22	1150	GW	X	X	X	X			7.84	7294	6.94	0.20	
004	MW3-90	3 May 22	0918	GW	X	X	X	X			6.03	4775	6.91	0.64	
005	MW80R	2 May 22	1257	GW	X	X	X	X			8.30	4784	6.93	0.24	
006	Dup 1	2 May 22	0900	GW	X	X	X	X			7.47	9688	6.94	3.00	
007	Field Blank (FB)	3 May 22	1250	GW	X	X	X	X			NA	NA	NA	NA	

Comments:

	Relinquished By		Sample Condition		Received By	
	Name	Date/Time	Location	Temp (°C)	Name	Date/Time
1	<i>[Signature]</i>	4 May 22 0810	log in Walk In #2	2.3 TMS62 / TM805	<i>[Signature]</i>	4 May 22 0810
2						

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 13
 Sampling Personal: Jerry Gray

Weather Conditions: Temp: 40 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES NO
Well Labeled?	YES NO
Casing Strait?	YES NO
Grout Seal Intact?	YES NO Not Visible
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	31.25 ft
Total Depth of Well:	ft
Well Volume:	liters
Depth to Top of Pump:	ft
Water Level After Sample:	33.75 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	Dup 1
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	25 Sec.
PSI:	20

FIELD READINGS												
Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (mL/Min)	mL Removed	Appearance or Comment	
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.	
	0810	Start of Well Purge										
2 May 22	0815	7.00	4088	7.44	10.42	198.1	0.19	31.76	100.0	500.0	Clear	
	0835	6.51	9759	6.96	4.01	206.8	1.51	32.15	100.0	2000.0	Clear	
	0845	7.42	9699	6.94	3.74	199.0	2.58	32.93	100.0	1000.0	Clear	
	0850	7.34	9654	6.95	3.79	200.9	2.71	33.40	100.0	500.0	Clear	
	0855	7.44	9677	6.95	3.50	201.4	3.40	33.65	100.0	500.0	Clear	
	0900	7.47	9688	6.94	3.21	202.2	3.80	33.72	100.0	500.0	Clear	
Well Stabilized?		YES	NO	Total Volume Purged: 5000.0 mL								

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
2 May 22	0900	7.47	9688	6.94	3.00	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 1-90
 Sampling Personal: J. J. J.

Weather Conditions: Temp: 50°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES (NO)
Well Labeled?	YES NO
Casing Strait?	YES NO
Grout Seal Intact?	YES NO <u>Not Visible</u>
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	9.9 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	10.17 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES (NO)
Duplicate Sample ID:	—
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	

Control Settings:	
Purge:	5 Sec.
Recover:	55 Sec.
PSI:	15

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.
	1240	Start of Well Purge									
3 May 22	1245	6.69	7282	6.92	1.88	165.9	0.20	10.10	100.0	500.0	Clear
	1305	6.45	8088	6.91	1.38	183.0	0.13	10.32	100.0	2000.0	Clear
	1315	6.43	9554	6.91	1.29	186.5	0.12	10.34	100.0	1000.0	Clear
	1320	6.65	8613	6.89	1.28	189.9	0.14	10.27	100.0	500.0	Clear
	1325	6.46	7987	6.89	1.13	191.6	0.12	10.18	100.0	500.0	Clear
	1330	6.58	7182	6.89	1.15	193.5	0.14	10.20	100.0	500.0	Clear
	1335	6.69	6423	6.89	1.26	193.8	0.14	10.21	100.0	500.0	Clear
	1340	6.71	7468	6.86	1.31	194.7	0.13	10.16	100.0	500.0	Clear
	1345	6.77	7558	6.85	1.33	195.6	0.12	10.15	100.0	500.0	Clear
Well Stabilized?		YES	NO	Total Volume Purged: 6500.0 ml							

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
3 May 22	1345	6.77	7558	6.85	0.12	Clear

Comments: Collected field blank I @ 1250

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2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 2-90
 Sampling Personal: *Jay Meyer*

Weather Conditions: Temp: 45 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>
Well Labeled?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Casing Strait?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Grout Seal Intact?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> <u>Not Visible</u>
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	21.28 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	21.95 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Duplicate Sample?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Duplicate Sample ID:	—
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	55 Sec.
PSI:	25

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±10	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	ml Removed	Appearance or Comment
Purge Date	Time	±0.5°									clear, slightly turbid, turbid
	1050	Start of Well Purge									
3 May 22	1055	7.31	7500	7.01	5.00	210.1	0.06	21.61	100.0	500.0	Clear
	1115	7.77	7020	6.95	3.65	202.3	0.15	21.67	100.0	2000.0	Clear
	1125	7.72	6654	6.96	3.95	182.0	0.29	21.90	100.0	1000.0	Clear
	1130	7.68	6516	6.96	4.01	176.8	0.16	21.91	100.0	500.0	Clear
	1135	7.69	6338	6.96	3.75	170.7	0.13	21.92	100.0	500.0	Clear
	1140	7.79	6987	6.95	3.98	170.3	0.15	21.93	100.0	500.0	Clear
	1145	7.81	7118	6.94	4.01	170.6	0.17	21.94	100.0	500.0	Clear
	1150	7.84	7294	6.94	4.12	170.9	0.20	21.94	100.0	500.0	Clear
Well Stabilized?		YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	Total Volume Purged: 6000.0 ml							

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
3 May 22	1150	7.84	7294	6.94	0.20	Clear

Comments:

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2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 3-90
 Sampling Personal: J. J. [Signature]

Weather Conditions: Temp: 40 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>
Well Labeled?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Casing Strait?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Grout Seal Intact?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> Not Visible
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	18.31 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	18.41 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Duplicate Sample?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Duplicate Sample ID:	—
Bottle List:	
1 Liter Raw	4- 1L Nitric
500ml Nitric	
500ml Nitric (filtered)	
250ml Sulfuric	

Control Settings:	
Purge:	5 Sec.
Recover:	55 Sec.
PSI:	20

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±10	Turbidity (NTU)	Water Level (ft)	Pumping Rate ml/Min	ml Removed	Appearance or Comment
Purge Date	Time										Clarity, Color, Odor, Ect.
	0820	Start of Well Purge									
3/4/22	0833	5.97	4794	6.96	3.69	152.2	16.88	18.42	100.0	500.0	Clear
	0853	5.99	4803	6.92	3.83	162.2	2.47	18.40	100.0	2000.0	Clear
	0903	5.99	4805	6.92	3.82	170.3	1.41	18.40	100.0	1000.0	Clear
	0908	6.01	4792	6.91	3.65	174.9	1.92	18.38	100.0	500.0	Clear
	0913	6.13	4792	6.91	3.72	179.6	1.69	18.39	100.0	500.0	Clear
	0918	6.03	4775	6.91	3.79	182.3	0.64	18.40	100.0	500.0	Clear

Well Stabilized? YES NO

Total Volume Purged: 5000.0 ml

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
3/4/22	0918	6.03	4775	6.91	0.64	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Surface water Assessment

Company: MDU Lewis & Clark
Event: Spring 2022
Sampling Personal: Jay King

Weather Conditions: Temp: 75°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	2 May 22	1130	2"	21.78	
MW33		1150	2"	42.76	
MW101		1132	2"	37.94	
MW102		1128	2"	19.50	
MW103		1140	2"	36.74	
MW44R		1137	2"	27.14	
MW104		1147	2"	14.18	
MW105		1154	2"	11.78	

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Original Sample	QC Type	Analyte	Analysis Date	QC Result	Original Sample Re	Units	Spike Amount	Spike Resu	Spike % Recov	Spike Duplicate	Spike Duplicate	RPD (%)	Lower Control Limi	Upper Control Limi	RPD Limit (%)
908001	PDS	Boron	05/11/2022 13:19:00	86.3	0.66	mg/L	2	2.385	86.3				75	125	
908001	PDS	Boron	05/11/2022 13:21:00	90.4	0.66	mg/L				2.466	90.4	3.34	75	125	20
	LFB-OE	Boron	05/11/2022 13:16:13	99		mg/L	0.4	0.3959	99				85	115	
	MB	Boron	05/11/2022 13:14:17	<0.1		mg/L									
905001	DUP	Calcium	05/10/2022 09:54:21	131.5		mg/L						3.8			20
908001	PDS	Calcium	05/10/2022 09:58:00	94.4	401	mg/L	400	778.7	94.4				75	125	
908001	PDS	Calcium	05/10/2022 10:00:00	94.6	401	mg/L				779.2	94.6	0.0642	75	125	20
926001	DUP	Calcium	05/10/2022 10:33:07	351.8	354	mg/L						0.623			20
926002	PDS	Calcium	05/10/2022 10:37:00	96.1	447	mg/L	400	831.4	96.1				75	125	
926002	PDS	Calcium	05/10/2022 10:39:00	94.1	447	mg/L				823.4	94.1	0.967	75	125	20
927004	PDS	Calcium	05/10/2022 11:02:00	101	716	mg/L	400	1012	101				75	125	
927004	PDS	Calcium	05/10/2022 11:04:00	99.7	716	mg/L				1006	99.7	0.595	75	125	20
	LFB-MI	Calcium	05/10/2022 10:24:55	106		mg/L	100	105.5	106				85	115	
	LFB-MI	Calcium	05/10/2022 09:50:19	107		mg/L	100	107.3	107				85	115	
	MB	Calcium	05/10/2022 09:47:00	<1		mg/L									
	MB	Calcium	05/10/2022 10:22:17	<1		mg/L									
908004	MS	Chloride	05/09/2022 09:16:17	112	36.5	mg/L	30	70.2	112				80	120	
908004	MSD	Chloride	05/09/2022 09:17:28	109	36.5	mg/L				69.3	109	1.29	80	120	20
	LFB	Chloride	05/09/2022 10:22:07	92.5		mg/L	30	27.7	92.5		92.5		90	110	
	LFB	Chloride	05/09/2022 09:19:49	92.8		mg/L	30	27.8	92.8				90	110	
	LFB	Chloride	05/09/2022 08:55:56	93.3		mg/L	30	28	93.3				90	110	
	MB	Chloride	05/09/2022 08:54:45	<2.0		mg/L									
	MB	Chloride	05/09/2022 10:20:56	<2.0		mg/L									
	MB	Chloride	05/09/2022 09:18:39	<2.0		mg/L									
908002	MS-F	Fluoride	05/04/2022 14:32:14	94	1.12	mg/L	0.5	1.59	94				80	120	
908002	MSD-F	Fluoride	05/04/2022 14:38:10	94	1.12	mg/L				1.59	94	0	80	120	20
	CRM-F	Fluoride	05/04/2022 11:24:00	103		mg/L	3.3	3.4	103				83.92	111.19	
	LFB-F	Fluoride	05/04/2022 17:01:32	100		mg/L	0.5	0.5	100				90	110	
	LFB-F	Fluoride	05/04/2022 11:36:53	100		mg/L	0.5	0.5	100				90	110	
	MB-F	Fluoride	05/04/2022 16:55:11	<0.1		mg/L									
	MB-F	Fluoride	05/04/2022 11:30:26	<0.1		mg/L									
849004	MS	Sulfate	05/05/2022 11:56:45	64.9	662	mg/L	500	987	64.9				85	115	
849004	MSD	Sulfate	05/05/2022 11:57:51	66.1	662	mg/L				993	66.1	0.61	85	115	20
901007	MS	Sulfate	05/05/2022 12:24:51	92	180	mg/L	1000	1100	92				85	115	
901007	MSD	Sulfate	05/05/2022 12:25:57	92.8	180	mg/L				1110	92.8	0.9	85	115	20
	LFB	Sulfate	05/05/2022 12:28:09	90.1		mg/L	100	90.1	90.1				85	115	
	LFB	Sulfate	05/05/2022 12:09:25	91.8		mg/L	100	91.8	91.8				85	115	
	MB	Sulfate	05/05/2022 12:27:03	<5		mg/L									
	MB	Sulfate	05/05/2022 12:08:19	<5		mg/L									
399003	DUP	Total Dissolved Solids	03/29/2022 11:30:00	2100	2140	mg/L						1.89			20
926002	DUP	Total Dissolved Solids	05/05/2022 10:00:00	5780	5880	mg/L						1.72			20
927006	DUP	Total Dissolved Solids	05/05/2022 10:00:00	2120	2140	mg/L						0.94			20
	CRM	Total Dissolved Solids	05/05/2022 10:00:00	103		mg/L	736	760	103				90.35	110.33	
	MB	Total Dissolved Solids	05/05/2022 10:00:00	<10		mg/L									
908003	DUP	pH	05/04/2022 15:00:46	7.15	7.4	units						3.44			
	CRM-PH	pH	05/04/2022 10:54:16	100.83		units	6	6	100.83				99.17	100.83	
	CRM-PH	pH	05/04/2022 17:19:00	100.17		units	6	6	100.17				99.17	100.83	



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

Sample Comments

908002 (MW1-90) - Paying sample

Total and dissolved selenium results have been rechecked.

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Report Date: Wednesday, June 29, 2022 10:27:02 AM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908003 **Date Collected:** 05/03/2022 11:50 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	1.07	mg/L	0.1	5	05/05/2022 08:13	05/11/2022 11:07	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	05/05/2022 08:13	05/19/2022 12:17	MDE	MA,NDA	
Arsenic	<0.004	mg/L	0.004	10	05/05/2022 08:13	05/19/2022 14:47	MDE	MA,NDA	
Barium	0.0085	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:17	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/20/2022 11:25	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:17	MDE	MA,NDA	
Chromium	<0.004	mg/L	0.004	10	05/05/2022 08:13	05/19/2022 14:47	MDE	MA,NDA	
Cobalt	<0.004	mg/L	0.004	10	05/05/2022 08:13	05/19/2022 14:47	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:17	MDE	MA,NDA	
Molybdenum	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:17	MDE	MA,NDA	
Selenium	0.0784	mg/L	0.01	10	05/05/2022 08:13	05/19/2022 14:47	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:17	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908004 **Date Collected:** 05/03/2022 09:18 **Matrix:** Groundwater
Sample ID: MW3-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	0.238	mg/L	0.02	1	05/05/2022 08:13	05/11/2022 11:09	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Arsenic	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Barium	0.0103	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/20/2022 11:26	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Chromium	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Cobalt	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Molybdenum	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Selenium	0.1246	mg/L	0.005	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:20	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908005 **Date Collected:** 05/02/2022 12:57 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: EPA 245.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	0.757	mg/L	0.1	5	05/05/2022 08:13	05/11/2022 11:11	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Arsenic	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Barium	0.0102	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/20/2022 11:28	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Chromium	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Cobalt	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Molybdenum	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Selenium	0.0570	mg/L	0.005	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:23	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908006 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: EPA 245.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	0.685	mg/L	0.1	5	05/05/2022 08:13	05/11/2022 11:13	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	05/05/2022 08:13	05/19/2022 12:25	MDE	MA,NDA	
Arsenic	<0.004	mg/L	0.004	10	05/05/2022 08:13	05/19/2022 14:50	MDE	MA,NDA	
Barium	0.0098	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:25	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/20/2022 11:29	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:25	MDE	MA,NDA	
Chromium	<0.004	mg/L	0.004	10	05/05/2022 08:13	05/19/2022 14:50	MDE	MA,NDA	
Cobalt	<0.004	mg/L	0.004	10	05/05/2022 08:13	05/19/2022 14:50	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:25	MDE	MA,NDA	
Molybdenum	0.0020	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:25	MDE	MA,NDA	
Selenium	0.0212	mg/L	0.01	10	05/05/2022 08:13	05/19/2022 14:50	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:25	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908007 **Date Collected:** 05/03/2022 12:50 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	<0.02	mg/L	0.02	1	05/05/2022 08:13	05/11/2022 11:14	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Arsenic	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Barium	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/20/2022 11:30	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Chromium	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Cobalt	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Molybdenum	<0.002	mg/L	0.002	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Selenium	<0.005	mg/L	0.005	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	05/05/2022 08:13	05/19/2022 12:28	MDE	MA,NDA	

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



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May 6, 2022

Montana-Dakota Utilities
Todd Peterson
400 N. 4th St
Bismarck, ND 58501

RE: MDU Heskett Groundwater Sampling

Dear Mr. Peterson,

From May 2-3, 2022, MVTL Field Services division collected ground water samples at the MDU Heskett Station near Mandan, ND. Samples were collected from 5 wells. A Duplicate sample was collected from well MW13. Samples collected were placed on ice and transported to MVTL in Bismarck, ND for analysis.

Thank you for your trust and support of our services. If you have any questions, please call me at (701) 391-4900.

Sincerely,

Jeremy Meyer
MVTL Field Services Manager

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis WO: 908 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com		Project Name: MDU Heskett Event: Spring 2022 Sampled By: <i>Jeremy Payer</i>

Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Spring 2022 Sampled By: <i>Jeremy Payer</i>
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Lab Number	Sample ID	Sample Information		Sample Type	Sample Containers				Field Readings				Analysis Required		
		Date	Time		1 Liter Raw	500 mL HNO3	500 mL HNO3 (filtered)	250 mL H2SO4	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)			
001	MW13	2 May 22	0900	GW	X	X	X	X			7.47	9688	6.94	3.00	MDU Heskett List
002	MW1-90	3 May 22	1345	GW	X	X	X	X			6.77	7558	6.85	0.12	
003	MW2-90	3 May 22	1150	GW	X	X	X	X			7.84	7294	6.94	0.20	
004	MW3-90	3 May 22	0918	GW	X	X	X	X			6.03	4775	6.91	0.64	
005	MW80R	2 May 22	1257	GW	X	X	X	X			8.30	4784	6.93	0.24	
006	Dup 1	2 May 22	0900	GW	X	X	X	X			7.47	9688	6.94	3.00	
007	Field Blank (FB)	3 May 22	1250	GW	X	X	X	X			NA	NA	NA	NA	

Comments:

	Relinquished By		Sample Condition		Received By	
	Name	Date/Time	Location	Temp (°C)	Name	Date/Time
1	<i>[Signature]</i>	4 May 22 0810	log in Walk In #2	2.3 TMS62 / TM805	<i>[Signature]</i>	4 May 22 0810
2						

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Report Date: Wednesday, June 29, 2022 10:27:02 AM



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
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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 13
 Sampling Personal: Jerry Gray

Weather Conditions: Temp: 40 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES NO
Well Labeled?	YES NO
Casing Strait?	YES NO
Grout Seal Intact?	YES NO Not Visible
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	31.25 ft
Total Depth of Well:	ft
Well Volume:	liters
Depth to Top of Pump:	ft
Water Level After Sample:	33.75 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	Dup 1
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	25 Sec.
PSI:	20

FIELD READINGS												
Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment	
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.	
	0810	Start of Well Purge										
2 May 22	0815	7.00	4088	7.44	10.42	198.1	0.19	31.76	100.0	500.0	Clear	
	0835	6.51	9759	6.96	4.01	206.8	1.51	32.15	100.0	2000.0	Clear	
	0845	7.42	9699	6.94	3.74	199.0	2.58	32.93	100.0	1000.0	Clear	
	0850	7.34	9654	6.95	3.79	200.9	2.71	33.40	100.0	500.0	Clear	
	0855	7.44	9677	6.95	3.50	201.4	3.40	33.65	100.0	500.0	Clear	
	0900	7.47	9688	6.94	3.21	202.2	3.80	33.72	100.0	500.0	Clear	
Well Stabilized?		YES	NO	Total Volume Purged: 5000.0 mL								

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
2 May 22	0900	7.47	9688	6.94	3.00	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event: Spring 2022
Sample ID: 1-90
Sampling Personal: J. J. J.

Weather Conditions: Temp: 50°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with fields: Well Locked?, Well Labeled?, Casing Strait?, Grout Seal Intact?, Repairs Necessary?, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with fields: Purging Method, Sampling Method, Dedicated Equipment?, Duplicate Sample?, Duplicate Sample ID, Bottle List.

Control Settings table with fields: Purge, Recover, PSI.

FIELD READINGS

Table with columns: Purge Date, Time, Temp, Spec. Cond., pH, DO, ORP, Turbidity, Water Level, Pumping Rate, mL Removed, Appearance or Comment. Includes handwritten data for 3 May 22.

Summary table with columns: Sample Date, Time, Temp, Spec. Cond., pH, Turbidity, Appearance or Comment.

Comments: Collected field blank I @ 1250

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 2-90
 Sampling Personal: *Jay*

Weather Conditions: Temp: 45 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>
Well Labeled?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Casing Strait?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Grout Seal Intact?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> <u>Not Visible</u>
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	21.28 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	21.95 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Duplicate Sample?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Duplicate Sample ID:	—
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	55 Sec.
PSI:	25

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±10	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	ml Removed	Appearance or Comment
Purge Date	Time	±0.5°									clear, slightly turbid, turbid
	1050	Start of Well Purge									
3 May 22	1055	7.31	7500	7.01	5.00	210.1	0.06	21.61	100.0	500.0	Clear
	1115	7.77	7020	6.95	3.65	202.3	0.15	21.67	100.0	2000.0	Clear
	1125	7.72	6654	6.96	3.95	182.0	0.29	21.90	100.0	1000.0	Clear
	1130	7.68	6516	6.96	4.01	176.8	0.16	21.91	100.0	500.0	Clear
	1135	7.69	6338	6.96	3.75	170.7	0.13	21.92	100.0	500.0	Clear
	1140	7.79	6987	6.95	3.98	170.3	0.15	21.93	100.0	500.0	Clear
	1145	7.81	7118	6.94	4.01	170.6	0.17	21.94	100.0	500.0	Clear
	1150	7.84	7294	6.94	4.12	170.9	0.20	21.94	100.0	500.0	Clear

Well Stabilized? YES NO Total Volume Purged: 6000.0 ml

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
3 May 22	1150	7.84	7294	6.94	0.20	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 3-90
 Sampling Personal: J. J. [Signature]

Weather Conditions: Temp: 40 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>
Well Labeled?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Casing Strait?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Grout Seal Intact?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> Not Visible
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	18.31 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	18.41 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Duplicate Sample?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Duplicate Sample ID:	—
Bottle List:	
1 Liter Raw	4- 1L Nitric
500ml Nitric	
500ml Nitric (filtered)	
250ml Sulfuric	

Control Settings:	
Purge:	5 Sec.
Recover:	55 Sec.
PSI:	20

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±10	Turbidity (NTU)	Water Level (ft)	Pumping Rate ml/Min	ml Removed	Appearance or Comment
Purge Date	Time										
	0820	Start of Well Purge									
3/1/22	0833	5.97	4794	6.96	3.69	152.2	16.88	18.42	100.0	500.0	Clear
	0853	5.99	4803	6.92	3.83	162.2	2.47	18.40	100.0	2000.0	Clear
	0903	5.99	4805	6.92	3.82	170.3	1.41	18.40	100.0	1000.0	Clear
	0908	6.01	4792	6.91	3.65	174.9	1.92	18.38	100.0	500.0	Clear
	0913	6.13	4792	6.91	3.72	179.6	1.69	18.39	100.0	500.0	Clear
	0918	6.03	4775	6.91	3.79	182.3	0.64	18.40	100.0	500.0	Clear

Well Stabilized? YES NO

Total Volume Purged: 5000.0 ml

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
3/1/22	0918	6.03	4775	6.91	0.64	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
Event: Spring 2022
Sample ID:
Sampling Personal: *Bob Jay*

Weather Conditions: Temp: 50°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION			
Well Locked?	YES	NO	
Well Labeled?	YES	NO	
Casing Strait?	YES	NO	
Grout Seal Intact?	YES	NO	Not Visible
Repairs Necessary?			
Casing Diameter:	2"		
Water Level Before Purge:	12.96	ft	
Total Depth of Well:		ft	
Well Volume:		liters	
Depth to Top of Pump:		ft	
Water Level After Sample:	13.40	ft	
Measurement Method:	Electric Water Level Indicator		

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	
Bottle List:	
1 Liter Raw	4- 1L Nitric
500ml Nitric	
500ml Nitric (filtered)	
250ml Sulfuric	

Control Settings:	
Purge:	5 Sec.
Recover:	25 Sec.
PSI:	15

FIELD READINGS											
Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±10	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	ml Removed	Appearance or Comment
Purge Date	Time	±0.5°									clear, slightly turbid, turbid
	1157	Start of Well Purge									
2 May 22	1203	7.34	5364	6.96	0.97	207.2	0.30	13.13	100.0	500.0	Clear
	1232	8.30	4977	6.95	1.01	202.7	0.29	13.21	100.0	2000.0	Clear
	1242	8.27	4918	6.94	1.11	201.9	0.19	13.24	100.0	1000.0	Clear
	1247	8.24	4678	6.93	1.00	200.3	0.26	13.32	100.0	500.0	Clear
	1252	8.21	4821	6.93	0.95	198.6	0.27	13.33	100.0	500.0	Clear
	1257	8.30	4784	6.93	0.89	198.1	0.24	13.34	100.0	500.0	Clear

Well Stabilized? YES NO Total Volume Purged: 5000.0 ml

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	ml Removed	Appearance or Comment
2 May 22	1257	8.30	4784	6.93			0.24				Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Surface water Assessment

Company: MDU Lewis & Clark
Event: Spring 2022
Sampling Personal: Jay King

Weather Conditions: Temp: 75°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	2 May 22	1130	2"	21.78	
MW33		1150	2"	42.76	
MW101		1132	2"	37.94	
MW102		1128	2"	19.50	
MW103		1140	2"	36.74	
MW44R		1137	2"	27.14	
MW104		1147	2"	14.18	
MW105		1154	2"	11.78	

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Sample Comments

908002 (MW1-90) - Sample

Total and dissolved selenium results have been rechecked.

Analysis Results Comments

908001 (MW13)

Sample required dilution due to matrix. Reporting limit has been raised.
(Nitrate + Nitrite as N)

908001 (MW13)

Sample analyzed beyond holding time.(pH)

908002 (MW1-90)

Sample analyzed beyond holding time.(pH)

908003 (MW2-90)

Sample analyzed beyond holding time.(pH)

908004 (MW3-90)

Sample analyzed beyond holding time.(pH)

908005 (MW80R)

Sample analyzed beyond holding time.(pH)

908006 (Dup 1)

Sample required dilution due to matrix. Reporting limit has been raised.
(Nitrate + Nitrite as N)

908006 (Dup 1)

Sample analyzed beyond holding time.(pH)

908007 (Field Blank)

Sample analyzed beyond holding time.(pH)

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Report Date: Thursday, June 30, 2022 8:25:26 AM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908001 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	9688	umhos/cm	1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.94	units	0.01	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	7.47	degrees C		1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6190	mg/L	250	50	05/05/2022 12:31	05/05/2022 12:31	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	3	NTU	0.1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	3.65	mg/L	1	5	05/05/2022 08:53	05/05/2022 08:53	EJV	MA,NDA	*

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.2	mg/L	0.2	1	05/05/2022 11:00	05/05/2022 14:36	SRD	MA,NDA	

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Report Date: [Thursday, June 30, 2022 8:25:26 AM](#)

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908001 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: EPA 6010D**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	0.64	mg/L	0.5	5	05/05/2022 08:53	05/11/2022 13:38	SLZ	MA,NDA	
Calcium	401	mg/L	5	5	05/05/2022 08:13	05/10/2022 09:56	MDE	MA,NDA	
Iron, Dissolved	<0.5	mg/L	0.5	5	05/05/2022 08:53	05/05/2022 12:57	SLZ	MA,NDA	
Magnesium	631	mg/L	5	5	05/05/2022 08:13	05/10/2022 09:56	MDE	MA,NDA	
Manganese, Dissolved	<0.25	mg/L	0.25	5	05/05/2022 08:53	05/05/2022 12:57	SLZ	MA,NDA	
Potassium	31.8	mg/L	5	5	05/05/2022 08:13	05/10/2022 09:56	MDE	MA,NDA	
Sodium	1970	mg/L	20	20	05/05/2022 08:13	05/10/2022 11:12	MDE	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:35	MDE	MA,NDA	
Barium, Dissolved	0.0077	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:35	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:35	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:35	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:35	MDE	MA,NDA	
Molybdenum, Dissolved	0.0023	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:35	MDE	MA,NDA	
Selenium, Dissolved	0.0218	mg/L	0.005	5	05/05/2022 08:53	06/16/2022 13:56	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:35	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	142	meq/L		1	06/29/2022 09:38	06/29/2022 09:38	CW		
Cation Summation	158	meq/L		1	06/29/2022 09:38	06/29/2022 09:38	CW		
Percent Difference	5.46	%		1	06/29/2022 09:38	06/29/2022 09:38	CW		
TDS - Summation	9630	mg/L	12.5	1	06/29/2022 09:39	06/29/2022 09:39	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908001 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: SM2320 B-2011**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:39	05/04/2022 13:39	RAA		
Alkalinity, Total	527	mg/L as CaCO3	20.5	1	05/04/2022 13:39	05/04/2022 13:39	RAA	MA,NDA	
Bicarbonate	527	mg/L as CaCO3	20.5	1	05/04/2022 13:39	05/04/2022 13:39	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:39	05/04/2022 13:39	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:39	05/04/2022 13:39	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	3600	mg/L as CaCO3	6.62	1	06/29/2022 09:38	06/29/2022 09:38	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	9874	umhos/cm	1	1	05/04/2022 13:39	05/04/2022 13:39	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.3	units	0.1	1	05/04/2022 13:39	05/04/2022 13:39	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	79.2	mg/L	2	1	05/09/2022 09:08	05/09/2022 09:08	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.76	mg/L	0.1	1	05/04/2022 13:39	05/04/2022 13:39	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	14.3		0.17	1	06/29/2022 09:38	06/29/2022 09:38	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908002 **Date Collected:** 05/03/2022 13:45 **Matrix:** Groundwater
Sample ID: MW1-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	7558	umhos/cm	1	1	05/03/2022 13:45	05/03/2022 13:45	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.85	units	0.01	1	05/03/2022 13:45	05/03/2022 13:45	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	6.77	degrees C		1	05/03/2022 13:45	05/03/2022 13:45	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6490	mg/L	250	50	05/05/2022 12:32	05/05/2022 12:32	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	0.12	NTU	0.1	1	05/03/2022 13:45	05/03/2022 13:45	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	15.4	mg/L	1	5	05/05/2022 08:54	05/05/2022 08:54	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.2	mg/L	0.2	1	05/05/2022 11:00	05/05/2022 14:37	SRD	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908002 **Date Collected:** 05/03/2022 13:45 **Matrix:** Groundwater
Sample ID: MW1-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	<0.5	mg/L	0.5	5	05/05/2022 08:53	05/11/2022 13:40	SLZ	MA,NDA	
Calcium	392	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:02	MDE	MA,NDA	
Iron, Dissolved	<0.5	mg/L	0.5	5	05/05/2022 08:53	05/05/2022 12:59	SLZ	MA,NDA	
Magnesium	909	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:02	MDE	MA,NDA	
Manganese, Dissolved	<0.25	mg/L	0.25	5	05/05/2022 08:53	05/05/2022 12:59	SLZ	MA,NDA	
Potassium	31.0	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:02	MDE	MA,NDA	
Sodium	1620	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:02	MDE	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:39	MDE	MA,NDA	
Barium, Dissolved	0.0072	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:39	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:39	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:39	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:39	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:39	MDE	MA,NDA	
Selenium, Dissolved	0.0224	mg/L	0.005	5	05/05/2022 08:53	06/16/2022 13:53	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:39	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	147	meq/L		1	06/29/2022 09:40	06/29/2022 09:40	CW		
Cation Summation	165	meq/L		1	06/29/2022 09:40	06/29/2022 09:40	CW		
Percent Difference	6.03	%		1	06/29/2022 09:40	06/29/2022 09:40	CW		
TDS - Summation	9780	mg/L	12.5	1	06/29/2022 09:40	06/29/2022 09:40	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908002 **Date Collected:** 05/03/2022 13:45 **Matrix:** Groundwater
Sample ID: MW1-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: SM2320 B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 14:15	05/04/2022 14:15	RAA		
Alkalinity, Total	390	mg/L as CaCO3	20.5	1	05/04/2022 14:15	05/04/2022 14:15	RAA	MA,NDA	
Bicarbonate	390	mg/L as CaCO3	20.5	1	05/04/2022 14:15	05/04/2022 14:15	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 14:15	05/04/2022 14:15	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 14:15	05/04/2022 14:15	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	4720	mg/L as CaCO3	6.62	1	06/29/2022 09:40	06/29/2022 09:40	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	9685	umhos/cm	1	1	05/04/2022 14:15	05/04/2022 14:15	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.4	units	0.1	1	05/04/2022 14:15	05/04/2022 14:15	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	90.7	mg/L	2	1	05/09/2022 09:09	05/09/2022 09:09	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	1.12	mg/L	0.1	1	05/04/2022 14:15	05/04/2022 14:15	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	10.2		0.17	1	06/29/2022 09:40	06/29/2022 09:40	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908003 **Date Collected:** 05/03/2022 11:50 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	7294	umhos/cm	1	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.94	units	0.01	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	7.84	degrees C		1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	4830	mg/L	100	20	05/05/2022 12:19	05/05/2022 12:19	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	0.2	NTU	0.1	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	34.1	mg/L	2	10	05/05/2022 08:56	05/05/2022 08:56	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.2	mg/L	0.2	1	05/05/2022 11:00	05/05/2022 14:45	SRD	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908003 **Date Collected:** 05/03/2022 11:50 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	<0.5	mg/L	0.5	5	05/05/2022 08:53	05/11/2022 13:42	SLZ	MA,NDA	
Calcium	451	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:04	MDE	MA,NDA	
Iron, Dissolved	<0.5	mg/L	0.5	5	05/05/2022 08:53	05/05/2022 13:02	SLZ	MA,NDA	
Magnesium	824	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:04	MDE	MA,NDA	
Manganese, Dissolved	<0.25	mg/L	0.25	5	05/05/2022 08:53	05/05/2022 13:02	SLZ	MA,NDA	
Potassium	32.4	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:04	MDE	MA,NDA	
Sodium	854	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:04	MDE	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:42	MDE	MA,NDA	
Barium, Dissolved	0.0089	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:42	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:42	MDE	MA,NDA	
Chromium, Dissolved	0.0021	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:42	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:42	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:42	MDE	MA,NDA	
Selenium, Dissolved	0.0845	mg/L	0.005	5	05/05/2022 08:53	06/16/2022 13:50	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:42	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	116	meq/L		1	06/29/2022 09:43	06/29/2022 09:43	CW		
Cation Summation	128	meq/L		1	06/29/2022 09:43	06/29/2022 09:43	CW		
Percent Difference	5.10	%		1	06/29/2022 09:43	06/29/2022 09:43	CW		
TDS - Summation	7420	mg/L	12.5	1	06/29/2022 09:43	06/29/2022 09:43	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908003 **Date Collected:** 05/03/2022 11:50 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: SM2320 B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 14:44	05/04/2022 14:44	RAA		
Alkalinity, Total	520	mg/L as CaCO3	20.5	1	05/04/2022 14:44	05/04/2022 14:44	RAA	MA,NDA	
Bicarbonate	520	mg/L as CaCO3	20.5	1	05/04/2022 14:44	05/04/2022 14:44	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 14:44	05/04/2022 14:44	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 14:44	05/04/2022 14:44	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	4520	mg/L as CaCO3	6.62	1	06/29/2022 09:43	06/29/2022 09:43	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	7454	umhos/cm	1	1	05/04/2022 14:44	05/04/2022 14:44	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.4	units	0.1	1	05/04/2022 14:44	05/04/2022 14:44	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	86.6	mg/L	2	1	05/09/2022 09:10	05/09/2022 09:10	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	1.01	mg/L	0.1	1	05/04/2022 14:44	05/04/2022 14:44	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	5.53		0.17	1	06/29/2022 09:43	06/29/2022 09:43	CW		

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Report Date: Thursday, June 30, 2022 8:25:26 AM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908004 **Date Collected:** 05/03/2022 09:18 **Matrix:** Groundwater
Sample ID: MW3-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	4775	umhos/cm	1	1	05/03/2022 09:18	05/03/2022 09:18	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.91	units	0.01	1	05/03/2022 09:18	05/03/2022 09:18	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	6.03	degrees C		1	05/03/2022 09:18	05/03/2022 09:18	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	2470	mg/L	100	20	05/05/2022 12:20	05/05/2022 12:20	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	0.64	NTU	0.1	1	05/03/2022 09:18	05/03/2022 09:18	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	<0.2	mg/L	0.2	1	05/05/2022 08:57	05/05/2022 08:57	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.2	mg/L	0.2	1	05/05/2022 11:00	05/05/2022 14:46	SRD	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908004 **Date Collected:** 05/03/2022 09:18 **Matrix:** Groundwater
Sample ID: MW3-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	0.14	mg/L	0.1	1	05/05/2022 08:53	05/11/2022 13:48	SLZ	MA,NDA	
Calcium	506	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:06	MDE	MA,NDA	
Iron, Dissolved	<0.1	mg/L	0.1	1	05/05/2022 08:53	05/05/2022 13:04	SLZ	MA,NDA	
Magnesium	246	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:06	MDE	MA,NDA	
Manganese, Dissolved	<0.05	mg/L	0.05	1	05/05/2022 08:53	05/05/2022 13:04	SLZ	MA,NDA	
Potassium	17.0	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:06	MDE	MA,NDA	
Sodium	673	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:06	MDE	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:45	MDE	MA,NDA	
Barium, Dissolved	0.0105	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:45	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:45	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:45	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:45	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:45	MDE	MA,NDA	
Selenium, Dissolved	0.1113	mg/L	0.005	5	05/05/2022 08:53	06/16/2022 13:47	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:45	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	61.9	meq/L		1	06/29/2022 09:45	06/29/2022 09:45	CW		
Cation Summation	75.2	meq/L		1	06/29/2022 09:45	06/29/2022 09:45	CW		
Percent Difference	9.72	%		1	06/29/2022 09:45	06/29/2022 09:45	CW		
TDS - Summation	4230	mg/L	12.5	1	06/29/2022 09:45	06/29/2022 09:45	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908004 **Date Collected:** 05/03/2022 09:18 **Matrix:** Groundwater
Sample ID: MW3-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: SM2320 B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 15:49	05/04/2022 15:49	RAA		
Alkalinity, Total	470	mg/L as CaCO3	20.5	1	05/04/2022 15:49	05/04/2022 15:49	RAA	MA,NDA	
Bicarbonate	470	mg/L as CaCO3	20.5	1	05/04/2022 15:49	05/04/2022 15:49	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 15:49	05/04/2022 15:49	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 15:49	05/04/2022 15:49	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	2280	mg/L as CaCO3	6.62	1	06/29/2022 09:45	06/29/2022 09:45	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	4886	umhos/cm	1	1	05/04/2022 15:49	05/04/2022 15:49	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.3	units	0.1	1	05/04/2022 15:49	05/04/2022 15:49	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	36.5	mg/L	2	1	05/09/2022 09:11	05/09/2022 09:11	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.11	mg/L	0.1	1	05/04/2022 15:49	05/04/2022 15:49	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	6.14		0.17	1	06/29/2022 09:45	06/29/2022 09:45	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908005 **Date Collected:** 05/02/2022 12:57 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	4784	umhos/cm	1	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.93	units	0.01	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	8.3	degrees C		1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	2910	mg/L	100	20	05/05/2022 12:21	05/05/2022 12:21	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	0.24	NTU	0.1	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	23.5	mg/L	2	10	05/05/2022 09:03	05/05/2022 09:03	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.2	mg/L	0.2	1	05/05/2022 11:00	05/05/2022 14:47	SRD	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908005 **Date Collected:** 05/02/2022 12:57 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: EPA 6010D**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	<0.5	mg/L	0.5	5	05/05/2022 08:53	05/11/2022 13:49	SLZ	MA,NDA	
Calcium	409	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:08	MDE	MA,NDA	
Iron, Dissolved	<0.1	mg/L	0.1	1	05/05/2022 08:53	05/05/2022 13:06	SLZ	MA,NDA	
Magnesium	558	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:08	MDE	MA,NDA	
Manganese, Dissolved	0.20	mg/L	0.05	1	05/05/2022 08:53	05/05/2022 13:06	SLZ	MA,NDA	
Potassium	<5	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:08	MDE	MA,NDA	
Sodium	618	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:08	MDE	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:48	MDE	MA,NDA	
Barium, Dissolved	0.0112	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:48	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:48	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:48	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:48	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	06/16/2022 13:44	MDE	MA,NDA	
Selenium, Dissolved	0.0595	mg/L	0.005	5	05/05/2022 08:53	06/16/2022 13:44	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:48	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	77.6	meq/L		1	06/29/2022 09:47	06/29/2022 09:47	CW		
Cation Summation	93.4	meq/L		1	06/29/2022 09:47	06/29/2022 09:47	CW		
Percent Difference	9.22	%		1	06/29/2022 09:47	06/29/2022 09:47	CW		
TDS - Summation	5010	mg/L	12.5	1	06/29/2022 09:47	06/29/2022 09:47	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908005 **Date Collected:** 05/02/2022 12:57 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: SM2320 B-2011**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 15:32	05/04/2022 15:32	RAA		
Alkalinity, Total	540	mg/L as CaCO3	20.5	1	05/04/2022 15:32	05/04/2022 15:32	RAA	MA,NDA	
Bicarbonate	540	mg/L as CaCO3	20.5	1	05/04/2022 15:32	05/04/2022 15:32	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 15:32	05/04/2022 15:32	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 15:32	05/04/2022 15:32	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	3320	mg/L as CaCO3	6.62	1	06/29/2022 09:47	06/29/2022 09:47	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	5684	umhos/cm	1	1	05/04/2022 15:32	05/04/2022 15:32	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.5	units	0.1	1	05/04/2022 15:32	05/04/2022 15:32	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	162	mg/L	2	1	05/09/2022 09:13	05/09/2022 09:13	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.21	mg/L	0.1	1	05/04/2022 15:32	05/04/2022 15:32	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	4.67		0.17	1	06/29/2022 09:47	06/29/2022 09:47	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908006 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	9688	umhos/cm	1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.94	units	0.01	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	7.47	degrees C		1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6190	mg/L	250	50	05/05/2022 12:34	05/05/2022 12:34	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	3	NTU	0.1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	3.70	mg/L	1	5	05/05/2022 09:11	05/05/2022 09:11	EJV	MA,NDA	*

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.2	mg/L	0.2	1	05/05/2022 11:00	05/05/2022 14:48	SRD	MA,NDA	

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Report Date: Thursday, June 30, 2022 8:25:26 AM

**MINNESOTA VALLEY TESTING LABORATORIES, INC.**

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

**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908006 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: EPA 6010D**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	0.64	mg/L	0.5	5	05/05/2022 08:53	05/11/2022 13:51	SLZ	MA,NDA	
Calcium	396	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:10	MDE	MA,NDA	
Iron, Dissolved	<0.5	mg/L	0.5	5	05/05/2022 08:53	05/05/2022 13:09	SLZ	MA,NDA	
Magnesium	623	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:10	MDE	MA,NDA	
Manganese, Dissolved	<0.25	mg/L	0.25	5	05/05/2022 08:53	05/05/2022 13:09	SLZ	MA,NDA	
Potassium	29.7	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:10	MDE	MA,NDA	
Sodium	1940	mg/L	5	5	05/05/2022 08:13	05/10/2022 10:10	MDE	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:51	MDE	MA,NDA	
Barium, Dissolved	0.0077	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:51	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:51	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:51	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	06/29/2022 13:34	MDE	MA,NDA	
Molybdenum, Dissolved	0.0023	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:51	MDE	MA,NDA	
Selenium, Dissolved	0.0234	mg/L	0.005	5	05/05/2022 08:53	06/16/2022 13:41	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:51	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	142	meq/L		1	06/30/2022 07:49	06/30/2022 07:49	CW		
Cation Summation	156	meq/L		1	06/30/2022 07:49	06/30/2022 07:49	CW		
Percent Difference	4.71	%		1	06/30/2022 07:49	06/30/2022 07:49	CW		
TDS - Summation	9580	mg/L	12.5	1	06/30/2022 07:49	06/30/2022 07:49	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908006 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Method: SM2320 B-2011**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 16:06	05/04/2022 16:06	RAA		
Alkalinity, Total	526	mg/L as CaCO3	20.5	1	05/04/2022 16:06	05/04/2022 16:06	RAA	MA,NDA	
Bicarbonate	526	mg/L as CaCO3	20.5	1	05/04/2022 16:06	05/04/2022 16:06	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 16:06	05/04/2022 16:06	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 16:06	05/04/2022 16:06	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	3550	mg/L as CaCO3	6.62	1	06/30/2022 07:49	06/30/2022 07:49	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	9848	umhos/cm	1	1	05/04/2022 16:06	05/04/2022 16:06	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.3	units	0.1	1	05/04/2022 16:06	05/04/2022 16:06	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	79.1	mg/L	2	1	05/09/2022 09:14	05/09/2022 09:14	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.77	mg/L	0.1	1	05/04/2022 16:06	05/04/2022 16:06	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	14.1		0.17	1	06/30/2022 07:49	06/30/2022 07:49	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908007 **Date Collected:** 05/03/2022 12:50 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: ASTM D516-11

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	<5	mg/L	5	1	05/05/2022 12:23	05/05/2022 12:23	EJV	MA,NDA	

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	05/05/2022 08:00	05/05/2022 08:00	MDE	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	<0.2	mg/L	0.2	1	05/05/2022 09:12	05/05/2022 09:12	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.2	mg/L	0.2	1	05/05/2022 11:00	05/05/2022 14:49	SRD	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	<0.1	mg/L	0.1	1	05/05/2022 08:53	05/11/2022 13:53	SLZ	MA,NDA	
Calcium	<1	mg/L	1	1	05/05/2022 08:13	05/10/2022 10:12	MDE	MA,NDA	
Iron, Dissolved	<0.1	mg/L	0.1	1	05/05/2022 08:53	05/05/2022 13:11	SLZ	MA,NDA	
Magnesium	<1	mg/L	1	1	05/05/2022 08:13	05/10/2022 10:12	MDE	MA,NDA	
Manganese, Dissolved	<0.05	mg/L	0.05	1	05/05/2022 08:53	05/05/2022 13:11	SLZ	MA,NDA	
Potassium	<1	mg/L	1	1	05/05/2022 08:13	05/10/2022 10:12	MDE	MA,NDA	
Sodium	<1	mg/L	1	1	05/05/2022 08:13	05/10/2022 10:12	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908007 **Date Collected:** 05/03/2022 12:50 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:54	MDE	MA,NDA	
Barium, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:54	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:54	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:54	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:54	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	05/05/2022 08:53	05/18/2022 15:54	MDE	MA,NDA	
Selenium, Dissolved	<0.005	mg/L	0.005	5	05/05/2022 08:53	06/16/2022 12:19	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	05/05/2022 08:53	05/18/2022 15:54	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
TDS - Summation	<12.5	mg/L	12.5	1	06/29/2022 09:50	06/29/2022 09:50	CW		

Method: SM2320 B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:13	05/04/2022 13:13	RAA		
Alkalinity, Total	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:13	05/04/2022 13:13	RAA	MA,NDA	
Bicarbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:13	05/04/2022 13:13	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:13	05/04/2022 13:13	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	05/04/2022 13:13	05/04/2022 13:13	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	<6.62	mg/L as CaCO3	6.62	1	06/29/2022 09:50	06/29/2022 09:50	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	2	umhos/cm	1	1	05/05/2022 11:33	05/05/2022 11:33	RAA	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 908007 **Date Collected:** 05/03/2022 12:50 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.0	units	0.1	1	05/04/2022 13:13	05/04/2022 13:13	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	<2	mg/L	2	1	05/09/2022 09:23	05/09/2022 09:23	SRD	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	<0.1	mg/L	0.1	1	05/04/2022 13:13	05/04/2022 13:13	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	<0.17		0.17	1	06/29/2022 09:50	06/29/2022 09:50	CW		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



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May 6, 2022

Montana-Dakota Utilities
Todd Peterson
400 N. 4th St
Bismarck, ND 58501

RE: MDU Heskett Groundwater Sampling

Dear Mr. Peterson,

From May 2-3, 2022, MVTL Field Services division collected ground water samples at the MDU Heskett Station near Mandan, ND. Samples were collected from 5 wells. A Duplicate sample was collected from well MW13. Samples collected were placed on ice and transported to MVTL in Bismarck, ND for analysis.

Thank you for your trust and support of our services. If you have any questions, please call me at (701) 391-4900.

Sincerely,

Jeremy Meyer
MVTL Field Services Manager

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis WO: 908 	Chain of Custody Record
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Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Spring 2022 Sampled By: <i>Jeremy Payer</i>
--	-----	--

Lab Number	Sample ID	Sample Information		Sample Type	Sample Containers				Field Readings				Analysis Required
		Date	Time		1 Liter Raw	500 mL HNO3	500 mL HNO3 (filtered)	250 mL H2SO4	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)	
001	MW13	2 May 22	0900	GW	X	X	X	X	7.47	9688	6.94	3.00	MDU Heskett List
002	MW1-90	3 May 22	1345	GW	X	X	X	X	6.77	7558	6.85	0.12	
003	MW2-90	3 May 22	1150	GW	X	X	X	X	7.84	7294	6.94	0.20	
004	MW3-90	3 May 22	0918	GW	X	X	X	X	6.03	4775	6.91	0.64	
005	MW80R	2 May 22	1257	GW	X	X	X	X	8.30	4784	6.93	0.24	
006	Dup 1	2 May 22	0900	GW	X	X	X	X	7.47	9688	6.94	3.00	
007	Field Blank (FB)	3 May 22	1250	GW	X	X	X	X	NA	NA	NA	NA	

Comments:

	Relinquished By		Sample Condition		Received By	
	Name	Date/Time	Location	Temp (°C)	Name	Date/Time
1	<i>[Signature]</i>	4 May 22 0810	log in Walk In #2	2.3 TMS62 / TM805	<i>[Signature]</i>	4 May 22 0810
2						

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 13
 Sampling Personal: Jerry Gray

Weather Conditions: Temp: 40 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES NO
Well Labeled?	YES NO
Casing Strait?	YES NO
Grout Seal Intact?	YES (NO) Not Visible
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	31.25 ft
Total Depth of Well:	ft
Well Volume:	liters
Depth to Top of Pump:	ft
Water Level After Sample:	33.75 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	Dup 1
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	25 Sec.
PSI:	20

FIELD READINGS												
Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment	
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.	
	0810	Start of Well Purge										
2 May 22	0815	7.00	4088	7.44	10.42	198.1	0.19	31.76	100.0	500.0	Clear	
	0835	6.51	9759	6.96	4.01	206.8	1.51	32.15	100.0	2000.0	Clear	
	0845	7.42	9699	6.94	3.74	199.0	2.58	32.93	100.0	1000.0	Clear	
	0850	7.34	9654	6.95	3.79	200.9	2.71	33.40	100.0	500.0	Clear	
	0855	7.44	9677	6.95	3.50	201.4	3.40	33.65	100.0	500.0	Clear	
	0900	7.47	9688	6.94	3.21	202.2	3.80	33.72	100.0	500.0	Clear	
Well Stabilized?		YES	NO	Total Volume Purged: 5000.0 mL								

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
2 May 22	0900	7.47	9688	6.94	3.00	Clear

Comments:

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www.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
Event: Spring 2022
Sample ID: 1-90
Sampling Personal: J. J. J.

Weather Conditions: Temp: 50°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES (NO)
Well Labeled?	YES NO
Casing Strait?	YES NO
Grout Seal Intact?	YES NO <u>Not Visible</u>
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	9.9 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	10.17 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES (NO)
Duplicate Sample ID:	—
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	55 Sec.
PSI:	15

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.
3 May 22		Start of Well Purge									
	1240										
	1245	6.69	7282	6.92	1.88	165.9	0.20	10.10	100.0	500.0	Clear
	1305	6.45	8088	6.91	1.38	183.0	0.13	10.32	100.0	2000.0	Clear
	1315	6.43	9554	6.91	1.29	186.5	0.12	10.34	100.0	1000.0	Clear
	1320	6.65	8613	6.89	1.28	189.9	0.14	10.27	100.0	500.0	Clear
	1325	6.46	7987	6.89	1.13	191.6	0.12	10.18	100.0	500.0	Clear
	1330	6.58	7182	6.89	1.15	193.5	0.14	10.20	100.0	500.0	Clear
	1335	6.69	6423	6.89	1.26	193.8	0.14	10.21	100.0	500.0	Clear
	1340	6.71	7468	6.86	1.31	194.7	0.13	10.16	100.0	500.0	Clear
	1345	6.77	7558	6.85	1.33	195.6	0.12	10.15	100.0	500.0	Clear
Well Stabilized?		YES	NO	Total Volume Purged: 6500.0 ml							

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
Clarity, Color, Odor, Ect.						
3 May 22	1345	6.77	7558	6.85	0.12	Clear

Comments: Collected field blank I @ 1250

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 2-90
 Sampling Personal: *Jay*

Weather Conditions: Temp: 45 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>
Well Labeled?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Casing Strait?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Grout Seal Intact?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> <u>Not Visible</u>
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	21.28 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	21.95 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Duplicate Sample?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Duplicate Sample ID:	—
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	55 Sec.
PSI:	25

FIELD READINGS												
Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±10	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	ml Removed	Appearance or Comment	
Purge Date	Time										clear, slightly turbid, turbid	
	1050	Start of Well Purge										
3 May 22	1055	7.31	7500	7.01	5.00	210.1	0.06	21.61	100.0	500.0	Clear	
	1115	7.77	7020	6.95	3.65	202.3	0.15	21.67	100.0	2000.0	Clear	
	1125	7.72	6654	6.96	3.95	182.0	0.29	21.90	100.0	1000.0	Clear	
	1130	7.68	6516	6.96	4.01	176.8	0.16	21.91	100.0	500.0	Clear	
	1135	7.69	6338	6.96	3.75	170.7	0.13	21.92	100.0	500.0	Clear	
	1140	7.79	6987	6.95	3.98	170.3	0.15	21.93	100.0	500.0	Clear	
	1145	7.81	7118	6.94	4.01	170.6	0.17	21.94	100.0	500.0	Clear	
	1150	7.84	7294	6.94	4.12	170.9	0.20	21.94	100.0	500.0	Clear	
Well Stabilized?		<input checked="" type="checkbox"/> YES		NO								
Total Volume Purged:										6000.0	ml	

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
3 May 22	1150	7.84	7294	6.94	0.20	Clear

Comments:

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www.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Surface water Assessment

Company: MDU Lewis & Clark
Event: Spring 2022
Sampling Personal: [Signature]

Weather Conditions: Temp: 75°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	2 May 22	1130	2"	21.78	
MW33		1150	2"	42.76	
MW101		1132	2"	37.94	
MW102		1128	2"	19.50	
MW103		1140	2"	36.74	
MW44R		1137	2"	27.14	
MW104		1147	2"	14.18	
MW105		1154	2"	11.78	

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Original Sample	QC Type	Analyte	Analysis Date	QC Result	Original Sample Re	Units	Spike Amount	Spike Result	Spike % Recovery	Spike Duplicate	Spike Duplicate RPD (%)	Lower Control Limit	Upper Control Limit	RPD Limit (%)	
908001	MS	Alkalinity, Total	05/04/2022 13:55:25	95.15	527	mg/L	410	917	95.15			80	120		
908001	MSD	Alkalinity, Total	05/04/2022 14:07:30	91.68	527	mg/L				903	91.68	1.54	80	120	20
	CRM	Alkalinity, Total	05/04/2022 10:43:59	94.62		mg/L	501	474	94.62			80	120		
	LFB	Alkalinity, Total	05/04/2022 10:33:10	94.28		mg/L	410	386	94.28			90	110		
	LFB	Alkalinity, Total	05/04/2022 16:32:14	95.21		mg/L	410	390	95.21			90	110		
	MB	Alkalinity, Total	05/04/2022 16:26:10	<20.5		mg/L as CaCO3									
	MB	Alkalinity, Total	05/04/2022 10:17:15	<20.5		mg/L as CaCO3									
908006	SPK	Arsenic, Dissolved	06/29/2022 12:11:00	117	<0.002	mg/L	0.1	0.1168	117			75	125		
908006	SPKD	Arsenic, Dissolved	06/29/2022 12:11:00	117	<0.002	mg/L				0.1174	117	0.51	75	125	20
908007	SPK	Arsenic, Dissolved	05/18/2022 16:17:00	113	<0.002	mg/L	0.1	0.1127	113			75	125		
908007	SPKD	Arsenic, Dissolved	05/18/2022 16:20:00	115	<0.002	mg/L				0.1148	115	1.85	75	125	20
925001	SPK	Arsenic, Dissolved	05/19/2022 12:55:34	101		mg/L	0.1	0.1077	101			75	125		
927004	SPK	Arsenic, Dissolved	05/19/2022 13:50:30	106		mg/L	0.1	0.1059	106			75	125		
1373003	SPK	Arsenic, Dissolved	06/29/2022 13:56:00	118	<0.002	mg/L	0.1	0.1176	118			75	125		
1373003	SPKD	Arsenic, Dissolved	06/29/2022 14:00:00	117	<0.002	mg/L				0.1174	117	0.17	75	125	20
	LFB-MS	Arsenic, Dissolved	05/19/2022 11:55:00	97		ug/L	100	97	97			80	120		
	LFB-MS	Arsenic, Dissolved	05/20/2022 15:03:01	102.3		ug/L	100	102	102.3			85	115		
	LFB-MS	Arsenic, Dissolved	05/19/2022 14:11:00	98.4		ug/L	100	98.4	98.4			80	120		
	MB	Arsenic, Dissolved	05/19/2022 11:29:00	<2.00		ug/L									
	MB	Arsenic, Dissolved	05/20/2022 15:00:02	<2.00		ug/L									
	MB	Arsenic, Dissolved	05/19/2022 12:43:00	<2.00		ug/L									
908001	MS	Barium, Dissolved	05/19/2022 12:05:00	93.9	7.7	ug/L	400	386	93.9			75	125		
908001	MSD	Barium, Dissolved	05/19/2022 12:08:00	93.4	7.7	ug/L				384	93.4	0.50	75	125	20
908006	SPK	Barium, Dissolved	06/29/2022 12:11:00	99.6	0.0077	mg/L	0.1	0.1073	99.6			75	125		
908006	SPKD	Barium, Dissolved	06/29/2022 12:11:00	99	0.0077	mg/L				0.1067	99	0.56	75	125	20
908007	SPK	Barium, Dissolved	05/18/2022 16:17:00	103	<0.002	mg/L	0.1	0.103	103			75	125		
908007	SPKD	Barium, Dissolved	05/18/2022 16:20:00	104	<0.002	mg/L				0.1037	104	0.68	75	125	20
925001	SPK	Barium, Dissolved	05/19/2022 12:55:34	93.2		mg/L	0.1	0.1957	93.2			75	125		
927004	SPK	Barium, Dissolved	05/19/2022 13:50:30	93.4		mg/L	0.1	0.1066	93.4			75	125		
1373003	SPK	Barium, Dissolved	06/29/2022 13:56:00	101	<0.1	mg/L	0.1	0.1705	101			75	125		
1373003	SPKD	Barium, Dissolved	06/29/2022 14:00:00	103	<0.1	mg/L				0.1725	103	1.17	75	125	20
	LFB-MS	Barium, Dissolved	05/19/2022 11:55:00	97.3		ug/L	100	97.3	97.3			80	120		
	LFB-MS	Barium, Dissolved	05/20/2022 15:03:01	106.6		ug/L	100	106	106.6			85	115		
	LFB-MS	Barium, Dissolved	05/19/2022 14:11:00	97.2		ug/L	100	97.2	97.2			80	120		
	MB	Barium, Dissolved	05/20/2022 15:00:02	<2.00		ug/L									
	MB	Barium, Dissolved	05/19/2022 12:43:00	<2.00		ug/L									
	MB	Barium, Dissolved	05/19/2022 11:29:00	<2.00		ug/L									
908001	PDS	Boron, Dissolved	05/11/2022 13:19:00		0.64	mg/L									
908001	PDSD	Boron, Dissolved	05/11/2022 13:21:00		0.64	mg/L					3.34			20	
908003	SPK	Boron, Dissolved	05/11/2022 13:44:00	110	<0.5	mg/L	2	2.207	110			75	125		
908003	SPKD	Boron, Dissolved	05/11/2022 13:46:00	115	<0.5	mg/L				2.294	115	3.87	75	125	20
	LFB-OE	Boron, Dissolved	05/11/2022 13:16:13	99		mg/L	0.4	0.3959	99			85	115		
	MB	Boron, Dissolved	05/11/2022 13:14:17	<0.1		mg/L									
908001	MS	Cadmium, Dissolved	05/19/2022 12:05:00	99.2	<0.5	ug/L	400	397	99.2			75	125		
908001	MSD	Cadmium, Dissolved	05/19/2022 12:08:00	100.4	<0.5	ug/L				401	100.4	1.00	75	125	20
908006	SPK	Cadmium, Dissolved	06/29/2022 12:11:00	102	<0.0005	mg/L	0.1	0.1019	102			75	125		
908006	SPKD	Cadmium, Dissolved	06/29/2022 12:11:00	104	<0.0005	mg/L				0.1044	104	2.42	75	125	20
908007	SPK	Cadmium, Dissolved	05/18/2022 16:17:00	118	<0.0005	mg/L	0.1	0.118	118			75	125		

908007	SPKD	Cadmium, Dissolved	05/18/2022 16:20:00	116	<0.0005	mg/L				0.1156	116	2.05	75	125	20
925001	SPK	Cadmium, Dissolved	05/19/2022 12:55:34	97.9		mg/L	0.1	0.0979	97.9				75	125	
927004	SPK	Cadmium, Dissolved	05/19/2022 13:50:30	93.2		mg/L	0.1	0.0937	93.2				75	125	
1373003	SPK	Cadmium, Dissolved	06/29/2022 13:56:00	115	<0.0005	mg/L	0.1	0.1146	115				75	125	
1373003	SPKD	Cadmium, Dissolved	06/29/2022 14:00:00	114	<0.0005	mg/L				0.1136	114	0.88	75	125	20
	LFB-MS	Cadmium, Dissolved	05/19/2022 11:55:00	100.6		ug/L	100	101	100.6				80	120	
	LFB-MS	Cadmium, Dissolved	05/20/2022 15:03:01	108.3		ug/L	100	108	108.3				85	115	
	LFB-MS	Cadmium, Dissolved	05/19/2022 14:11:00	105.3		ug/L	100	105	105.3				80	120	
	MB	Cadmium, Dissolved	05/19/2022 12:43:00	<0.500		ug/L									
	MB	Cadmium, Dissolved	05/19/2022 11:29:00	<0.500		ug/L									
	MB	Cadmium, Dissolved	05/20/2022 15:00:02	<0.500		ug/L									
905001	DUP	Calcium	05/10/2022 09:54:21	131.5		mg/L						3.80			20
908001	PDS	Calcium	05/10/2022 09:58:00	94.4	401	mg/L	400	778.7	94.4				75	125	
908001	PDSD	Calcium	05/10/2022 10:00:00	94.6	401	mg/L				779.2	94.6	0.06	75	125	20
926001	DUP	Calcium	05/10/2022 10:33:07	351.8	354	mg/L						0.62			20
926002	PDS	Calcium	05/10/2022 10:37:00	96.1	447	mg/L	400	831.4	96.1				75	125	
926002	PDSD	Calcium	05/10/2022 10:39:00	94.1	447	mg/L				823.4	94.1	0.97	75	125	20
927004	PDS	Calcium	05/10/2022 11:02:00	101	716	mg/L	400	1012	101				75	125	
927004	PDSD	Calcium	05/10/2022 11:04:00	99.7	716	mg/L				1006	99.7	0.60	75	125	20
	LFB-MI	Calcium	05/10/2022 10:24:55	106		mg/L	100	105.5	106				85	115	
	LFB-MI	Calcium	05/10/2022 09:50:19	107		mg/L	100	107.3	107				85	115	
	MB	Calcium	05/10/2022 09:47:00	<1		mg/L									
	MB	Calcium	05/10/2022 10:22:17	<1		mg/L									
908004	MS	Chloride	05/09/2022 09:16:17	112	36.5	mg/L	30	70.2	112				80	120	
908004	MSD	Chloride	05/09/2022 09:17:28	109	36.5	mg/L				69.3	109	1.29	80	120	20
	LFB	Chloride	05/09/2022 09:19:49	92.8		mg/L	30	27.8	92.8				90	110	
	LFB	Chloride	05/09/2022 10:22:07	92.5		mg/L	30	27.7	92.5				90	110	
	LFB	Chloride	05/09/2022 08:55:56	93.3		mg/L	30	28	93.3				90	110	
	MB	Chloride	05/09/2022 10:20:56	<2.00		mg/L									
	MB	Chloride	05/09/2022 09:18:39	<2.00		mg/L									
	MB	Chloride	05/09/2022 08:54:45	<2.00		mg/L									
908006	SPK	Chromium, Dissolved	06/29/2022 12:11:00	107	<0.002	mg/L	0.1	0.1073	107				75	125	
908006	SPKD	Chromium, Dissolved	06/29/2022 12:11:00	110	<0.002	mg/L				0.1097	110	2.21	75	125	20
908007	SPK	Chromium, Dissolved	05/18/2022 16:17:00	97.7	<0.002	mg/L	0.1	0.0977	97.7				75	125	
908007	SPKD	Chromium, Dissolved	05/18/2022 16:20:00	98.8	<0.002	mg/L				0.0988	98.8	1.12	75	125	20
925001	SPK	Chromium, Dissolved	05/19/2022 12:55:34	105		mg/L	0.1	0.1094	105				75	125	
927004	SPK	Chromium, Dissolved	05/19/2022 13:50:30	111		mg/L	0.1	0.1113	111				75	125	
1373003	SPK	Chromium, Dissolved	06/29/2022 13:56:00	103	<0.002	mg/L	0.1	0.1027	103				75	125	
1373003	SPKD	Chromium, Dissolved	06/29/2022 14:00:00	103	<0.002	mg/L				0.1034	103	0.68	75	125	20
	LFB-MS	Chromium, Dissolved	05/19/2022 14:11:00	102		ug/L	100	102	102				80	120	
	LFB-MS	Chromium, Dissolved	05/19/2022 11:55:00	98.8		ug/L	100	98.8	98.8				80	120	
	LFB-MS	Chromium, Dissolved	05/20/2022 15:03:01	107.5		ug/L	100	107	107.5				85	115	
	MB	Chromium, Dissolved	05/20/2022 15:00:02	<2.00		ug/L									
	MB	Chromium, Dissolved	05/19/2022 11:29:00	<2.00		ug/L									
	MB	Chromium, Dissolved	05/19/2022 12:43:00	<2.00		ug/L									
908002	MS-F	Fluoride	05/04/2022 14:32:14	94	1.12	mg/L	0.5	1.59	94				80	120	
908002	MSD-F	Fluoride	05/04/2022 14:38:10	94	1.12	mg/L				1.59	94	0.00	80	120	20
	CRM-F	Fluoride	05/04/2022 11:24:00	103		mg/L	3.3	3.4	103				83.92	111.19	
	LFB-F	Fluoride	05/04/2022 17:01:32	100		mg/L	0.5	0.5	100				90	110	

908006	SPK	Molybdenum, Dissolved	06/29/2022 12:11:00	118	0.0023	mg/L	0.1	0.1205	118			75	125		
908006	SPKD	Molybdenum, Dissolved	06/29/2022 12:11:00	121	0.0023	mg/L				0.1229	121	1.97	75	125	20
908007	SPK	Molybdenum, Dissolved	06/16/2022 12:22:00	99.4	<0.002	mg/L	0.02	0.0199	99.4				75	125	
908007	SPK	Molybdenum, Dissolved	05/18/2022 16:17:00	116	<0.002	mg/L	0.1	0.1163	116				75	125	
908007	SPKD	Molybdenum, Dissolved	06/16/2022 12:25:00	101	<0.002	mg/L				0.0202	101	1.50	75	125	20
908007	SPKD	Molybdenum, Dissolved	05/18/2022 16:20:00	116	<0.002	mg/L				0.1161	116	0.17	75	125	20
925001	SPK	Molybdenum, Dissolved	05/19/2022 12:55:34	110		mg/L	0.1	0.1194	110				75	125	
927004	SPK	Molybdenum, Dissolved	05/19/2022 13:50:30	113		mg/L	0.1	0.1157	113				75	125	
1373003	SPK	Molybdenum, Dissolved	06/29/2022 13:56:00	114	0.0027	mg/L	0.1	0.1169	114				75	125	
1373003	SPKD	Molybdenum, Dissolved	06/29/2022 14:00:00	113	0.0027	mg/L				0.1157	113	1.03	75	125	20
	LFB-MS	Molybdenum, Dissolved	05/20/2022 15:03:01	108.4		ug/L	100	108	108.4				85	115	
	LFB-MS	Molybdenum, Dissolved	05/19/2022 14:11:00	103.9		ug/L	100	104	103.9				80	120	
	LFB-MS	Molybdenum, Dissolved	05/19/2022 11:55:00	99.7		ug/L	100	99.7	99.7				80	120	
	MB	Molybdenum, Dissolved	05/19/2022 12:43:00	<2.00		ug/L									
	MB	Molybdenum, Dissolved	05/19/2022 11:29:00	<2.00		ug/L									
	MB	Molybdenum, Dissolved	05/20/2022 15:00:02	<2.00		ug/L									
819001	MS	Nitrate + Nitrite as N	05/05/2022 08:29:35	104	<0.2	mg/L	1	1.04	104				90	110	
819001	MSD	Nitrate + Nitrite as N	05/05/2022 08:30:41	102	<0.2	mg/L				1.02	102	1.94	90	110	20
851001	MS	Nitrate + Nitrite as N	05/05/2022 08:41:42	102	<0.2	mg/L	1	1.02	102				90	110	
851001	MSD	Nitrate + Nitrite as N	05/05/2022 08:42:49	103	<0.2	mg/L				1.03	103	0.98	90	110	20
892006	MS	Nitrate + Nitrite as N	05/05/2022 09:06:01	96	73.6	mg/L	40	112	96				90	110	
892006	MSD	Nitrate + Nitrite as N	05/05/2022 09:07:08	99	73.6	mg/L				113	99	0.89	90	110	20
908007	MS	Nitrate + Nitrite as N	05/05/2022 09:22:37	104	<0.2	mg/L	1	1.04	104				90	110	
908007	MSD	Nitrate + Nitrite as N	05/05/2022 09:23:44	104	<0.2	mg/L				1.04	104	0.00	90	110	20
927002	MS	Nitrate + Nitrite as N	05/05/2022 09:41:24	108	0.24	mg/L	1	1.32	108				90	110	
927002	MSD	Nitrate + Nitrite as N	05/05/2022 09:42:30	109	0.24	mg/L				1.33	109	0.76	90	110	20
	LFB	Nitrate + Nitrite as N	05/05/2022 08:26:16	100		mg/L	0.5	0.5	100				90	110	
	LFB	Nitrate + Nitrite as N	05/05/2022 08:45:04	102		mg/L	0.5	0.51	102				90	110	
	LFB	Nitrate + Nitrite as N	05/05/2022 09:09:23	102		mg/L	0.5	0.51	102				90	110	
	LFB	Nitrate + Nitrite as N	05/05/2022 09:29:16	102		mg/L	0.5	0.51	102				90	110	
	LFB	Nitrate + Nitrite as N	05/05/2022 09:45:52	100		mg/L	0.5	0.5	100				90	110	
880001	MS	Phosphorus as P	05/05/2022 14:38:27	116	3.83	mg/L	1	4.99	116				90	110	
880001	MSD	Phosphorus as P	05/05/2022 14:39:33	113	3.83	mg/L				4.96	113	0.60	90	110	20
913001	MS	Phosphorus as P	05/05/2022 14:55:58	119	<0.2	mg/L	1	1.19	119				90	110	
913001	MSD	Phosphorus as P	05/05/2022 14:57:04	117	<0.2	mg/L				1.17	117	1.69	90	110	20
	LFB	Phosphorus as P	05/05/2022 15:26:27	104		mg/L	0.5	0.52	104				90	110	
	LFB	Phosphorus as P	05/05/2022 14:25:41	110		mg/L	0.5	0.55	110				90	110	
	MB	Phosphorus as P	05/05/2022 14:58:10	<0.2		mg/L									
	MB	Phosphorus as P	05/05/2022 14:22:12	<0.2		mg/L									
905001	DUP	Potassium	05/10/2022 09:54:21	12.01		mg/L						2.22			20
908001	PDS	Potassium	05/10/2022 09:58:00	105	31.8	mg/L	400	451.2	105				75	125	
908001	PDSD	Potassium	05/10/2022 10:00:00	103	31.8	mg/L				442.5	103	1.95	75	125	20
926001	DUP	Potassium	05/10/2022 10:33:07	58.78	59.4	mg/L						1.05			20
926002	PDS	Potassium	05/10/2022 10:37:00	97.9	361	mg/L	400	752.8	97.9				75	125	
926002	PDSD	Potassium	05/10/2022 10:39:00	97.3	361	mg/L				750.4	97.3	0.32	75	125	20
927004	PDS	Potassium	05/10/2022 11:02:00	99.5	13.7	mg/L	400	410.2	99.5				75	125	
927004	PDSD	Potassium	05/10/2022 11:04:00	101	13.7	mg/L				417	101	1.64	75	125	20
	LFB-MI	Potassium	05/10/2022 10:24:55	104		mg/L	100	104	104				85	115	
	LFB-MI	Potassium	05/10/2022 09:50:19	109		mg/L	100	108.6	109				85	115	

MB	Potassium	05/10/2022 09:47:00	<1		mg/L															
MB	Potassium	05/10/2022 10:22:17	<1		mg/L															
908006 SPK	Selenium, Dissolved	06/29/2022 12:11:00	133	0.0234	mg/L		0.1	0.1561	133									75	125	
908006 SPKD	Selenium, Dissolved	06/29/2022 12:11:00	129	0.0234	mg/L					0.1528		129	2.14					75	125	20
908007 SPK	Selenium, Dissolved	06/16/2022 12:22:00	102	<0.005	mg/L		0.02	0.0203	102									75	125	
908007 SPKD	Selenium, Dissolved	06/16/2022 12:25:00	96.4	<0.005	mg/L					0.0193		96.4	5.05					75	125	20
925001 SPK	Selenium, Dissolved	05/19/2022 12:55:34	99.7		mg/L		0.1	0.0997	99.7									75	125	
927004 SPK	Selenium, Dissolved	05/19/2022 13:50:30	105		mg/L		0.1	0.1047	105									75	125	
1373003 SPK	Selenium, Dissolved	06/29/2022 13:56:00	138	<0.005	mg/L		0.1	0.1376	138									75	125	
1373003 SPKD	Selenium, Dissolved	06/29/2022 14:00:00	137	<0.005	mg/L					0.1375		137	0.07					75	125	20
LFB-MS	Selenium, Dissolved	05/19/2022 11:55:00	95		ug/L		100	95	95									80	120	
LFB-MS	Selenium, Dissolved	05/19/2022 14:11:00	100.2		ug/L		100	100	100.2									80	120	
LFB-MS	Selenium, Dissolved	05/20/2022 15:03:01	108		ug/L		100	108	108									85	115	
MB	Selenium, Dissolved	05/20/2022 15:00:02	<5.00		ug/L															
MB	Selenium, Dissolved	05/19/2022 11:29:00	<5.00		ug/L															
MB	Selenium, Dissolved	05/19/2022 12:43:00	<5.00		ug/L															
908001 MS	Silver, Dissolved	05/19/2022 12:05:00	39.3	<0.5	ug/L		400	158	39.3									75	125	
908001 MSD	Silver, Dissolved	05/19/2022 12:08:00	39.5	<0.5	ug/L					159		39.5	0.60					75	125	20
908006 SPK	Silver, Dissolved	06/29/2022 12:11:00	88.3	<0.0005	mg/L		0.1	0.0883	88.3									75	125	
908006 SPKD	Silver, Dissolved	06/29/2022 12:11:00	88.6	<0.0005	mg/L					0.0886		88.6	0.34					75	125	20
908007 SPK	Silver, Dissolved	05/18/2022 16:17:00	109	<0.0005	mg/L		0.1	0.1089	109									75	125	
908007 SPKD	Silver, Dissolved	05/18/2022 16:20:00	107	<0.0005	mg/L					0.1069		107	1.85					75	125	20
925001 SPK	Silver, Dissolved	05/19/2022 12:55:34	97.2		mg/L		0.1	0.0972	97.2									75	125	
927004 SPK	Silver, Dissolved	05/19/2022 13:50:30	90.1		mg/L		0.1	0.0901	90.1									75	125	
1373003 SPK	Silver, Dissolved	06/29/2022 13:56:00	95.4		mg/L		0.1	0.0954	95.4									75	125	
1373003 SPKD	Silver, Dissolved	06/29/2022 14:00:00	95.2		mg/L					0.0952		95.2	0.21					75	125	20
LFB-MS	Silver, Dissolved	05/20/2022 15:03:01	106.7		ug/L		100	107	106.7									85	115	
LFB-MS	Silver, Dissolved	05/19/2022 14:11:00	104.4		ug/L		100	104	104.4									80	120	
LFB-MS	Silver, Dissolved	05/19/2022 11:55:00	100.9		ug/L		100	101	100.9									80	120	
MB	Silver, Dissolved	05/20/2022 15:00:02	<0.500		ug/L															
MB	Silver, Dissolved	05/19/2022 12:43:00	<0.500		ug/L															
MB	Silver, Dissolved	05/19/2022 11:29:00	<0.500		ug/L															
905001 DUP	Sodium	05/10/2022 09:54:21	164.0	165	mg/L								0.61							20
908001 PDS	Sodium	05/10/2022 11:14:00	96.1	1970	mg/L		1600	3506	96.1									75	125	
908001 PDSD	Sodium	05/10/2022 11:16:00	93.1	1970	mg/L					3458		93.1	1.38					75	125	20
926001 DUP	Sodium	05/10/2022 10:33:07	356.0	355	mg/L								0.28							20
926002 PDS	Sodium	05/10/2022 10:37:00	84	901	mg/L		400	1237	84									75	125	
926002 PDSD	Sodium	05/10/2022 10:39:00	85.5	901	mg/L					1243		85.5	0.48					75	125	20
927004 PDS	Sodium	05/10/2022 11:02:00	88.5	876	mg/L		400	1071	88.5									75	125	
927004 PDSD	Sodium	05/10/2022 11:04:00	87.5	876	mg/L					1067		87.5	0.37					75	125	20
LFB-MI	Sodium	05/10/2022 10:24:55	105		mg/L		100	105	105									85	115	
LFB-MI	Sodium	05/10/2022 09:50:19	109		mg/L		100	109.3	109									85	115	
MB	Sodium	05/10/2022 10:22:17	<1		mg/L															
MB	Sodium	05/10/2022 09:47:00	<1		mg/L															
908003 DUP	Specific Conductance	05/04/2022 15:00:46	7446.0	7454	umhos/cm								0.11							20
908007 DUP	Specific Conductance	05/05/2022 11:33:03	1.9360	2	umhos/cm								3.25							20.
CRM-C	Specific Conductance	05/04/2022 17:41:14	100		umhos/cm		1409	1410	100			100						95	105	
CRM-C	Specific Conductance	05/05/2022 11:11:00	100		umhos/cm		1409	1413	100			100						95	105	
CRM-C	Specific Conductance	05/05/2022 11:33:03	100		umhos/cm		1409	1413	100			100						95	105	

CRM-C	Specific Conductance	05/04/2022 12:04:45	100		umhos/cm	1409	1403	100		100		95	105	
849004 MS	Sulfate	05/05/2022 11:56:45	64.9	662	mg/L	500	987	64.9				85	115	
849004 MSD	Sulfate	05/05/2022 11:57:51	66.1	662	mg/L				993	66.1	0.61	85	115	20
901007 MS	Sulfate	05/05/2022 12:24:51	92	180	mg/L	1000	1100	92				85	115	
901007 MSD	Sulfate	05/05/2022 12:25:57	92.8	180	mg/L				1110	92.8	0.90	85	115	20
LFB	Sulfate	05/05/2022 12:09:25	91.8		mg/L	100	91.8	91.8				85	115	
LFB	Sulfate	05/05/2022 12:28:09	90.1		mg/L	100	90.1	90.1				85	115	
MB	Sulfate	05/05/2022 12:08:19	<5		mg/L									
MB	Sulfate	05/05/2022 12:27:03	<5		mg/L									
908003 DUP	pH	05/04/2022 15:00:46	7.15	7.4	units						3.44			20.
CRM-PH	pH	05/04/2022 10:54:16	100.83		units	6	6	100.83				99.17	100.83	
CRM-PH	pH	05/04/2022 17:19:00	100.17		units	6	6	100.17				99.17	100.83	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 909001 **Date Collected:** 05/02/2022 09:00 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Contract Lab****Method: Contracted Result**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		
Radium 228	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		

Sampling Information**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	9688	umhos/cm	1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7.47	units	0.01	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	6.94	degrees C		1	05/02/2022 09:00	05/02/2022 09:00	JSM		

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	3	NTU	0.1	1	05/02/2022 09:00	05/02/2022 09:00	JSM		

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.

Report Date: Thursday, June 23, 2022 2:05:59 PM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 909003 **Date Collected:** 05/03/2022 11:50 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service
Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Contract Lab**Method: Contracted Result**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		
Radium 228	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		

Sampling Information**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	7294	umhos/cm	1	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7.84	units	0.01	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	6.94	degrees C		1	05/03/2022 11:50	05/03/2022 11:50	JSM		

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	0.2	NTU	0.1	1	05/03/2022 11:50	05/03/2022 11:50	JSM		

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Report Date: Thursday, June 23, 2022 2:05:59 PM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 909005 **Date Collected:** 05/02/2022 12:57 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3**Contract Lab****Method: Contracted Result**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		
Radium 228	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		

Sampling Information**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	4784	umhos/cm	1	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	8.3	units	0.01	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	6.93	degrees C		1	05/02/2022 12:57	05/02/2022 12:57	JSM		

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	0.24	NTU	0.1	1	05/02/2022 12:57	05/02/2022 12:57	JSM		

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Report Date: Thursday, June 23, 2022 2:05:59 PM



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 909007 **Date Collected:** 05/03/2022 12:50 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 05/04/2022 08:10 **Collector:** MVTL Field Service

Temp @ Receipt (C): 2.3 **Received on Ice:** Yes

Contract Lab

Method: Contracted Result

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		
Radium 228	See Attached			1	06/14/2022 17:02	06/14/2022 17:02	CC		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



June 01, 2022

Claudette Carroll

2616 E Broadway Ave
Bismarck, North Dakota 58501

Re: Routine Analysis - Radiochemistry
Work Order: 579401
SDG: 909

Dear Claudette Carroll:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 10, 2022. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,

Delaney Stone
Project Manager

Purchase Order: BL6539
Enclosures



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.

Report Date: Thursday, June 23, 2022 2:05:59 PM

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

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Case Narrative



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Client: Montana-Dakota Utilities - Bismarck

Receipt Narrative
for
Minnesota Valley Testing Laboratories, Inc.
SDG: 909
Work Order: 579401

June 01, 2022

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on May 10, 2022 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
579401001	MW13
579401002	MW1-90
579401003	MW2-90
579401004	MW3-90
579401005	MW80R
579401006	Dup 1
579401007	Flied Blank

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

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Client: Montana-Dakota Utilities - Bismarck

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Delaney Stone".

Delaney Stone
Project Manager



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Chain of Custody and Supporting Documentation

Page 4 of 24 SDG: 909

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

579401

Page 1 of 1

Chain of Custody Record



LABORATORIES, Inc.
2616 E Broadway Ave
Bismarck, ND 58501

Phone: (701) 258-9720
Fax: (701) 258-9724

Company Name and Address:

MVTL
2616 E Broadway
Bismarck, ND 58501

Billing Address (indicate if different from above):

PO Box 249
New Ulm, MN 56073

Account #: WO #909		Phone #: 701-258-9720									
Contact: Claudette		Fax #: 701-258-9720									
Name of Sampler: Claudette		For faxed report check box <input type="checkbox"/>									
Quote Number		E-mail: ccairroll@mvtl.com									
Project Name/Number:		For e-mail report check box <input type="checkbox"/>									
Purchase Order #: BL6539		Date Submitted: 4-May-22									
Sample Information											
IML Lab Number	MVTL Lab Number	Client Sample ID	Sample Type	Date Sampled	Time Sampled	Bottle Type				Analysis Required	
						Untreated	1000 ml HNO3	Unpreserved	Glass Jar		Other
	909001	MW13	GW	2-May-22	900	4					Ra226 & Ra228
	909002	MW1-90	GW	3-May-22	1345	4					Ra226 & Ra228
	909003	MW2-90	GW	3-May-22	1150	4					Ra226 & Ra228
	909004	MW3-90	GW	3-May-22	918	4					Ra226 & Ra228
	909005	MW80R	GW	2-May-22	1257	4					Ra226 & Ra228
	909006	Dup 1	GW	2-May-22	900	4					Ra226 & Ra228
	909007	Field Blank	GW	3-May-22	1250	4					Ra226 & Ra228
All results must be reported as a numerical value											
Transferred by:		Date:	Time:	Sample Condition:	Received by:	Date:	Temp:				
T. Olson		4-May-22	1700		<i>Lacey Perry</i>	5/10/22	1020				
2.							23				

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

GEL Laboratories LLC SAMPLE RECEIPT & REVIEW FORM
Client: MVTL SDG/AR/COC/Work Order: 579401
Received By: JZB Date Received: 5-10-22
Carrier and Tracking Number
Suspected Hazard Information
A) Shipped as a DOT Hazardous?
B) Did the client designate the samples are to be received as radioactive?
C) Did the RSO classify the samples as radioactive?
D) Did the client designate samples are hazardous?
E) Did the RSO identify possible hazards?
Sample Receipt Criteria
1 Shipping containers received intact and sealed?
2 Chain of custody documents included with shipment?
3 Samples requiring cold preservation within (0 <= 5 deg. C)?
4 Daily check performed and passed on IR temperature gun?
5 Sample containers intact and sealed?
6 Samples requiring chemical preservation at proper pH?
7 Do any samples require Volatile Analysis?
8 Samples received within holding time?
9 Sample ID's on COC match ID's on bottles?
10 Date & time on COC match date & time on bottles?
11 Number of containers received match number indicated on COC?
12 Are sample containers identifiable as GEL provided by use of GEL labels?
13 COC form is properly signed in relinquished/received sections?
Comments (Use Continuation Form if needed):
12 555 901 03 6734 5893 19c 12 555 901 03 6658 3280 18c
PM (or PMA) review: Initials NZL Date 5/11/22 Page 1 of 1

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Laboratory Certifications



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List of current GEL Certifications as of 01 June 2022

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (A133904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122022-4
New Hampshire NELAP	2054
New Jersey NELAP	SC0002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2019-165
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122021-36
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

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Radiological Analysis



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Case Narrative



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Radiochemistry
Technical Case Narrative
Minnesota Valley Testing Laboratories, Inc.
SDG #: 909
Work Order #: 579401

Product: GFPC Ra228, Liquid
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2265144

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
579401001	MW13
579401002	MW1-90
579401003	MW2-90
579401004	MW3-90
579401005	MW80R
579401006	Dup 1
579401007	Flid Blank
1205090237	Method Blank (MB)
1205090238	579401001(MW13) Sample Duplicate (DUP)
1205090239	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Lucas Cell, Ra226, Liquid
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2265130

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
579401001	MW13
579401002	MW1-90
579401003	MW2-90
579401004	MW3-90
579401005	MW80R
579401006	Dup 1
579401007	Flid Blank
1205090199	Method Blank (MB)

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

1205090200 577964002(NonSDG) Sample Duplicate (DUP)
1205090201 577964002(NonSDG) Matrix Spike (MS)
1205090202 Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205090201 (Non SDG 577964002MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.



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GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MVTL001 Minnesota Valley Testing Laboratories, Inc.
Client SDG: 909 GEL Work Order: 579401

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 

Name: Kate Gellatly

Date: 08 JUN 2022

Title: Analyst I



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Sample Data Summary



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Certificate of Analysis

Report Date: June 8, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: MW13
Sample ID: 579401001
Matrix: Ground Water
Collect Date: 02-MAY-22 09:00
Receive Date: 10-MAY-22
Collector: Client

Project: MVT00121
Client ID: MVT001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	1.22	+/-1.03	1.67	3.00	pCi/L		JXC9	06/01/22	1222	2265144	1
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.521	+/-0.279	0.338	1.00	pCi/L		LXP1	05/25/22	0921	2265130	2
The following Analytical Methods were performed:												
Method	Description	Analyst Comments										
1	EPA 904.0/SW846 9320 Modified											
2	EPA 903.1 Modified											
Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits						
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			86.1	(15%-125%)						

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:
DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Account #: 2800

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GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: June 8, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: MW1-90
Sample ID: 579401002
Matrix: Ground Water
Collect Date: 03-MAY-22 13:45
Receive Date: 10-MAY-22
Collector: Client

Project: MVTL00121
Client ID: MVTL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.17	+/-0.990	1.59	3.00	pCi/L		JXC9	06/01/22	1222	2265144		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.820	+/-0.334	0.251	1.00	pCi/L		LXP1	05/25/22	0921	2265130		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			89.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: June 8, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: MW2-90
Sample ID: 579401003
Matrix: Ground Water
Collect Date: 03-MAY-22 11:50
Receive Date: 10-MAY-22
Collector: Client

Project: MVTL00121
Client ID: MVTL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.933	+/-0.795	1.26	3.00	pCi/L			JXC9	06/01/22	1223	2265144	1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.528	+/-0.261	0.266	1.00	pCi/L			LXP1	05/25/22	0921	2265130	2

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA 904.0/SW846 9320 Modified		
2	EPA 903.1 Modified		

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			88.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: June 8, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: MW3-90
Sample ID: 579401004
Matrix: Ground Water
Collect Date: 03-MAY-22 09:18
Receive Date: 10-MAY-22
Collector: Client

Project: MVT00121
Client ID: MVT001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.766	+/-1.16	2.00	3.00	pCi/L		JXC9	06/01/22	1223	2265144	1
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.125	+/-0.194	0.346	1.00	pCi/L		LXP1	05/25/22	0921	2265130	2
The following Analytical Methods were performed:												
Method	Description	Analyst Comments										
1	EPA 904.0/SW846 9320 Modified											
2	EPA 903.1 Modified											
Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits						
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			83.9	(15%-125%)						

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:
DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Account #: 2800

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Certificate of Analysis

Report Date: June 8, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: MW80R
Sample ID: 579401005
Matrix: Ground Water
Collect Date: 02-MAY-22 12:57
Receive Date: 10-MAY-22
Collector: Client

Project: MVT00121
Client ID: MVT001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	-0.526	+/-0.846	1.71	3.00	pCi/L		JXC9	06/01/22	1223	2265144	1
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.431	+/-0.298	0.408	1.00	pCi/L		LXP1	05/25/22	0921	2265130	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			90.3	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

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Certificate of Analysis

Report Date: June 8, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: Dup 1 Project: MVTL00121
Sample ID: 579401006 Client ID: MVTL001
Matrix: Ground Water
Collect Date: 02-MAY-22 09:00
Receive Date: 10-MAY-22
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.22	+/-1.11	1.83	3.00	pCi/L		JXC9	06/01/22	1223	2265144		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.432	+/-0.277	0.389	1.00	pCi/L		LXP1	05/25/22	0921	2265130		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			87.8	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 8, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: Flied Blank
Sample ID: 579401007
Matrix: Ground Water
Collect Date: 03-MAY-22 12:50
Receive Date: 10-MAY-22
Collector: Client

Project: MVTL00121
Client ID: MVTL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.0662	+/-0.867	1.66	3.00	pCi/L		JXC9	06/01/22	1223	2265144		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.134	+/-0.208	0.371	1.00	pCi/L		LXP1	05/25/22	0952	2265130		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			83.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Quality Control Summary

Page 22 of 24 SDG: 909

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Report Date: Thursday, June 23, 2022 2:05:59 PM

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Account #: 2800

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QC Summary

Report Date: June 8, 2022

Page 1 of 2

Contact: 2616 E Broadway Ave
Bismarck, North Dakota
Claudette Carroll

Workorder: 579401

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2265144										
QC1205090238	579401001	DUP									
Radium-228	U	1.22	U	0.988	pCi/L	N/A		N/A	JXC9	06/01/22	12:22
	Uncertainty	+/-1.03		+/-0.906							
QC1205090239	LCS										
Radium-228	45.7			37.6	pCi/L		82.2	(75%-125%)		06/01/22	12:22
	Uncertainty			+/-3.13							
QC1205090237	MB										
Radium-228			U	0.521	pCi/L					06/01/22	12:22
	Uncertainty			+/-1.11							
Rad Ra-226											
Batch	2265130										
QC1205090200	577964002	DUP									
Radium-226		0.569		1.02	pCi/L	56.8		(0% - 100%)	LXP1	05/25/22	09:52
	Uncertainty	+/-0.286		+/-0.429							
QC1205090202	LCS										
Radium-226	26.7			21.9	pCi/L		82	(75%-125%)		05/25/22	09:52
	Uncertainty			+/-1.54							
QC1205090199	MB										
Radium-226			U	0.126	pCi/L					05/25/22	09:52
	Uncertainty			+/-0.174							
QC1205090201	577964002	MS									
Radium-226	133	0.569		127	pCi/L		94.9	(75%-125%)		05/25/22	09:52
	Uncertainty	+/-0.286		+/-8.56							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

GEL LABORATORIES LLC

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QC Summary

Workorder: 579401

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
J											
J											
K											
L											
M											
M											
N/A											
N1											
ND											
NJ											
Q											
R											
U											
UI											
UJ											
UL											
X											
Y											
^											
h											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where the duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis WO: 909 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Spring 2022 Sampled By: <i>Jeremy Meyer</i>

Lab Number	Sample Information				Sample Containers				Field Readings				Analysis Required
	Sample ID	Date	Time	Sample Type	1 Liter	Nitric							
001	MW13	2 May 22	0900	GW	4								Rad 226 & 228
002	MW1-90	3 May 22	1345	GW	4								
003	MW2-90	3 May 22	1150	GW	4								
004	MW3-90	3 May 22	0913	GW	4								
005	MW80R	2 May 22	1257	GW	4								
006	Dup 1	2 May 22	0900	GW	4								
007	Field Blank (FB)	3 May 22	1250	GW	4								

Comments:

Relinquished By		Sample Condition			Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time	
<i>[Signature]</i>	4 May 22	Log In	2.3	<i>[Signature]</i>	4 May 22	
	0810	Walk In #2	TMS62 / TMS805		0810	

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Report Date: Thursday, June 23, 2022 2:05:59 PM



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Account #: 2800

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2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet
 Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 13
 Sampling Personal: *Jay [Signature]*

Weather Conditions: Temp: 40 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES NO
Well Labeled?	YES NO
Casing Strait?	YES NO
Grout Seal Intact?	YES (NO) Not Visible
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	31.25 ft
Total Depth of Well:	— ft
Well Volume:	— liters
Depth to Top of Pump:	— ft
Water Level After Sample:	33.75 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	(YES) NO
Duplicate Sample?	(YES) NO
Duplicate Sample ID:	Dup 1
Bottle List:	
1 Liter Raw	4- 1L Nitric
500ml Nitric	
500ml Nitric (filtered)	
250ml Sulfuric	
Control Settings:	
Purge:	5 Sec.
Recover:	25 Sec.
PSI:	20

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±10	Turbidity (NTU)	Water Level (ft)	Pumping Rate (mL/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10		(ft)	mL/Min		Clarity, Color, Odor, Ect.
	0810	Start of Well Purge									
2 May 22	0815	7.00	4088	7.44	10.42	198.1	0.19	31.76	100.0	500.0	Clear
	0835	6.51	9759	6.94	4.01	206.8	1.51	32.15	100.0	2000.0	Clear
	0845	7.42	9699	6.94	3.74	199.0	2.58	32.93	100.0	1000.0	Clear
	0850	7.34	9654	6.95	3.79	200.9	2.71	33.40	100.0	500.0	Clear
	0855	7.44	9677	6.95	3.50	201.4	3.40	33.65	100.0	500.0	Clear
	0900	7.47	9688	6.94	3.71	202.2	3.00	33.72	100.0	500.0	Clear
Well Stabilized?		(YES)	NO	Total Volume Purged: 5000.0 mL							

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
2 May 22	0900	7.47	9688	6.94	3.00	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Spring 2022
 Sample ID: 1-90
 Sampling Personal: J. J. [Signature]

Weather Conditions: Temp: 50 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION		SAMPLING INFORMATION	
Well Locked?	YES (NO)	Purging Method:	Bladder
Well Labeled?	YES NO	Sampling Method:	Bladder
Casing Strait?	YES NO	Dedicated Equipment?	YES NO
Grout Seal Intact?	YES NO (Not Visible)	Duplicate Sample?	YES (NO)
Repairs Necessary?		Duplicate Sample ID:	
Casing Diameter:	2"	Bottle List:	
Water Level Before Purge:	9.99 ft	1 Liter Raw	4- 1L Nitric
Total Depth of Well:		500mL Nitric	
Well Volume:		500mL Nitric (filtered)	
Depth to Top of Pump:		250mL Sulfuric	
Water Level After Sample:	10.17 ft		
Measurement Method:	Electric Water Level Indicator		

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	ml Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.
	1240	Start of Well Purge									
3 May 22	1245	6.69	7282	6.92	1.88	165.9	0.20	10.10	100.0	500.0	Clear
	1305	6.43	8088	6.91	1.38	183.0	0.13	10.32	100.0	200.0	Clear
	1315	6.43	9554	6.91	1.29	186.5	0.12	10.34	100.0	100.0	Clear
	1320	6.65	8613	6.89	1.28	189.9	0.14	10.27	100.0	500.0	Clear
	1325	6.46	7987	6.89	1.13	191.6	0.12	10.18	100.0	500.0	Clear
	1330	6.58	7182	6.89	1.15	193.5	0.14	10.20	100.0	500.0	Clear
	1335	6.69	6423	6.89	1.26	193.8	0.14	10.21	100.0	500.0	Clear
	1340	6.71	7468	6.86	1.31	194.7	0.13	10.18	100.0	500.0	Clear
	1345	6.77	7558	6.85	1.33	195.6	0.12	10.15	100.0	500.0	Clear
		Well Stabilized?		YES NO	Total Volume Purged: 6500.0 ml						

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
3 May 22	1345	6.77	7558	6.85	0.12	Clear

Comments: Collected field blank 1 @ 1250

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www.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Surface water Assessment

Company: MDU Lewis & Clark
Event: Spring 2022

Sampling Personal: *Jay P. [Signature]*

Weather Conditions: Temp: 45°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	2 May 22	1130	2"	21.78	
MW33		1150	2"	42.76	
MW101		1132	2"	37.94	
MW102		1128	2"	19.50	
MW103		1140	2"	36.74	
MW44R		1137	2"	27.14	
MW104		1147	2"	14.18	
MW105		1154	2"	11.78	

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Report Date: Thursday, June 23, 2022 2:05:59 PM



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

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Report Date: Wednesday, August 17, 2022 3:06:30 PM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 2603001 **Date Collected:** 08/08/2022 12:25 **Matrix:** Groundwater
Sample ID: MW2-90 **Date Received:** 08/08/2022 13:30 **Collector:** MVTL Field Service
Temp @ Receipt (C): 14.0 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	8351	umhos/cm	1	1	08/08/2022 12:25	08/08/2022 12:25	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7	units	0.01	1	08/08/2022 12:25	08/08/2022 12:25	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	17.16	degrees C		1	08/08/2022 12:25	08/08/2022 12:25	JSM		

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	<0.1	NTU	0.1	1	08/08/2022 12:25	08/08/2022 12:25	JSM		

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Calcium	508	mg/L	5	5	08/08/2022 17:15	08/10/2022 11:05	SLZ	MA,NDA	
Calcium, Dissolved	471	mg/L	5	5	08/09/2022 17:44	08/16/2022 14:20	SLZ	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 2603002 **Date Collected:** 08/08/2022 11:35 **Matrix:** Groundwater
Sample ID: MW3-90 **Date Received:** 08/08/2022 13:30 **Collector:** MVTL Field Service
Temp @ Receipt (C): 14.0 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	5278	umhos/cm	1	1	08/08/2022 11:35	08/08/2022 11:35	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	6.92	units	0.01	1	08/08/2022 11:35	08/08/2022 11:35	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	13.03	degrees C		1	08/08/2022 11:35	08/08/2022 11:35	JSM		

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	<0.1	NTU	0.1	1	08/08/2022 11:35	08/08/2022 11:35	JSM		

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Calcium	501	mg/L	5	5	08/08/2022 17:15	08/10/2022 11:06	SLZ	MA,NDA	
Calcium, Dissolved	494	mg/L	5	5	08/09/2022 17:44	08/16/2022 14:22	SLZ	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 2603003 **Date Collected:** 08/08/2022 10:39 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 08/08/2022 13:30 **Collector:** MVTL Field Service
Temp @ Receipt (C): 14.0 **Received on Ice:** Yes

Method: 120.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	6532	umhos/cm	1	1	08/08/2022 10:39	08/08/2022 10:39	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7	units	0.01	1	08/08/2022 10:39	08/08/2022 10:39	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	15.58	degrees C		1	08/08/2022 10:39	08/08/2022 10:39	JSM		

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	<0.1	NTU	0.1	1	08/08/2022 10:39	08/08/2022 10:39	JSM		

Method: SM4500-Cl-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	154	mg/L	2.0	1	08/12/2022 09:15	08/12/2022 09:15	EJV	MA,NDA	

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Account #: 2800

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August 12, 2022

Montana-Dakota Utilities
Todd Peterson
400 N. 4th St
Bismarck, ND 58501

RE: MDU Heskett Groundwater Sampling

Dear Mr. Peterson,

On August 8, 2022, MVTL Field Services division collected ground water samples at the MDU Heskett Station near Mandan, ND.

This event consisted of resampling 4 wells. Samples were collected from 3 of the 4 wells. Well MW1-90 was not able to be sampled due to damage.

Samples collected were placed on ice and transported to MVTL in Bismarck, ND for analysis.

Thank you for your trust and support of our services. If you have any questions, please call me at (701) 391-4900.

Sincerely,

Jeremy Meyer

MVTL Field Services Manager

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bismarck WO: 2603 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com		Project Name: MDU Heskett Event: Aug-22 Sampled By: <i>Jerry [Signature]</i>

Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Aug-22 Sampled By: <i>Jerry [Signature]</i>
--	-----	--

Lab Number	Sample Information				Sample Containers				Field Readings				Analysis Required
	Sample ID	Date	Time	Sample Type	1 Liter Raw	500 mL HNO3	500 mL HNO3 (filtered)	250 mL H2SO4	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)	
—	MW1-90	8 Aug 22	1254	GW	X	X	X		<i>Demaged</i>				TDS, Fluoride, Boron (T+D)
001	MW2-90	8 Aug 22	1225	GW	X	X			12.16	8351	7.00	0.02	Calcium (T+D)
002	MW3-90	8 Aug 22	1135	GW	X	X			13.03	5278	6.92	0.08	Calcium (T+D)
003	MW80R	8 Aug 22	1039	GW	X				15.58	6532	7.00	0.05	Chloride

Comments: *8 Aug 22 → T+D = Total and Dissolved

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>[Signature]</i>	8 Aug 22 1330	Log # Walk In #2	R01 14.0 TM562 / TM805	<i>[Signature]</i>	8 Aug 22 1330

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event:
Sample ID: 190
Sampling Personal: JTB

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with rows for Well Locked, Well Labeled, Casing Strait, Well Seal Intact, Repairs Necessary, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with rows for Purging Method, Sampling Method, Dedicated Equipment, Duplicate Sample, Duplicate Sample ID, Bottle List.

Control Settings table with rows for Purge, Recover, PSI.

FIELD READINGS

Large table for field readings with columns: Purge Date, Time, Temp, Spec. Cond., pH, DO, ORP, Turbidity, Water Level, Pumping Rate, mL Removed, Appearance or Comment.

Summary table for field readings with columns: Sample Date, Time, Temp, Spec. Cond., pH, Turbidity, Appearance or Comment.

Comments: Well damaged could not get water level meter down.

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
Event:
Sample ID: 2-90
Sampling Personal: JTB

Weather Conditions: Temp: 45 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES (NO)
Well Labeled?	(YES) NO
Casing Strait?	YES NO
Well Seal Intact?	YES NO (Not Visible)
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	22.25 ft
Total Depth of Well:	ft
Well Volume:	liters
Depth to Top of Pump:	22.40 ft
Water Level After Sample:	Below Pump ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES (NO)
Duplicate Sample ID:	
Bottle List:	
1-liter Raw	4 1-liter Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	

Control Settings:	
Purge:	3 Sec.
Recover:	27 Sec.
PSI:	20

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (mL/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					clear, slightly turbid, turbid
8 Aug 22	1155	Start of Well Purge									
	1200	16.32	8351	7.00	4.54	203.9	0.04	Below Pump	100.0	500.0	Clear
	1210	17.44	8371	6.99	3.71	212.9	0.06	BP	100.0	1000.0	Clear
	1215	17.40	8355	6.99	3.68	214.9	0.04	BP	100.0	500.0	Clear
	1220	17.32	8359	7.00	3.62	216.2	0.03	BP	100.0	500.0	Clear
	1225	17.16	8351	7.00	3.62	217.2	0.02	BP	100.0	500.0	Clear

Well Stabilized? YES NO

Total Volume Purged: 3000.0 mL

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
8 Aug 22	1225	17.16	8351	7.00	0.02	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett

Event:

Sample ID: 3-90

Sampling Personal: J. Heskett

Weather Conditions: Temp: 75 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES NO
Well Labeled?	YES NO
Casing Strait?	YES NO
Well Seal Intact?	YES NO <u>Not Visible</u>
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	19.75 ft
Total Depth of Well:	ft
Well Volume:	liters
Depth to Top of Pump:	20.20 ft
Water Level After Sample:	19.93 ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	
Bottle List:	
1-Liter Raw	4-1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	

Control Settings:	
Purge:	3 Sec.
Recover:	27 Sec.
PSI:	20

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (mL/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.
8 Aug 22											
	1105	Start of Well Purge									
	1110	17.82	5287	6.95	2.32	174.0	0.76	19.90	100.0	500.0	Clear
	1120	12.74	5285	6.93	2.27	147.6	0.33	19.90	100.0	1000.0	Clear
	1125	13.19	5278	6.92	2.23	133.9	0.02	19.91	100.0	500.0	Clear
	1130	12.94	5274	6.93	2.20	127.6	0.10	19.92	100.0	500.0	Clear
	1135	13.03	5278	6.92	2.20	124.2	0.08	19.92	100.0	500.0	Clear

Well Stabilized? YES NO

Total Volume Purged: 3000.0 mL

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
8 Aug 22	1135	13.03	5278	6.92	0.08	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event:
Sample ID: MW 80R
Sampling Personal: JTB

Weather Conditions: Temp: 70 F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with fields: Well Locked?, Well Labeled?, Casing Strait?, Well Seal Intact?, Repairs Necessary?, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with fields: Purging Method, Sampling Method, Dedicated Equipment?, Duplicate Sample?, Duplicate Sample ID, Bottle List.

Control Settings table with fields: Purge, Recover, PSI.

FIELD READINGS

Table with columns: Purge Date, Time, Temp, Spec. Cond., pH, DO, ORP, Turbidity, Water Level, Pumping Rate, mL Removed, Appearance or Comment. Includes handwritten data for 8 Aug 22.

Summary table with columns: Sample Date, Time, Temp, Spec. Cond., pH, Turbidity, Appearance or Comment.

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

Sample Comments

2721001 (MW 1-90) - Sample

A portion of the unpreserved sample was filtered in the laboratory and then preserved as necessary. This filtered, preserved sample was used for the analysis of any dissolved parameters.

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Report Date: Friday, August 19, 2022 3:45:33 PM

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 2721001 **Date Collected:** 08/11/2022 11:55 **Matrix:** Groundwater
Sample ID: MW 1-90 **Date Received:** 08/11/2022 14:54 **Collector:** Client
Temp @ Receipt (C): 3.2 **Received on Ice:** Yes

Method: ASTM D516-16

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	7280	mg/L	250	50	08/17/2022 10:27	08/17/2022 10:27	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	0.29	mg/L	0.1	1	08/12/2022 16:35	08/15/2022 14:52	SLZ	MA,NDA	
Calcium	370	mg/L	1	1	08/12/2022 16:35	08/16/2022 13:36	SLZ	MA,NDA	

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	97.0	mg/L	2.0	1	08/17/2022 12:23	08/17/2022 12:23	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	1.14	mg/L	0.1	1	08/12/2022 14:41	08/12/2022 14:41	RAA		

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	12700	mg/L	10	1	08/12/2022 14:45	08/12/2022 14:45	AMC	MA,NDA	

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Chain of Custody form for Barr Engineering Co. Chain of Custody 2721001. Includes fields for Report to, Invoice to, Sample Origination State, Matrix Code, Preservative Code, and a table for sample collection details. Handwritten notes include 'Analyze for: Fluoride, TDS, Boron, Major Ions: Ca, Mg, K, Na, Alk, Cl, SO4' and 'Questions: Anna Schneider 952-832-2771'.

Distribution - White-Original: Accompanies Shipment to Laboratory; Yellow Copy: Include in Field Documents; Scan and email: a copy to BarrDM@barr.com for tracking and filing procedures

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Original Sample	QC Type	Analyte	Analysis Date	QC Result	Original Sample R	Units	Spike Amo	Spike Resu	Spike % Recov	Spike Duplicat	Spike Duplicat	RPD (%)	Lower Control Lim	Upper Control Lim	RPD Limit (%)
2721001	MS	Boron	08/15/2022 14:54:00	80.5	0.29	mg/L	0.4	0.6154	80.5				70	130	
2721001	MSD	Boron	08/15/2022 14:55:53	82.9	0.29	mg/L				0.6251	82.9	1.56	70	130	20
	LFB-OE	Boron	08/15/2022 14:50:13	93.3		mg/L	0.4	0.373	93.3				85	115	
	MB	Boron	08/15/2022 14:48:30	<0.1		mg/L									
2693005	PDS	Calcium	08/16/2022 11:33:02	96.7	41.5	mg/L	100	138.2	96.7				75	125	
2693005	PDS	Calcium	08/16/2022 11:35:04	96.7	41.5	mg/L				138.2	96.7	0.00	75	125	20
2716001	DUP	Calcium	08/16/2022 11:55:25	45.76	45.4	mg/L						0.79			20
2718004	PDS	Calcium	08/16/2022 12:10:32	95.9	97.7	mg/L	100	193.6	95.9				75	125	
2718004	PDS	Calcium	08/16/2022 12:12:37	97	97.7	mg/L				194.7	97	0.57	75	125	20
2718009	DUP	Calcium	08/16/2022 12:25:07	333.3	331	mg/L						0.69			20
2719003	PDS	Calcium	08/16/2022 12:55:52	98.6	98.1	mg/L	100	196.7	98.6				75	125	
2719003	PDS	Calcium	08/16/2022 12:57:56	95	98.1	mg/L				193.1	95	1.85	75	125	20
2719006	DUP	Calcium	08/16/2022 13:06:29	378.1	388	mg/L						2.58			20
2720002	PDS	Calcium	08/16/2022 13:17:33	92.9	90.5	mg/L	100	183.4	92.9				75	125	
2720002	PDS	Calcium	08/16/2022 13:19:36	90.8	90.5	mg/L				181.3	90.8	1.15	75	125	20
2720010	DUP	Calcium	08/16/2022 13:45:40	56.71	57.2	mg/L						0.86			20
2720010	PDS	Calcium	08/16/2022 13:47:44	94.2	57.2	mg/L	100	151.4	94.2				75	125	
2720010	PDS	Calcium	08/16/2022 13:49:47	93.8	57.2	mg/L				151	93.8	0.27	75	125	20
	LFB-MI	Calcium	08/16/2022 14:01:19	106		mg/L	100	106.1	106				85	115	
	LFB-MI	Calcium	08/16/2022 12:51:44	107		mg/L	100	106.7	107				85	115	
	LFB-MI	Calcium	08/16/2022 11:49:11	109		mg/L	100	109.4	109				85	115	
	MB	Calcium	08/16/2022 13:58:38	<1		mg/L									
	MB	Calcium	08/16/2022 12:49:03	<1		mg/L									
	MB	Calcium	08/16/2022 11:46:31	<1		mg/L									
2718009	MS	Chloride	08/17/2022 11:55:53	95.3	21.0	mg/L	30	49.6	95.3				80	120	
2718009	MSD	Chloride	08/17/2022 11:57:04	94.3	21.0	mg/L				49.3	94.3	0.61	80	120	20
2720008	MS	Chloride	08/17/2022 12:31:21	123	105	mg/L	30	142	123				80	120	
2720008	MSD	Chloride	08/17/2022 12:32:31	123	105	mg/L				142	123	0.00	80	120	20
2788001	MS	Chloride	08/17/2022 14:29:58	125	86.2	mg/L	30	124	125				80	120	
2788001	MSD	Chloride	08/17/2022 14:31:09	127	86.2	mg/L				124	127	0.00	80	120	20
2788010	MS	Chloride	08/17/2022 14:59:04	87.5	17.2	mg/L	30	43.5	87.5				80	120	
2788010	MSD	Chloride	08/17/2022 15:00:15	88.9	17.2	mg/L				43.9	88.9	0.92	80	120	20
	LFB	Chloride	08/17/2022 11:21:36	91.2		mg/L	30	27.4	91.2				90	110	
	LFB	Chloride	08/17/2022 11:35:48	91		mg/L	30	27.3	91				90	110	
	LFB	Chloride	08/17/2022 11:59:25	90.7		mg/L	30	27.2	90.7				90	110	
	LFB	Chloride	08/17/2022 12:15:58	90.6		mg/L	30	27.2	90.6				90	110	
	LFB	Chloride	08/17/2022 12:34:53	90.3		mg/L	30	27.1	90.3				90	110	
	LFB	Chloride	08/17/2022 14:14:36	90.5		mg/L	30	27.2	90.5				90	110	
	LFB	Chloride	08/17/2022 14:37:08	98.6		mg/L	30	29.6	98.6				90	110	
	LFB	Chloride	08/17/2022 15:02:37	98.6		mg/L	30	29.6	98.6				90	110	
	MB	Chloride	08/17/2022 14:32:20	<2.0		mg/L									
	MB	Chloride	08/17/2022 14:13:25	<2.0		mg/L									
	MB	Chloride	08/17/2022 12:33:43	<2.0		mg/L									
	MB	Chloride	08/17/2022 12:14:48	<2.0		mg/L									
	MB	Chloride	08/17/2022 11:58:14	<2.0		mg/L									
	MB	Chloride	08/17/2022 15:01:26	<2.0		mg/L									
	MB	Chloride	08/17/2022 11:34:37	<2.0		mg/L									
	MB	Chloride	08/17/2022 11:16:53	<2.0		mg/L									
2721001	MS-F	Fluoride	08/12/2022 14:52:17	80	1.14	mg/L	0.5	1.54	80				80	120	
2721001	MSD-F	Fluoride	08/12/2022 14:58:16	86	1.14	mg/L				1.57	86	1.93	80	120	20
	CRM-F	Fluoride	08/12/2022 12:46:00	98.8		mg/L	3.39	3.35	98.8				83.8	111	
	LFB-F	Fluoride	08/12/2022 12:59:02	100		mg/L	0.5	0.5	100				90	110	
	LFB-F	Fluoride	08/12/2022 18:18:32	102		mg/L	0.5	0.51	102				90	110	



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

Unreported samples to correct field summary report attached to workorder, collection dates for field blank and field duplicate. CC 30Nov22

Sample Comments

4467003 (Dup 1) - Sample

Time sampled was not supplied by the client.

4467004 (Field Blank) - Sample

Time sampled was not supplied by the client.

Analysis Results Comments

4467001 (MW13)

Sample analyzed beyond holding time.(pH)

4467002 (MW80R)

Sample analyzed beyond holding time.(pH)

4467003 (Dup 1)

Sample analyzed beyond holding time.(pH)

4467004 (Field Blank)

Sample analyzed beyond holding time.(pH)

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467001 **Date Collected:** 10/17/2022 12:30 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	9773	umhos/cm	1	1	10/17/2022 12:30	10/17/2022 12:30	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7.03	units	0.01	1	10/17/2022 12:30	10/17/2022 12:30	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	8.73	degrees C		1	10/17/2022 12:30	10/17/2022 12:30	JSM		

Method: ASTM D516-16

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6890	mg/L	250	50	10/26/2022 09:49	10/26/2022 09:49	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	0.57	mg/L	0.5	5	10/19/2022 16:41	10/27/2022 10:51	SLZ	MA,NDA	
Calcium	397	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.5	units	0.1	1	10/20/2022 17:29	10/20/2022 17:29	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	71.5	mg/L	2.0	1	10/26/2022 12:28	10/26/2022 12:28	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.84	mg/L	0.1	1	10/20/2022 17:29	10/20/2022 17:29	RAA		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 4467001 **Date Collected:** 10/17/2022 12:30 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	10600	mg/L	10	1	10/21/2022 09:40	10/21/2022 09:40	RAA	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467002 **Date Collected:** 10/17/2022 15:43 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	5892	umhos/cm	1	1	10/17/2022 15:43	10/17/2022 15:43	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7.05	units	0.01	1	10/17/2022 15:43	10/17/2022 15:43	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	9.87	degrees C		1	10/17/2022 15:43	10/17/2022 15:43	JSM		

Method: ASTM D516-16

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	3460	mg/L	200	40	10/26/2022 09:57	10/26/2022 09:57	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	<0.5	mg/L	0.5	5	10/19/2022 16:41	10/27/2022 10:56	SLZ	MA,NDA	
Calcium	418	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.6	units	0.1	1	10/20/2022 19:02	10/20/2022 19:02	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	149	mg/L	2.0	1	10/26/2022 12:29	10/26/2022 12:29	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.23	mg/L	0.1	1	10/20/2022 19:02	10/20/2022 19:02	RAA		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 4467002 **Date Collected:** 10/17/2022 15:43 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	6310	mg/L	10	1	10/21/2022 09:40	10/21/2022 09:40	RAA	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467003 **Date Collected:** 10/17/2022 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: ASTM D516-16**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6700	mg/L	250	50	10/26/2022 09:58	10/26/2022 09:58	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	0.62	mg/L	0.5	5	10/19/2022 16:41	10/27/2022 10:58	SLZ	MA,NDA	
Calcium	409	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:49	SLZ	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.2	units	0.1	1	10/20/2022 14:36	10/20/2022 14:36	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	71.8	mg/L	2.0	1	10/26/2022 12:30	10/26/2022 12:30	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.84	mg/L	0.1	1	10/20/2022 14:36	10/20/2022 14:36	RAA		

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	10500	mg/L	10	1	10/21/2022 09:40	10/21/2022 09:40	RAA	MA,NDA	

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Report Date: Tuesday, December 13, 2022 12:57:18 PM

**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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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467004 **Date Collected:** 10/18/2022 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: ASTM D516-16**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	<5	mg/L	5	1	10/26/2022 09:59	10/26/2022 09:59	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron	<0.1	mg/L	0.1	1	10/19/2022 16:41	10/27/2022 11:00	SLZ	MA,NDA	
Calcium	<1	mg/L	1	1	10/19/2022 16:41	10/25/2022 13:50	SLZ	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	6.3	units	0.1	1	10/20/2022 12:21	10/20/2022 12:21	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	<2.0	mg/L	2.0	1	10/26/2022 12:31	10/26/2022 12:31	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	<0.1	mg/L	0.1	1	10/20/2022 12:21	10/20/2022 12:21	RAA		

Method: USGS I-1750-85

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Total Dissolved Solids	<10	mg/L	10	1	10/21/2022 09:40	10/21/2022 09:40	RAA	MA,NDA	

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis WO: 4467 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:

Lab Number	Sample ID	Sample Information		Sample Type	Sample Containers				Field Readings				Analysis Required
		Date	Time		1 Liter Raw	500 mL HNO3	500 mL HNO3 (filtered)	250 mL H2SO4	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)	
001	MW13	17Oct22	1230	GW	X	X	X	X	8.73	9773	7.08	0.57	MDU Heskett List
	MW1-90	18Oct22	1205	GW	X	X	X	X	Dry				
	MW2-90	18Oct22	1202	GW	X	X	X	X	Dry				
	MW3-90	18Oct22	1158	GW	X	X	X	X	Dry				
002	MW80R	17Oct22	1543	GW	X	X	X	X	9.87	5892	7.05	1.15	
003	Dup 1	17Oct22	NA	GW	X	X	X	X	NA	NA	NA	NA	
004	Field Blank (FB)	18Oct22	NA	GW	X	X	X	X	NA	NA	NA	NA	

Comments: * 18Oct 22 *

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>[Signature]</i>	17Oct22	Log In	26	<i>[Signature]</i>	19Oct22
	0820	Walk In #2	TM562 / (TM805)		0820

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event: Fall 2022
Sample ID: 1-90
Sampling Personal: J. J. King

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with fields: Well Locked?, Well Labeled?, Casing Strait?, Grout Seal Intact?, Repairs Necessary?, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with fields: Purging Method, Sampling Method, Dedicated Equipment?, Duplicate Sample?, Duplicate Sample ID, Bottle List.

Control Settings table with fields: Purge, Recover, PSI.

FIELD READINGS

Table for field readings with columns: Purge Date, Time, Temp. (°C), Spec. Cond., pH, DO (mg/L), ORP (mV), Turbidity (NTU), Water Level (ft), Pumping Rate (ml/Min), mL Removed, Appearance or Comment.

Summary table with columns: Sample Date, Time, Temp. (°C), Spec. Cond., pH, Turbidity (NTU), Appearance or Comment.

Comments: insufficient volume / No Sample

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event: Fall 2022
Sample ID: 3-90
Sampling Personal: Jy [signature]

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with fields: Well Locked?, Well Labeled?, Casing Strait?, Grout Seal Intact?, Repairs Necessary?, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with fields: Purging Method, Sampling Method, Dedicated Equipment?, Duplicate Sample?, Duplicate Sample ID, Bottle List.

Control Settings table with fields: Purge, Recover, PSI.

FIELD READINGS

Table with columns: Purge Date, Time, Temp. (°C), Spec. Cond., pH, DO (mg/L), ORP (mV), Turbidity (NTU), Water Level (ft), Pumping Rate (mL/Min), mL Removed, Appearance or Comment.

Table with columns: Sample Date, Time, Temp. (°C), Spec. Cond., pH, Turbidity (NTU), Appearance or Comment.

Comments: insufficient volume No Sample
Water level below pump

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Surface water Assessment

Company: MDU Lewis & Clark *Hesketh*
Event: Fall 2022
Sampling Personal: *[Signature]*

@ ca 30 NOV 22

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	<i>17 Oct 22</i>	<i>1437</i>	2"	<i>22.50</i>	
MW33		<i>1456</i>	2"	<i>44.10</i>	
MW101		<i>1440</i>	2"	<i>38.50</i>	
MW102		<i>1434</i>	2"	<i>19.28</i>	
MW103		<i>1445</i>	2"	<i>35.68</i>	
MW44R		<i>1450</i>	2"	<i>28.91</i>	
MW104		<i>1500</i>	2"	<i>15.54</i>	
MW105		<i>1503</i>	2"	<i>13.53</i>	

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October 20, 2022

Montana-Dakota Utilities
Todd Peterson
400 N. 4th St
Bismarck, ND 58501

RE: MDU Heskett Groundwater Sampling

Dear Mr. Peterson,

From October 17-18, 2022, MVTL Field Services division collected ground water samples at the MDU Heskett Station near Mandan, ND. Samples were collected from 2 of the 5 wells. Wells 1-90, 2-90, and 3-90 were found to be dry during this sample event. A Duplicate sample was collected from well MW13. Samples collected were placed on ice and transported to MVTL in Bismarck, ND for analysis.

Thank you for your trust and support of our services. If you have any questions, please call me at (701) 391-4900.

Sincerely,

Jeremy Meyer

MVTL Field Services Manager

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Original Sample	QC Type	Analyte	Analysis Date	QC Result	Original Sample Re	Units	Spike Amount	Spike Result	Spike % Recovery	Spike Duplicate	Spike Duplicate RPD (%)	Lower Control Limit	Upper Control Limit	RPD Limit (%)	
4311001	PDS	Boron	10/27/2022 10:41:00	110	<1	mg/L	4	4.387	110			75	125		
4311001	PDS	Boron	10/27/2022 10:43:00	111	<1	mg/L				4.427	111	0.91	75	125	20
4467001	PDS	Boron	10/27/2022 10:52:00	88.8	0.57	mg/L	2	2.344	88.8			75	125		
4467001	PDS	Boron	10/27/2022 10:54:00	93.5	0.57	mg/L				2.439	93.5	3.97	75	125	20
4467004	MS	Boron	10/27/2022 11:02:37	97.8	<0.1	mg/L	0.4	0.3911	97.8			70	130		
4467004	MSD	Boron	10/27/2022 11:04:27	99.6	<0.1	mg/L				0.3985	99.6	1.87	70	130	20
4506005	MS	Boron	10/27/2022 11:25:06	118	<0.1	mg/L	0.4	0.4718	118			70	130		
4506005	MSD	Boron	10/27/2022 11:26:57	116	<0.1	mg/L				0.4623	116	2.03	70	130	20
	LFB-OE	Boron	10/27/2022 10:49:14	98.9		mg/L	0.4	0.3955	98.9			85	115		
	LFB-OE	Boron	10/27/2022 10:37:47	99		mg/L	0.4	0.3961	99			85	115		
	MB	Boron	10/27/2022 10:35:50	<0.1		mg/L									
	MB	Boron	10/27/2022 10:47:14	<0.1		mg/L									
4049002	PDS	Calcium	10/25/2022 12:08:18	101	64.7	mg/L	100	166	101			75	125		
4049002	PDS	Calcium	10/25/2022 12:09:06	101	64.7	mg/L				165.5	101	0.30	75	125	20
4278001	PDS	Calcium	10/25/2022 12:25:24	93.5		mg/L	100	219.6	93.5			75	125		
4278001	PDS	Calcium	10/25/2022 12:26:11	96.2		mg/L				222.3	96.2	1.22	75	125	20
4283001	PDS	Calcium	10/25/2022 12:48:41	97.5	41.8	mg/L	100	139.3	97.5			75	125		
4283001	PDS	Calcium	10/25/2022 12:49:31	97.7	41.8	mg/L				139.5	97.7	0.14	75	125	20
4284001	PDS	Calcium	10/25/2022 12:55:26	103	1.78	mg/L	100	104.4	103			75	125		
4284001	PDS	Calcium	10/25/2022 12:56:29	104	1.78	mg/L				105.3	104	0.86	75	125	20
4311001	PDS	Calcium	10/25/2022 13:10:00	105	24.6	mg/L	1000	1072	105			75	125		
4311001	PDS	Calcium	10/25/2022 13:11:00	104	24.6	mg/L				1061	104	1.03	75	125	20
4448001	DUP	Calcium	10/25/2022 13:13:23	220.6	221	mg/L						0.18			20
4458008	DUP	Calcium	10/25/2022 13:22:52	492.5	488	mg/L						0.92			20
4458009	PDS	Calcium	10/25/2022 13:24:00	98.9	294	mg/L	500	788	98.9			75	125		
4458009	PDS	Calcium	10/25/2022 13:25:00	99.9	294	mg/L				793.3	99.9	0.67	75	125	20
4458014	DUP	Calcium	10/25/2022 13:32:17	122.1	117	mg/L						4.26			20
4458021	PDS	Calcium	10/25/2022 13:40:35	102	8.08	mg/L	100	109.7	102			75	125		
4458021	PDS	Calcium	10/25/2022 13:41:32	102	8.08	mg/L				110.1	102	0.36	75	125	20
4467002	DUP	Calcium	10/25/2022 13:48:43	437.9	418	mg/L						4.65			20
4470001	DUP	Calcium	10/25/2022 13:51:59	129.2	132	mg/L						2.14			20
4470002	PDS	Calcium	10/25/2022 13:53:32	95.3	104	mg/L	100	199.8	95.3			75	125		
4470002	PDS	Calcium	10/25/2022 13:54:25	95.7	104	mg/L				200.2	95.7	0.20	75	125	20
4477001	PDS	Calcium	10/25/2022 13:58:22	102		mg/L	100	105.7	102			75	125		
4477001	PDS	Calcium	10/25/2022 13:59:23	102		mg/L				106.1	102	0.38	75	125	20
4506006	DUP	Calcium	10/25/2022 14:06:43	47.55	47.7	mg/L						0.31			20
	LFB-MI	Calcium	10/25/2022 13:08:42	106		mg/L	100	105.7	106			85	115		
	LFB-MI	Calcium	10/25/2022 13:36:29	106		mg/L	100	106.3	106			85	115		
	MB	Calcium	10/25/2022 13:07:50	<1		mg/L									
	MB	Calcium	10/25/2022 13:35:37	<1		mg/L									
4479001	MS	Chloride	10/26/2022 12:38:48	116	96.1	mg/L	30	131	116			80	120		
4479001	MSD	Chloride	10/26/2022 12:39:58	116	96.1	mg/L				131	116	0.00	80	120	20
4519004	MS	Chloride	10/26/2022 14:30:22	94	5.3	mg/L	30	33.5	94			80	120		
4519004	MSD	Chloride	10/26/2022 14:31:34	94.1	5.3	mg/L				33.5	94.1	0.00	80	120	20
4594001	MS	Chloride	10/26/2022 15:05:50	101	4.5	mg/L	30	34.9	101			80	120		

4594001	MSD	Chloride	10/26/2022 15:07:01	101	4.5	mg/L				34.8	101	0.29	80	120	20
	LFB	Chloride	10/26/2022 12:06:52	92.9		mg/L	30	27.9	92.9				90	110	
	LFB	Chloride	10/26/2022 12:23:25	92.8		mg/L	30	27.8	92.8				90	110	
	LFB	Chloride	10/26/2022 12:42:20	91.5		mg/L	30	27.5	91.5				90	110	
	LFB	Chloride	10/26/2022 14:15:01	94		mg/L	30	28.2	94				90	110	
	LFB	Chloride	10/26/2022 14:33:55	92.8		mg/L	30	27.8	92.8				90	110	
	LFB	Chloride	10/26/2022 14:50:28	92.5		mg/L	30	27.7	92.5				90	110	
	LFB	Chloride	10/26/2022 15:10:33	93.5		mg/L	30	28	93.5				90	110	
	MB	Chloride	10/26/2022 12:05:41	<2.0		mg/L									
	MB	Chloride	10/26/2022 12:22:15	<2.0		mg/L									
	MB	Chloride	10/26/2022 12:41:09	<2.0		mg/L									
	MB	Chloride	10/26/2022 15:09:22	<2.0		mg/L									
	MB	Chloride	10/26/2022 14:32:44	<2.0		mg/L									
	MB	Chloride	10/26/2022 14:49:17	<2.0		mg/L									
	MB	Chloride	10/26/2022 14:13:50	<2.0		mg/L									
4467001	MS-F	Fluoride	10/20/2022 17:45:15	96	0.84	mg/L	0.5	1.32	96				80	120	
4467001	MSD-F	Fluoride	10/20/2022 17:51:14	94	0.84	mg/L				1.31	94	0.76	80	120	20
4470002	MS-F	Fluoride	10/20/2022 12:52:57	128	<0.1	mg/L	0.5	0.64	128				80	120	
4470002	MSD-F	Fluoride	10/20/2022 12:58:54	128	<0.1	mg/L				0.64	128	0.00	80	120	20
4555001	MS-F	Fluoride	10/21/2022 03:13:17	106	0.29	mg/L	0.5	0.82	106				80	120	
4555001	MSD-F	Fluoride	10/21/2022 03:19:01	110	0.29	mg/L				0.84	110	2.41	80	120	20
	CRM-F	Fluoride	10/20/2022 10:57:00	102		mg/L	3.39	3.45	102				83.8	111	
	LFB-F	Fluoride	10/20/2022 15:25:16	100		mg/L	0.5	0.5	100				90	110	
	LFB-F	Fluoride	10/20/2022 20:44:49	100		mg/L	0.5	0.5	100				90	110	
	LFB-F	Fluoride	10/20/2022 11:10:18	104		mg/L	0.5	0.52	104				90	110	
	LFB-F	Fluoride	10/21/2022 01:13:30	104		mg/L	0.5	0.52	104				90	110	
	LFB-F	Fluoride	10/21/2022 05:23:54	102		mg/L	0.5	0.51	102				90	110	
	MB-F	Fluoride	10/20/2022 11:03:51	<0.1		mg/L									
	MB-F	Fluoride	10/21/2022 05:17:36	<0.1		mg/L									
	MB-F	Fluoride	10/21/2022 01:07:12	<0.1		mg/L									
	MB-F	Fluoride	10/20/2022 20:38:31	<0.1		mg/L									
	MB-F	Fluoride	10/20/2022 15:18:57	<0.1		mg/L									
4458002	MS	Sulfate	10/26/2022 09:08:52	92.9	5640	mg/L	5000	10300	92.9				85	115	
4458002	MSD	Sulfate	10/26/2022 09:09:57	93.1	5640	mg/L				10300	93.1	0.00	85	115	20
4458008	MS	Sulfate	10/26/2022 09:35:21	85.7	5660	mg/L	5000	9950	85.7				85	115	
4458008	MSD	Sulfate	10/26/2022 09:36:26	85.1	5660	mg/L				9920	85.1	0.30	85	115	20
4458019	MS	Sulfate	10/26/2022 09:50:49	96.8	<5	mg/L	100	96.8	96.8				85	115	
4458019	MSD	Sulfate	10/26/2022 09:51:55	98.8	<5	mg/L				98.8	98.8	2.04	85	115	20
4483001	MS	Sulfate	10/26/2022 10:08:29	97.6	24.0	mg/L	100	122	97.6				85	115	
4483001	MSD	Sulfate	10/26/2022 10:09:34	94	24.0	mg/L				118	94	3.33	85	115	20
4519001	MS	Sulfate	10/26/2022 10:28:21	94.5	203	mg/L	500	675	94.5				85	115	
4519001	MSD	Sulfate	10/26/2022 10:29:27	99.1	203	mg/L				698	99.1	3.35	85	115	20
4519006	MS	Sulfate	10/26/2022 10:54:52	92.1	576	mg/L	500	1040	92.1				85	115	
4519006	MSD	Sulfate	10/26/2022 10:55:58	90.9	576	mg/L				1030	90.9	0.97	85	115	20
4594001	MS	Sulfate	10/26/2022 11:13:39	97.4	62.9	mg/L	200	258	97.4				85	115	
4594001	MSD	Sulfate	10/26/2022 11:14:43	107	62.9	mg/L				276	107	6.74	85	115	20
4594005	MS	Sulfate	10/26/2022 11:32:26	85.4	195	mg/L	200	366	85.4				85	115	

4594005	MSD	Sulfate	10/26/2022 11:31:21	88.2	195	mg/L				372	88.2	1.63	85	115	20
	LFB	Sulfate	10/26/2022 09:54:07	99.7		mg/L	100	99.7	99.7				85	115	
	LFB	Sulfate	10/26/2022 09:30:56	96.1		mg/L	100	96.1	96.1				85	115	
	LFB	Sulfate	10/26/2022 09:13:16	98.9		mg/L	100	98.9	98.9				85	115	
	LFB	Sulfate	10/26/2022 08:54:30	102		mg/L	100	102	102				85	115	
	LFB	Sulfate	10/26/2022 11:34:39	93.4		mg/L	100	93.4	93.4				85	115	
	LFB	Sulfate	10/26/2022 10:11:47	98		mg/L	100	98	98				85	115	
	LFB	Sulfate	10/26/2022 10:34:57	99.4		mg/L	100	99.4	99.4				85	115	
	LFB	Sulfate	10/26/2022 11:01:29	98.8		mg/L	100	98.8	98.8				85	115	
	LFB	Sulfate	10/26/2022 11:20:16	90.7		mg/L	100	90.7	90.7				85	115	
	MB	Sulfate	10/26/2022 11:40:10	<5		mg/L									
	MB	Sulfate	10/26/2022 11:19:10	<5		mg/L									
	MB	Sulfate	10/26/2022 10:57:04	<5		mg/L									
	MB	Sulfate	10/26/2022 10:47:08	<5		mg/L									
	MB	Sulfate	10/26/2022 10:26:09	<5		mg/L									
	MB	Sulfate	10/26/2022 09:53:01	<5		mg/L									
	MB	Sulfate	10/26/2022 09:29:49	<5		mg/L									
	MB	Sulfate	10/26/2022 09:12:10	<5		mg/L									
	MB	Sulfate	10/26/2022 08:53:23	<5		mg/L									
4448001	DUP	Total Dissolved Solids	10/21/2022 09:50:37	2490	2520	mg/L						1.20			20
	CRM	Total Dissolved Solids	10/21/2022 09:50:37	101		mg/L	736	742	101				90.35	110.33	
	MB	Total Dissolved Solids	10/21/2022 09:50:37	<10		mg/L									
4458015	DUP	pH	10/20/2022 16:08:46	7.66	7.6	units						0.79			20
4483001	DUP	pH	10/20/2022 13:21:54	7.31	7.8	units						6.48			20
4519002	DUP	pH	10/20/2022 18:51:08	7.26	7.3	units						0.55			20
4519005	DUP	pH	10/20/2022 22:56:11	7.33	7.4	units						0.95			20
4553001	DUP	pH	10/21/2022 02:27:32	8.65	8.8	units						1.72			20
	CRM-PH	pH	10/21/2022 05:41:30	98.33		units	6	5.9	98.33				98.33	101.67	
	CRM-PH	pH	10/20/2022 16:55:16	99		units	6	5.9	99				98.33	101.67	
	CRM-PH	pH	10/20/2022 15:42:54	99		units	6	5.9	99				98.33	101.67	
	CRM-PH	pH	10/21/2022 01:31:04	98.67		units	6	5.9	98.67				98.33	101.67	
	CRM-PH	pH	10/20/2022 10:27:41	99.67		units	6	6	99.67				98.33	101.67	
	CRM-PH	pH	10/20/2022 21:02:26	98.5		units	6	5.9	98.5				98.33	101.67	



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

Unreported samples to correct field summary report attached to workorder, collection dates for field blank and field duplicate. CC 30Nov22

Sample Comments

4467003 (Dup 1) - Sample

Time sampled was not supplied by the client.

4467004 (Field Blank) - Sample

Time sampled was not supplied by the client.

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467001 **Date Collected:** 10/17/2022 12:30 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 245.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	11/14/2022 10:30	11/15/2022 10:45	AMC	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	0.573	mg/L	0.1	5	10/19/2022 16:41	10/26/2022 09:08	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Arsenic	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Barium	0.0067	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Chromium	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Cobalt	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Molybdenum	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Selenium	0.0313	mg/L	0.005	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:00	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467002 **Date Collected:** 10/17/2022 15:43 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 245.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	11/14/2022 10:30	11/15/2022 10:45	AMC	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	0.715	mg/L	0.1	5	10/19/2022 16:41	10/26/2022 09:10	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Arsenic	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Barium	0.0130	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Chromium	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Cobalt	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Molybdenum	0.0026	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Selenium	0.0441	mg/L	0.005	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:18	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467003 **Date Collected:** 10/17/2022 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 245.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	11/14/2022 10:30	11/15/2022 10:45	AMC	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	0.606	mg/L	0.1	5	10/19/2022 16:41	10/26/2022 09:10	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Arsenic	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Barium	0.0069	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Chromium	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Cobalt	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Molybdenum	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Selenium	0.0322	mg/L	0.005	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:22	MDE	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467004 **Date Collected:** 10/18/2022 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 245.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury	<0.0002	mg/L	0.0002	1	11/14/2022 10:30	11/15/2022 10:45	AMC	MA,NDA, SDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Lithium	<0.02	mg/L	0.02	1	10/19/2022 16:41	10/26/2022 09:11	SLZ	NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Antimony	<0.001	mg/L	0.001	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Arsenic	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Barium	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Beryllium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Cadmium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Chromium	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Cobalt	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Lead	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Molybdenum	<0.002	mg/L	0.002	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Selenium	<0.005	mg/L	0.005	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	
Thallium	<0.0005	mg/L	0.0005	5	10/19/2022 16:41	11/03/2022 13:26	MDE	MA,NDA	

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis WO: 4467 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Fall 2022 Sampled By: <i>Joseph</i>

Lab Number	Sample ID	Sample Information		Sample Type	Sample Containers				Field Readings				Analysis Required
		Date	Time		1 Liter Raw	500 mL HNO3	500 mL HNO3 (filtered)	250 mL H2SO4	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)	
001	MW13	17Oct22	1230	GW	X	X	X	X	8.73	9773	7.08	0.57	MDU Heskett List
	MW1-90	18Oct22	1205	GW	X	X	X	X	Dry				
	MW2-90	18Oct22	1202	GW	X	X	X	X	Dry				
	MW3-90	18Oct22	1158	GW	X	X	X	X	Dry				
002	MW80R	17Oct22	1543	GW	X	X	X	X	9.87	5892	7.05	1.15	
003	Dup 1	17Oct22	NA	GW	X	X	X	X	NA	NA	NA	NA	
004	Field Blank (FB)	18Oct22	NA	GW	X	X	X	X	NA	NA	NA	NA	

Comments: * 18Oct 22 *

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>Todd Peterson</i>	17 Oct 22	Log In	16	<i>Todd Peterson</i>	19 Oct 22
	08:10	Walk In #2	TM562 / TM805		08:20

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event: Fall 2022
Sample ID: 1-90
Sampling Personal: J. J. King

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with fields: Well Locked?, Well Labeled?, Casing Strait?, Grout Seal Intact?, Repairs Necessary?, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with fields: Purging Method, Sampling Method, Dedicated Equipment?, Duplicate Sample?, Duplicate Sample ID, Bottle List.

Control Settings table with fields: Purge, Recover, PSI.

FIELD READINGS

Table with columns: Purge Date, Time, Temp. (°C), Spec. Cond., pH, DO (mg/L), ORP (mV), Turbidity (NTU), Water Level (ft), Pumping Rate (ml/Min), mL Removed, Appearance or Comment.

Table with columns: Sample Date, Time, Temp. (°C), Spec. Cond., pH, Turbidity (NTU), Appearance or Comment.

Comments: insufficient volume / No Sample

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.

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event: Fall 2022
Sample ID: 3-90
Sampling Personal: Jy [signature]

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION			
Well Locked?	YES	NO	
Well Labeled?	YES	NO	
Casing Strait?	YES	NO	
Grout Seal Intact?	YES	NO	Not Visible
Repairs Necessary?			
Casing Diameter:	2"		
Water Level Before Purge:	Below Pump ft		
Total Depth of Well:	ft		
Well Volume:	liters		
Depth to Top of Pump:	20.22 ft		
Water Level After Sample:	ft		
Measurement Method:	Electric Water Level Indicator		

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	
Bottle List:	
1 Liter Raw	4- 1L Nitric
500ml Nitric	
500ml Nitric (filtered)	
250ml Sulfuric	

Control Settings:	
Purge:	Sec.
Recover:	Sec.
PSI:	

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					clear, slightly turbid, turbid
Start of Well Purge											
Well Stabilized? YES NO Total Volume Purged: _____ mL											

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
18 Oct 22	1158					

Comments: insufficient volume No Sample
Water level below pump

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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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.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Surface water Assessment

Company: MDU Lewis & Clark *Hesketh*
Event: Fall 2022
Sampling Personal: *[Signature]*

@ ca 30 NOV 22

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	<i>17 Oct 22</i>	<i>1437</i>	2"	<i>22.50</i>	
MW33		<i>1456</i>	2"	<i>44.10</i>	
MW101		<i>1440</i>	2"	<i>38.50</i>	
MW102		<i>1434</i>	2"	<i>19.28</i>	
MW103		<i>1445</i>	2"	<i>35.68</i>	
MW44R		<i>1450</i>	2"	<i>28.91</i>	
MW104		<i>1500</i>	2"	<i>15.54</i>	
MW105		<i>1503</i>	2"	<i>13.53</i>	

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Report Date: Tuesday, December 13, 2022 12:59:12 PM



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October 20, 2022

Montana-Dakota Utilities
Todd Peterson
400 N. 4th St
Bismarck, ND 58501

RE: MDU Heskett Groundwater Sampling

Dear Mr. Peterson,

From October 17-18, 2022, MVTL Field Services division collected ground water samples at the MDU Heskett Station near Mandan, ND. Samples were collected from 2 of the 5 wells. Wells 1-90, 2-90, and 3-90 were found to be dry during this sample event. A Duplicate sample was collected from well MW13. Samples collected were placed on ice and transported to MVTL in Bismarck, ND for analysis.

Thank you for your trust and support of our services. If you have any questions, please call me at (701) 391-4900.

Sincerely,

Jeremy Meyer

MVTL Field Services Manager

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.

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.

Report Date: Tuesday, December 13, 2022 12:59:12 PM

Original Sample	QC Type	Analyte	Analysis Date	QC Result	Original Sample Re	Units	Spike Amount	Spike Resu	Spike %	Recovery	Spike Duplicate	Spike Duplicate	RPD (%)	Lower Control Limi	Upper Control Limi	RPD Limit (%)
4283001	SPK	Antimony	11/03/2022 10:51:00	100	<0.001	mg/L	0.1	0.1004	100					75	125	
4311001	MS	Antimony	11/03/2022 11:46:46	99.9	0.0079	mg/L	0.4	0.407	99.9					75	125	
4311001	MSD	Antimony	11/03/2022 11:50:56	101	0.0079	mg/L					0.412	101	1.22	75	125	20
4311001	SPK	Antimony	11/03/2022 11:42:00	99.4	0.0079	mg/L	0.1	0.1071	99.4					75	125	
4458008	MS	Antimony	11/03/2022 12:19:32	97.8		mg/L	0.4	0.392	97.8					75	125	
4458008	MSD	Antimony	11/03/2022 12:23:40	95.4		mg/L					0.382	95.4	2.58	75	125	20
4458008	SPK	Antimony	11/03/2022 12:15:00	102		mg/L	0.1	0.1035	102					75	125	
4467001	MS	Antimony	11/03/2022 13:04:37	99.5	<0.001	mg/L	0.4	0.398	99.5					75	125	
4467001	MSD	Antimony	11/03/2022 13:08:45	99.1	<0.001	mg/L					0.396	99.1	0.50	75	125	20
4467004	MS	Antimony	11/03/2022 13:34:18	95	<0.001	mg/L	0.4	0.38	95					75	125	
4467004	MSD	Antimony	11/03/2022 13:38:27	95.3	<0.001	mg/L					0.381	95.3	0.26	75	125	20
4470002	MS	Antimony	11/03/2022 14:06:57	95		mg/L	0.4	0.382	95					75	125	
4470002	MSD	Antimony	11/03/2022 14:11:04	94.4		mg/L					0.38	94.4	0.52	75	125	20
4470002	SPK	Antimony	11/03/2022 14:02:00	99.1		mg/L	0.1	0.1013	99.1					75	125	
4506005	MS	Antimony	11/03/2022 14:46:44	98.1		mg/L	0.4	0.392	98.1					75	125	
4506005	MSD	Antimony	11/03/2022 14:50:52	97.2		mg/L					0.389	97.2	0.77	75	125	20
	LFB-MS	Antimony	11/03/2022 11:30:45	97		mg/L	0.1	0.097	97					80	120	
	LFB-MS	Antimony	11/01/2022 11:21:00	99.9		mg/L	0.1	0.0999	99.9					85	115	
	LFB-MS	Antimony	11/03/2022 12:48:12	99.9		mg/L	0.1	0.0999	99.9					80	120	
	MB	Antimony	11/03/2022 11:20:19	<0.001		mg/L										
	MB	Antimony	11/01/2022 11:11:00	<0.001		mg/L										
	MB	Antimony	11/03/2022 12:44:04	<0.001		mg/L										
4283001	SPK	Arsenic	11/03/2022 10:51:00	102	<0.002	mg/L	0.1	0.1016	102					75	125	
4311001	MS	Arsenic	11/03/2022 11:46:46	99.4	0.1093	mg/L	0.4	0.513	99.4					75	125	
4311001	MSD	Arsenic	11/03/2022 11:50:56	100	0.1093	mg/L					0.516	100	0.58	75	125	20
4311001	SPK	Arsenic	11/03/2022 11:42:00	95.3	0.1093	mg/L	0.1	0.2101	95.3					75	125	
4458008	MS	Arsenic	11/03/2022 12:19:32	100		mg/L	0.4	0.404	100					75	125	
4458008	MSD	Arsenic	11/03/2022 12:23:40	99.3		mg/L					0.4	99.3	1.00	75	125	20
4458008	SPK	Arsenic	11/03/2022 12:15:00	105		mg/L	0.1	0.1085	105					75	125	
4467001	MS	Arsenic	11/03/2022 13:04:37	102	<0.002	mg/L	0.4	0.41	102					75	125	
4467001	MSD	Arsenic	11/03/2022 13:08:45	101	<0.002	mg/L					0.405	101	1.23	75	125	20
4467004	MS	Arsenic	11/03/2022 13:34:18	98.6	<0.002	mg/L	0.4	0.394	98.6					75	125	
4467004	MSD	Arsenic	11/03/2022 13:38:27	99.3	<0.002	mg/L					0.397	99.3	0.76	75	125	20
4470002	MS	Arsenic	11/03/2022 14:06:57	96.3		mg/L	0.4	0.389	96.3					75	125	
4470002	MSD	Arsenic	11/03/2022 14:11:04	99.5		mg/L					0.402	99.5	3.29	75	125	20
4470002	SPK	Arsenic	11/03/2022 14:02:00	100		mg/L	0.1	0.1046	100					75	125	
4506005	MS	Arsenic	11/03/2022 14:46:44	100	<0.002	mg/L	0.4	0.4	100					75	125	
4506005	MSD	Arsenic	11/03/2022 14:50:52	102	<0.002	mg/L					0.407	102	1.73	75	125	20
	LFB-MS	Arsenic	11/03/2022 11:30:45	98.1		mg/L	0.1	0.0981	98.1					80	120	
	LFB-MS	Arsenic	11/01/2022 11:21:00	99		mg/L	0.1	0.099	99					85	115	
	LFB-MS	Arsenic	11/03/2022 12:48:12	100		mg/L	0.1	0.1	100					80	120	
	MB	Arsenic	11/03/2022 12:44:04	<0.002		mg/L										
	MB	Arsenic	11/01/2022 11:11:00	<0.005		mg/L										
	MB	Arsenic	11/03/2022 11:20:19	<0.002		mg/L										
4283001	SPK	Barium	11/03/2022 10:51:00	94.9	<0.1	mg/L	0.1	0.1503	94.9					75	125	
4311001	MS	Barium	11/03/2022 11:46:46	76.5	0.1876	mg/L	0.4	0.486	76.5					75	125	
4311001	MSD	Barium	11/03/2022 11:50:56	88.5	0.1876	mg/L					0.535	88.5	9.60	75	125	20
4311001	SPK	Barium	11/03/2022 11:42:00	93.6	0.1876	mg/L	0.1	0.2742	93.6					75	125	
4458008	MS	Barium	11/03/2022 12:19:32	98.4		mg/L	0.4	0.436	98.4					75	125	
4458008	MSD	Barium	11/03/2022 12:23:40	98.9		mg/L					0.438	98.9	0.46	75	125	20
4458008	SPK	Barium	11/03/2022 12:15:00	105		mg/L	0.1	0.1481	105					75	125	
4467001	MS	Barium	11/03/2022 13:04:37	94.3	0.0067	mg/L	0.4	0.384	94.3					75	125	

4467001	MSD	Barium	11/03/2022 13:08:45	93.7	0.0067	mg/L				0.382	93.7	0.52	75	125	20
4467004	MS	Barium	11/03/2022 13:34:18	98.9	<0.002	mg/L	0.4	0.395	98.9				75	125	
4467004	MSD	Barium	11/03/2022 13:38:27	98.7	<0.002	mg/L				0.395	98.7	0.00	75	125	20
4470002	MS	Barium	11/03/2022 14:06:57	95.9		mg/L	0.4	0.425	95.9				75	125	
4470002	MSD	Barium	11/03/2022 14:11:04	97.3		mg/L				0.431	97.3	1.40	75	125	20
4470002	SPK	Barium	11/03/2022 14:02:00	98.5		mg/L	0.1	0.1404	98.5				75	125	
4506005	MS	Barium	11/03/2022 14:46:44	99.2	<0.1	mg/L	0.4	0.483	99.2				75	125	
4506005	MSD	Barium	11/03/2022 14:50:52	96.6	<0.1	mg/L				0.473	96.6	2.09	75	125	20
	LFB-MS	Barium	11/03/2022 11:30:45	95		mg/L	0.1	0.095	95				80	120	
	LFB-MS	Barium	11/01/2022 11:21:00	97.8		mg/L	0.1	0.0978	97.8				85	115	
	LFB-MS	Barium	11/03/2022 12:48:12	98		mg/L	0.1	0.098	98				80	120	
	MB	Barium	11/03/2022 11:20:19	<0.002		mg/L									
	MB	Barium	11/01/2022 11:11:00	<0.002		mg/L									
	MB	Barium	11/03/2022 12:44:04	<0.002		mg/L									
4283001	SPK	Beryllium	11/03/2022 10:51:00	101	<0.0005	mg/L	0.1	0.1012	101				75	125	
4311001	MS	Beryllium	11/03/2022 11:46:46	104	<0.002	mg/L	0.4	0.417	104				75	125	
4311001	MSD	Beryllium	11/03/2022 11:50:56	106	<0.002	mg/L				0.423	106	1.43	75	125	20
4311001	SPK	Beryllium	11/03/2022 11:42:00	105	<0.002	mg/L	0.1	0.1052	105				75	125	
4458008	MS	Beryllium	11/03/2022 12:19:32	104		mg/L	0.4	0.416	104				75	125	
4458008	MSD	Beryllium	11/03/2022 12:23:40	99.3		mg/L				0.397	99.3	4.67	75	125	20
4458008	SPK	Beryllium	11/03/2022 12:15:00	110		mg/L	0.1	0.1102	110				75	125	
4467001	MS	Beryllium	11/03/2022 13:04:37	104	<0.0005	mg/L	0.4	0.417	104				75	125	
4467001	MSD	Beryllium	11/03/2022 13:08:45	102	<0.0005	mg/L				0.407	102	2.43	75	125	20
4467004	MS	Beryllium	11/03/2022 13:34:18	98.7	<0.0005	mg/L	0.4	0.395	98.7				75	125	
4467004	MSD	Beryllium	11/03/2022 13:38:27	98	<0.0005	mg/L				0.392	98	0.76	75	125	20
4470002	MS	Beryllium	11/03/2022 14:06:57	96.7		mg/L	0.4	0.387	96.7				75	125	
4470002	MSD	Beryllium	11/03/2022 14:11:04	99.3		mg/L				0.397	99.3	2.55	75	125	20
4470002	SPK	Beryllium	11/03/2022 14:02:00	101		mg/L	0.1	0.1012	101				75	125	
4506005	MS	Beryllium	11/03/2022 14:46:44	101		mg/L	0.4	0.405	101				75	125	
4506005	MSD	Beryllium	11/03/2022 14:50:52	102		mg/L				0.408	102	0.74	75	125	20
	LFB-MS	Beryllium	11/03/2022 11:30:45	101		mg/L	0.1	0.101	101				80	120	
	LFB-MS	Beryllium	11/02/2022 12:05:00	92.9		mg/L	0.1	0.0929	92.9				85	115	
	LFB-MS	Beryllium	11/03/2022 12:48:12	104		mg/L	0.1	0.104	104				80	120	
	MB	Beryllium	11/03/2022 12:44:04	<0.0005		mg/L									
	MB	Beryllium	11/02/2022 12:02:00	<0.0005		mg/L									
	MB	Beryllium	11/03/2022 11:20:19	<0.0005		mg/L									
4283001	SPK	Cadmium	11/03/2022 10:51:00	97	<0.0005	mg/L	0.1	0.097	97				75	125	
4311001	MS	Cadmium	11/03/2022 11:46:46	92.7	<0.002	mg/L	0.4	0.371	92.7				75	125	
4311001	MSD	Cadmium	11/03/2022 11:50:56	94.2	<0.002	mg/L				0.377	94.2	1.60	75	125	20
4311001	SPK	Cadmium	11/03/2022 11:42:00	87.1	<0.002	mg/L	0.1	0.0871	87.1				75	125	
4458008	MS	Cadmium	11/03/2022 12:19:32	93.6		mg/L	0.4	0.375	93.6				75	125	
4458008	MSD	Cadmium	11/03/2022 12:23:40	92		mg/L				0.369	92	1.61	75	125	20
4458008	SPK	Cadmium	11/03/2022 12:15:00	92.2		mg/L	0.1	0.0928	92.2				75	125	
4467001	MS	Cadmium	11/03/2022 13:04:37	93.2	<0.0005	mg/L	0.4	0.373	93.2				75	125	
4467001	MSD	Cadmium	11/03/2022 13:08:45	91.6	<0.0005	mg/L				0.366	91.6	1.89	75	125	20
4467004	MS	Cadmium	11/03/2022 13:34:18	94.6	<0.0005	mg/L	0.4	0.378	94.6				75	125	
4467004	MSD	Cadmium	11/03/2022 13:38:27	95.1	<0.0005	mg/L				0.38	95.1	0.53	75	125	20
4470002	MS	Cadmium	11/03/2022 14:06:57	92.3		mg/L	0.4	0.369	92.3				75	125	
4470002	MSD	Cadmium	11/03/2022 14:11:04	93.4		mg/L				0.374	93.4	1.34	75	125	20
4470002	SPK	Cadmium	11/03/2022 14:02:00	93.6		mg/L	0.1	0.0936	93.6				75	125	
4506005	MS	Cadmium	11/03/2022 14:46:44	96.3		mg/L	0.4	0.385	96.3				75	125	
4506005	MSD	Cadmium	11/03/2022 14:50:52	96.5		mg/L				0.386	96.5	0.26	75	125	20
	LFB-MS	Cadmium	11/03/2022 11:30:45	95.6		mg/L	0.1	0.0956	95.6				80	120	
	LFB-MS	Cadmium	11/01/2022 11:21:00	101		mg/L	0.1	0.101	101				85	115	

	LFB-MS	Cadmium	11/03/2022 12:48:12	99.3		mg/L	0.1	0.0993	99.3			80	120		
	MB	Cadmium	11/03/2022 11:20:19	<0.0005		mg/L									
	MB	Cadmium	11/01/2022 11:11:00	<0.0005		mg/L									
	MB	Cadmium	11/03/2022 12:44:04	<0.0005		mg/L									
4283001	SPK	Chromium	11/03/2022 10:51:00	98.7	<0.002	mg/L	0.1	0.0987	98.7			75	125		
4311001	MS	Chromium	11/03/2022 11:46:46	96.7	0.0839	mg/L	0.4	0.479	96.7			75	125		
4311001	MSD	Chromium	11/03/2022 11:50:56	99.7	0.0839	mg/L				0.491	99.7	2.47	75	125	20
4311001	SPK	Chromium	11/03/2022 11:42:00	103	0.0839	mg/L	0.1	0.195	103				75	125	
4458008	MS	Chromium	11/03/2022 12:19:32	99.8		mg/L	0.4	0.406	99.8				75	125	
4458008	MSD	Chromium	11/03/2022 12:23:40	98.1		mg/L				0.4	98.1	1.49	75	125	20
4458008	SPK	Chromium	11/03/2022 12:15:00	113		mg/L	0.1	0.1201	113				75	125	
4467001	MS	Chromium	11/03/2022 13:04:37	101	<0.002	mg/L	0.4	0.404	101				75	125	
4467001	MSD	Chromium	11/03/2022 13:08:45	97.9	<0.002	mg/L				0.392	97.9	3.02	75	125	20
4467004	MS	Chromium	11/03/2022 13:34:18	97.8	<0.002	mg/L	0.4	0.391	97.8				75	125	
4467004	MSD	Chromium	11/03/2022 13:38:27	97.3	<0.002	mg/L				0.389	97.3	0.51	75	125	20
4470002	MS	Chromium	11/03/2022 14:06:57	94.6		mg/L	0.4	0.378	94.6				75	125	
4470002	MSD	Chromium	11/03/2022 14:11:04	96.8		mg/L				0.387	96.8	2.35	75	125	20
4470002	SPK	Chromium	11/03/2022 14:02:00	102		mg/L	0.1	0.1016	102				75	125	
4506005	MS	Chromium	11/03/2022 14:46:44	97.5	<0.05	mg/L	0.4	0.39	97.5				75	125	
4506005	MSD	Chromium	11/03/2022 14:50:52	98.4	<0.05	mg/L				0.394	98.4	1.02	75	125	20
	LFB-MS	Chromium	11/03/2022 12:48:12	103		mg/L	0.1	0.103	103				80	120	
	LFB-MS	Chromium	11/01/2022 11:21:00	101		mg/L	0.1	0.101	101				85	115	
	LFB-MS	Chromium	11/03/2022 11:30:45	99.3		mg/L	0.1	0.0993	99.3				80	120	
	MB	Chromium	11/01/2022 11:11:00	<0.002		mg/L									
	MB	Chromium	11/03/2022 12:44:04	<0.002		mg/L									
	MB	Chromium	11/03/2022 11:20:19	<0.002		mg/L									
4283001	SPK	Cobalt	11/03/2022 10:51:00	98.7	<0.002	mg/L	0.1	0.0987	98.7				75	125	
4311001	MS	Cobalt	11/03/2022 11:46:46	98.3	<0.008	mg/L	0.4	0.393	98.3				75	125	
4311001	MSD	Cobalt	11/03/2022 11:50:56	99.2	<0.008	mg/L				0.397	99.2	1.01	75	125	20
4311001	SPK	Cobalt	11/03/2022 11:42:00	103	<0.008	mg/L	0.1	0.1031	103				75	125	
4458008	MS	Cobalt	11/03/2022 12:19:32	98.1		mg/L	0.4	0.396	98.1				75	125	
4458008	MSD	Cobalt	11/03/2022 12:23:40	96.5		mg/L				0.39	96.5	1.53	75	125	20
4458008	SPK	Cobalt	11/03/2022 12:15:00	108		mg/L	0.1	0.1114	108				75	125	
4467001	MS	Cobalt	11/03/2022 13:04:37	99.1	<0.002	mg/L	0.4	0.396	99.1				75	125	
4467001	MSD	Cobalt	11/03/2022 13:08:45	96.5	<0.002	mg/L				0.386	96.5	2.56	75	125	20
4467004	MS	Cobalt	11/03/2022 13:34:18	97.5	<0.002	mg/L	0.4	0.39	97.5				75	125	
4467004	MSD	Cobalt	11/03/2022 13:38:27	96.8	<0.002	mg/L				0.387	96.8	0.77	75	125	20
4470002	MS	Cobalt	11/03/2022 14:06:57	94.4		mg/L	0.4	0.397	94.4				75	125	
4470002	MSD	Cobalt	11/03/2022 14:11:04	95		mg/L				0.399	95	0.50	75	125	20
4470002	SPK	Cobalt	11/03/2022 14:02:00	98.4		mg/L	0.1	0.1177	98.4				75	125	
4506005	MS	Cobalt	11/03/2022 14:46:44	96.2		mg/L	0.4	0.385	96.2				75	125	
4506005	MSD	Cobalt	11/03/2022 14:50:52	97		mg/L				0.388	97	0.78	75	125	20
	LFB-MS	Cobalt	11/01/2022 11:21:00	100		mg/L	0.1	0.1	100				85	115	
	LFB-MS	Cobalt	11/03/2022 12:48:12	102		mg/L	0.1	0.102	102				80	120	
	LFB-MS	Cobalt	11/03/2022 11:30:45	99.5		mg/L	0.1	0.0995	99.5				80	120	
	MB	Cobalt	11/03/2022 12:44:04	<0.002		mg/L									
	MB	Cobalt	11/01/2022 11:11:00	<0.002		mg/L									
	MB	Cobalt	11/03/2022 11:20:19	<0.002		mg/L									
4283001	SPK	Lead	11/03/2022 10:51:00	95.1	<0.0005	mg/L	0.1	0.0951	95.1				75	125	
4311001	MS	Lead	11/03/2022 11:46:46	86.3	<0.002	mg/L	0.4	0.345	86.3				75	125	
4311001	MSD	Lead	11/03/2022 11:50:56	89.9	<0.002	mg/L				0.36	89.9	4.26	75	125	20
4311001	SPK	Lead	11/03/2022 11:42:00	85.8	<0.002	mg/L	0.1	0.0858	85.8				75	125	
4458008	MS	Lead	11/03/2022 12:19:32	91.9		mg/L	0.4	0.37	91.9				75	125	
4458008	MSD	Lead	11/03/2022 12:23:40	90.6		mg/L				0.365	90.6	1.36	75	125	20

4458008	SPK	Lead	11/03/2022 12:15:00	93.1		mg/L	0.1	0.0958	93.1			75	125		
4467001	MS	Lead	11/03/2022 13:04:37	91.3	<0.0005	mg/L	0.4	0.365	91.3			75	125		
4467001	MSD	Lead	11/03/2022 13:08:45	90.4	<0.0005	mg/L				0.362	90.4	0.82	75	125	20
4467004	MS	Lead	11/03/2022 13:34:18	98	<0.0005	mg/L	0.4	0.392	98			75	125		
4467004	MSD	Lead	11/03/2022 13:38:27	98.2	<0.0005	mg/L				0.393	98.2	0.25	75	125	20
4470002	MS	Lead	11/03/2022 14:06:57	93.4		mg/L	0.4	0.374	93.4			75	125		
4470002	MSD	Lead	11/03/2022 14:11:04	95.2		mg/L				0.381	95.2	1.85	75	125	20
4470002	SPK	Lead	11/03/2022 14:02:00	94.5		mg/L	0.1	0.0953	94.5			75	125		
4506005	MS	Lead	11/03/2022 14:46:44	97.9	<0.0005	mg/L	0.4	0.392	97.9			75	125		
4506005	MSD	Lead	11/03/2022 14:50:52	97.2	<0.0005	mg/L				0.389	97.2	0.77	75	125	20
	LFB-MS	Lead	11/03/2022 11:30:45	94.6		mg/L	0.1	0.0946	94.6			80	120		
	LFB-MS	Lead	11/01/2022 11:21:00	97.2		mg/L	0.1	0.0972	97.2			85	115		
	LFB-MS	Lead	11/03/2022 12:48:12	97.7		mg/L	0.1	0.0977	97.7			80	120		
	MB	Lead	11/01/2022 11:11:00	<0.0005		mg/L									
	MB	Lead	11/03/2022 11:20:19	<0.0005		mg/L									
	MB	Lead	11/03/2022 12:44:04	<0.0005		mg/L									
4467001	PDS	Lithium	10/26/2022 09:08:00	88.9	0.573	mg/L	2	2.35	88.9			75	125		
4467001	PDS	Lithium	10/26/2022 09:09:00	88.6	0.573	mg/L				2.344	88.6	0.26	75	125	20
4467004	MS	Lithium	10/26/2022 09:11:51	98.6	<0.02	mg/L	0.4	0.3946	98.6			70	130		
4467004	MSD	Lithium	10/26/2022 09:12:28	99.6	<0.02	mg/L				0.3982	99.6	0.91	70	130	20
	LFB-OE	Lithium	10/26/2022 09:07:42	99.6		mg/L	0.4	0.3983	99.6			85	115		
	MB	Lithium	10/26/2022 09:07:09	<0.04		mg/L									
4278005	MS	Mercury	11/15/2022 10:45:00	96.5	<0.0002	mg/L	0.002	0.0019	96.5			70	130		
4278005	MSD	Mercury	11/15/2022 10:45:00	98.1	<0.0002	mg/L				0.002	98.1	5.13	70	130	20
4467004	MS	Mercury	11/15/2022 10:45:00	96.4	<0.0002	mg/L	0.002	0.0019	96.4			70	130		
4467004	MSD	Mercury	11/15/2022 10:45:00	97.4	<0.0002	mg/L				0.0019	97.4	0.00	70	130	20
4832008	MS	Mercury	11/15/2022 10:45:00	107	<0.0002	mg/L	0.002	0.0021	107			70	130		
4832008	MSD	Mercury	11/15/2022 10:45:00	108	<0.0002	mg/L				0.0022	108	4.65	70	130	20
4962003	MS	Mercury	11/15/2022 10:45:00	104	<0.0002	mg/L	0.002	0.0021	104			70	130		
4962003	MSD	Mercury	11/15/2022 10:45:00	110	<0.0002	mg/L				0.0022	110	4.65	70	130	20
	LFB	Mercury	11/15/2022 10:45:00	103		mg/L	0.002	0.0021	103			85	115		
	LFB	Mercury	11/15/2022 10:45:00	101		mg/L	0.002	0.002	101			85	115		
	LFB	Mercury	10/28/2022 13:46:00	98		mg/L	0.002	0.002	98			85	115		
	LRB	Mercury	11/15/2022 10:45:00	<0.0002		mg/L									
	LRB	Mercury	10/28/2022 13:46:00	<0.0002		mg/L									
	MB	Mercury	11/15/2022 10:45:00	<0.0002		mg/L									
4283001	SPK	Molybdenum	11/03/2022 10:51:00	105	<0.002	mg/L	0.1	0.1048	105			75	125		
4311001	MS	Molybdenum	11/03/2022 11:46:46	82.1	<25	mg/L	0.4	1.63	82.1			75	125		
4311001	MSD	Molybdenum	11/03/2022 11:50:56	84.5	<25	mg/L				1.64	84.5	0.61	75	125	20
4311001	SPK	Molybdenum	11/03/2022 11:42:00	56.6	<25	mg/L	0.1	1.357	56.6			75	125		
4458008	MS	Molybdenum	11/03/2022 12:19:32	105		mg/L	0.4	0.426	105			75	125		
4458008	MSD	Molybdenum	11/03/2022 12:23:40	102		mg/L				0.414	102	2.86	75	125	20
4458008	SPK	Molybdenum	11/03/2022 12:15:00	115		mg/L	0.1	0.1203	115			75	125		
4467001	MS	Molybdenum	11/03/2022 13:04:37	106	<0.002	mg/L	0.4	0.426	106			75	125		
4467001	MSD	Molybdenum	11/03/2022 13:08:45	106	<0.002	mg/L				0.423	106	0.71	75	125	20
4467004	MS	Molybdenum	11/03/2022 13:34:18	96.5	<0.002	mg/L	0.4	0.386	96.5			75	125		
4467004	MSD	Molybdenum	11/03/2022 13:38:27	97	<0.002	mg/L				0.388	97	0.52	75	125	20
4470002	MS	Molybdenum	11/03/2022 14:06:57	96.6		mg/L	0.4	0.429	96.6			75	125		
4470002	MSD	Molybdenum	11/03/2022 14:11:04	97.9		mg/L				0.434	97.9	1.16	75	125	20
4470002	SPK	Molybdenum	11/03/2022 14:02:00	101		mg/L	0.1	0.1437	101			75	125		
4506005	MS	Molybdenum	11/03/2022 14:46:44	99.7		mg/L	0.4	0.399	99.7			75	125		
4506005	MSD	Molybdenum	11/03/2022 14:50:52	100		mg/L				0.401	100	0.50	75	125	20
	LFB-MS	Molybdenum	11/01/2022 11:21:00	104		mg/L	0.1	0.104	104			85	115		
	LFB-MS	Molybdenum	11/03/2022 12:48:12	102		mg/L	0.1	0.102	102			80	120		



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

Sample Comments

4467003 (Dup 1) - Sample

Time sampled was not supplied by the client.

4467004 (Field Blank) - Sample

Time sampled was not supplied by the client.

Analysis Results Comments

4467001 (MW13)

Sample analyzed beyond holding time.(pH)

4467002 (MW80R)

Sample analyzed beyond holding time.(pH)

4467003 (Dup 1)

Sample analyzed beyond holding time.(pH)

4467004 (Field Blank)

Sample analyzed beyond holding time.(pH)

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467001 **Date Collected:** 10/17/2022 12:30 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	9773	umhos/cm	1	1	10/17/2022 12:30	10/17/2022 12:30	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7.03	units	0.01	1	10/17/2022 12:30	10/17/2022 12:30	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	8.73	degrees C		1	10/17/2022 12:30	10/17/2022 12:30	JSM		

Method: ASTM D516-16

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6890	mg/L	250	50	10/26/2022 09:49	10/26/2022 09:49	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	0.57	NTU	0.1	1	10/17/2022 12:30	10/17/2022 12:30	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	10/28/2022 11:15	10/28/2022 13:46	AMC	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	4.15	mg/L	1	5	10/20/2022 10:28	10/20/2022 10:28	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.1	mg/L	0.1	1	10/20/2022 11:31	10/24/2022 09:57	EJV	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467001 **Date Collected:** 10/17/2022 12:30 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 6010D**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	0.59	mg/L	0.5	5	10/24/2022 08:55	10/27/2022 11:48	SLZ	MA,NDA	
Calcium	397	mg/L	5	5	10/19/2022 16:41	10/19/2022 13:47	SLZ	MA,NDA	
Iron, Dissolved	<0.5	mg/L	0.5	5	10/24/2022 08:55	11/01/2022 12:17	SLZ	MA,NDA	
Magnesium	593	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	
Manganese, Dissolved	<0.25	mg/L	0.25	5	10/24/2022 08:55	11/01/2022 12:17	SLZ	MA,NDA	
Potassium	23.8	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	
Sodium	1860	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	
Barium, Dissolved	0.0063	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	
Selenium, Dissolved	0.0334	mg/L	0.005	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 15:52	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	156	meq/L		1	11/04/2022 13:57	11/04/2022 13:57	CW		
Cation Summation	150	meq/L		1	11/04/2022 13:57	11/04/2022 13:57	CW		
Percent Difference	-2.01	%		1	11/04/2022 13:57	11/04/2022 13:57	CW		
TDS - Summation	10100	mg/L	12.5	1	11/04/2022 13:57	11/04/2022 13:57	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467001 **Date Collected:** 10/17/2022 12:30 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: SM2320 B-2011**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 17:29	10/20/2022 17:29	RAA		
Alkalinity, Total	513	mg/L as CaCO3	20.5	1	10/20/2022 17:29	10/20/2022 17:29	RAA	MA,NDA	
Bicarbonate	513	mg/L as CaCO3	20.5	1	10/20/2022 17:29	10/20/2022 17:29	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 17:29	10/20/2022 17:29	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 17:29	10/20/2022 17:29	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	3430	mg/L as CaCO3	6.62	1	11/04/2022 13:57	11/04/2022 13:57	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	9777	umhos/cm	1	1	10/20/2022 17:29	10/20/2022 17:29	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.5	units	0.1	1	10/20/2022 17:29	10/20/2022 17:29	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	71.5	mg/L	2.0	1	10/26/2022 12:28	10/26/2022 12:28	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.84	mg/L	0.1	1	10/20/2022 17:29	10/20/2022 17:29	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	13.8		0.17	1	11/04/2022 13:57	11/04/2022 13:57	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467002 **Date Collected:** 10/17/2022 15:43 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: 120.1**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance - Field	5892	umhos/cm	1	1	10/17/2022 15:43	10/17/2022 15:43	JSM		

Method: 150.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH - Field	7.05	units	0.01	1	10/17/2022 15:43	10/17/2022 15:43	JSM		

Method: 170.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Temperature - Field C	9.87	degrees C		1	10/17/2022 15:43	10/17/2022 15:43	JSM		

Method: ASTM D516-16

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	3460	mg/L	200	40	10/26/2022 09:57	10/26/2022 09:57	EJV	MA,NDA	

Method: EPA 180.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Turbidity - Field	1.15	NTU	0.1	1	10/17/2022 15:43	10/17/2022 15:43	JSM		

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	10/28/2022 11:15	10/28/2022 13:46	AMC	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	22.7	mg/L	1	5	10/20/2022 10:29	10/20/2022 10:29	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.1	mg/L	0.1	1	10/20/2022 11:31	10/24/2022 09:58	EJV	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467002 **Date Collected:** 10/17/2022 15:43 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 6010D**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	<0.5	mg/L	0.5	5	10/24/2022 08:55	10/27/2022 11:49	SLZ	MA,NDA	
Calcium	418	mg/L	5	5	10/19/2022 16:41	10/19/2022 13:47	SLZ	MA,NDA	
Iron, Dissolved	<0.5	mg/L	0.5	5	10/24/2022 08:55	11/01/2022 12:18	SLZ	MA,NDA	
Magnesium	529	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	
Manganese, Dissolved	0.26	mg/L	0.25	5	10/24/2022 08:55	11/01/2022 12:18	SLZ	MA,NDA	
Potassium	5.17	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	
Sodium	582	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:47	SLZ	MA,NDA	

Method: EPA 6020B

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	
Barium, Dissolved	0.0107	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	
Molybdenum, Dissolved	0.0025	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	
Selenium, Dissolved	0.0452	mg/L	0.005	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 15:56	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	88.7	meq/L		1	11/04/2022 13:57	11/04/2022 13:57	CW		
Cation Summation	89.8	meq/L		1	11/04/2022 13:57	11/04/2022 13:57	CW		
Percent Difference	0.65	%		1	11/04/2022 13:57	11/04/2022 13:57	CW		
TDS - Summation	5490	mg/L	12.5	1	11/04/2022 13:57	11/04/2022 13:57	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467002 **Date Collected:** 10/17/2022 15:43 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: SM2320 B-2011**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 19:02	10/20/2022 19:02	RAA		
Alkalinity, Total	543	mg/L as CaCO3	20.5	1	10/20/2022 19:02	10/20/2022 19:02	RAA	MA,NDA	
Bicarbonate	543	mg/L as CaCO3	20.5	1	10/20/2022 19:02	10/20/2022 19:02	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 19:02	10/20/2022 19:02	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 19:02	10/20/2022 19:02	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	3220	mg/L as CaCO3	6.62	1	11/04/2022 13:57	11/04/2022 13:57	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	5924	umhos/cm	1	1	10/20/2022 19:02	10/20/2022 19:02	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.6	units	0.1	1	10/20/2022 19:02	10/20/2022 19:02	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	149	mg/L	2.0	1	10/26/2022 12:29	10/26/2022 12:29	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.23	mg/L	0.1	1	10/20/2022 19:02	10/20/2022 19:02	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	4.46		0.17	1	11/04/2022 13:57	11/04/2022 13:57	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467003 **Date Collected:** 11/04/2022 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: ASTM D516-16**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	6700	mg/L	250	50	10/28/2022 09:58	10/26/2022 09:58	EJV	MA,NDA	

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	10/28/2022 11:15	10/28/2022 13:46	AMC	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	4.10	mg/L	1	5	10/20/2022 10:31	10/20/2022 10:31	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.1	mg/L	0.1	1	10/20/2022 11:31	10/24/2022 09:59	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	0.59	mg/L	0.5	5	10/24/2022 08:55	10/27/2022 11:51	SLZ	MA,NDA	
Calcium	409	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:49	SLZ	MA,NDA	
Iron, Dissolved	<0.5	mg/L	0.5	5	10/24/2022 08:55	11/01/2022 12:22	SLZ	MA,NDA	
Magnesium	612	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:49	SLZ	MA,NDA	
Manganese, Dissolved	<0.25	mg/L	0.25	5	10/24/2022 08:55	11/01/2022 12:22	SLZ	MA,NDA	
Potassium	24.0	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:49	SLZ	MA,NDA	
Sodium	1920	mg/L	5	5	10/19/2022 16:41	10/25/2022 13:49	SLZ	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467003 **Date Collected:** 11/04/2022 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 6020B**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	
Barium, Dissolved	0.0062	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	
Selenium, Dissolved	0.0334	mg/L	0.005	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 16:00	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Anion Summation	154	meq/L		1	11/04/2022 13:58	11/04/2022 13:58	CW		
Cation Summation	155	meq/L		1	11/04/2022 13:58	11/04/2022 13:58	CW		
Percent Difference	0.39	%		1	11/04/2022 13:58	11/04/2022 13:58	CW		
TDS - Summation	10100	mg/L	12.5	1	11/04/2022 13:58	11/04/2022 13:58	CW		

Method: SM2320 B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 14:36	10/20/2022 14:36	RAA		
Alkalinity, Total	579	mg/L as CaCO3	20.5	1	10/20/2022 14:36	10/20/2022 14:36	RAA	MA,NDA	
Bicarbonate	579	mg/L as CaCO3	20.5	1	10/20/2022 14:36	10/20/2022 14:36	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 14:36	10/20/2022 14:36	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 14:36	10/20/2022 14:36	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	3540	mg/L as CaCO3	6.62	1	11/04/2022 13:57	11/04/2022 13:57	CW	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467003 **Date Collected:** 11/04/2022 **Matrix:** Groundwater
Sample ID: Dup 1 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: SM2510 B-2011 EC**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	9783	umhos/cm	1	1	10/20/2022 14:36	10/20/2022 14:36	RAA	MA,NDA	

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	7.2	units	0.1	1	10/20/2022 14:36	10/20/2022 14:36	RAA	MA,NDA	*

Method: SM4500-Cl-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	71.8	mg/L	2.0	1	10/26/2022 12:30	10/26/2022 12:30	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	0.84	mg/L	0.1	1	10/20/2022 14:36	10/20/2022 14:36	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	14.0		0.17	1	11/04/2022 13:58	11/04/2022 13:58	CW		

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467004 **Date Collected:** 11/04/2022 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: ASTM D516-16**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sulfate	<5	mg/L	5	1	10/26/2022 09:59	10/26/2022 09:59	EJV	MA,NDA	

Method: EPA 245.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Mercury, Dissolved	<0.0002	mg/L	0.0002	1	10/28/2022 11:15	10/28/2022 13:46	AMC	MA,NDA	

Method: EPA 353.2

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Nitrate + Nitrite as N	<0.2	mg/L	0.2	1	10/20/2022 10:32	10/20/2022 10:32	EJV	MA,NDA	

Method: EPA 365.1

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Phosphorus as P	<0.1	mg/L	0.1	1	10/20/2022 11:31	10/24/2022 10:00	EJV	MA,NDA	

Method: EPA 6010D

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Boron, Dissolved	<0.1	mg/L	0.1	1	10/24/2022 08:55	10/27/2022 11:53	SLZ	MA,NDA	
Calcium	<1	mg/L	1	1	10/19/2022 16:41	10/25/2022 13:50	SLZ	MA,NDA	
Iron, Dissolved	<0.1	mg/L	0.1	1	10/24/2022 08:55	11/01/2022 12:23	SLZ	MA,NDA	
Magnesium	<1	mg/L	1	1	10/19/2022 16:41	10/25/2022 13:50	SLZ	MA,NDA	
Manganese, Dissolved	<0.05	mg/L	0.05	1	10/24/2022 08:55	11/01/2022 12:23	SLZ	MA,NDA	
Potassium	<1	mg/L	1	1	10/19/2022 16:41	10/25/2022 13:50	SLZ	MA,NDA	
Sodium	<1	mg/L	1	1	10/19/2022 16:41	10/25/2022 13:50	SLZ	MA,NDA	

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4467004 **Date Collected:** 11/04/2022 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6**Method: EPA 6020B**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Arsenic, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	
Barium, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	
Cadmium, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	
Chromium, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	
Lead, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	
Molybdenum, Dissolved	<0.002	mg/L	0.002	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	
Selenium, Dissolved	<0.005	mg/L	0.005	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	
Silver, Dissolved	<0.0005	mg/L	0.0005	5	10/24/2022 08:55	11/03/2022 16:04	MDE	MA,NDA	

Method: SM1030F

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
TDS - Summation	<12.5	mg/L	12.5	1	11/04/2022 13:59	11/04/2022 13:59	CW		

Method: SM2320 B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Alkalinity, Phenolphthalein	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 12:21	10/20/2022 12:21	RAA		
Alkalinity, Total	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 12:21	10/20/2022 12:21	RAA	MA,NDA	
Bicarbonate	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 12:21	10/20/2022 12:21	RAA		
Carbonate	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 12:21	10/20/2022 12:21	RAA		
Hydroxide	<20.5	mg/L as CaCO3	20.5	1	10/20/2022 12:21	10/20/2022 12:21	RAA		

Method: SM2340B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Hardness - Total	<6.62	mg/L as CaCO3	6.62	1	11/04/2022 13:58	11/04/2022 13:58	CW	MA,NDA	

Method: SM2510 B-2011 EC

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Specific Conductance	1	umhos/cm	1	1	10/21/2022 09:20	10/21/2022 09:20	RAA	MA,NDA	

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www.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 4467004 **Date Collected:** 11/04/2022 **Matrix:** Groundwater
Sample ID: Field Blank **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 0.6

Method: SM4500 H+ B-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
pH	6.3	units	0.1	1	10/20/2022 12:21	10/20/2022 12:21	RAA	MA,NDA	*

Method: SM4500-CI-E 2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Chloride	<2.0	mg/L	2.0	1	10/20/2022 12:31	10/26/2022 12:31	EJV	MA,NDA	

Method: SM4500-F-C-2011

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Fluoride	<0.1	mg/L	0.1	1	10/20/2022 12:21	10/20/2022 12:21	RAA		

Method: USDA 20b

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Sodium Adsorption Ratio	<0.17		0.17	1	11/04/2022 13:58	11/04/2022 13:58	CW		

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October 20, 2022

Montana-Dakota Utilities
Todd Peterson
400 N. 4th St
Bismarck, ND 58501

RE: MDU Heskett Groundwater Sampling

Dear Mr. Peterson,

From October 17-18, 2022, MVTL Field Services division collected ground water samples at the MDU Heskett Station near Mandan, ND. Samples were collected from 2 of the 5 wells. Wells 1-90, 2-90, and 3-90 were found to be dry during this sample event. A Duplicate sample was collected from well MW13. Samples collected were placed on ice and transported to MVTL in Bismarck, ND for analysis.

Thank you for your trust and support of our services. If you have any questions, please call me at (701) 391-4900.

Sincerely,

Jeremy Meyer

MVTL Field Services Manager

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis WO: 4467 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Fall 2022 Sampled By: <i>Jerry</i>

Lab Number	Sample ID	Sample Information		Sample Type	Sample Containers						Field Readings				Analysis Required	
		Date	Time		1 Liter Raw	500 mL HN03	500 mL HN03 (filtered)	250 mL H2SO4	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)				
001	MW13	17Oct22	1230	GW	X	X	X	X				8.73	9773	7.03	0.57	MDU Heskett List
---	MW1-90	18Oct22	1205	GW	X	X	X	X	X			Dry				
---	MW2-90	18Oct22	1202	GW	X	X	X	X	X			Dry				
---	MW3-90	18Oct22	1158	GW	X	X	X	X	X			Dry				
002	MW80R	17Oct22	1543	GW	X	X	X	X				9.87	5892	7.05	1.15	
003	Dup 1	17Oct22	NA	GW	X	X	X	X				NA	NA	NA	NA	
004	Field Blank (FB)	18Oct22	NA	GW	X	X	X	X				NA	NA	NA	NA	

Comments: * 18Oct22 ↘

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>Jerry</i>	17 Oct 22 08:00	Log In Walk In #2	16 TM562 / TM805	<i>Jerry</i>	19 Oct 22 08:20

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event: Fall 2022
Sample ID: 13
Sampling Personal: J. Taylor

Weather Conditions: Temp: 50 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with fields: Well Locked?, Well Labeled?, Casing Strait?, Grout Seal Intact?, Repairs Necessary?, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with fields: Purging Method, Sampling Method, Dedicated Equipment?, Duplicate Sample?, Duplicate Sample ID, Bottle List, Control Settings.

FIELD READINGS table with columns: Purge Date, Time, Temp. (°C), Spec. Cond., pH, DO (mg/L), ORP (mV), Turbidity (NTU), Water Level (ft), Pumping Rate (ml/Min), mL Removed, Appearance or Comment.

Summary table with columns: Sample Date, Time, Temp. (°C), Spec. Cond., pH, Turbidity (NTU), Appearance or Comment.

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



Field Datasheet
Groundwater Assessment

Company: MDU Heskett
Event: Fall 2022
Sample ID: 390
Sampling Personal: JyH

2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION table with fields: Well Locked?, Well Labeled?, Casing Strait?, Grout Seal Intact?, Repairs Necessary?, Casing Diameter, Water Level Before Purge, Total Depth of Well, Well Volume, Depth to Top of Pump, Water Level After Sample, Measurement Method.

SAMPLING INFORMATION table with fields: Purging Method, Sampling Method, Dedicated Equipment?, Duplicate Sample?, Duplicate Sample ID, Control Settings, Bottle List.

FIELD READINGS table with columns: Purge Date, Time, Temp. (°C), Spec. Cond., pH, DO (mg/L), ORP (mV), Turbidity (NTU), Water Level (ft), Pumping Rate (ml/Min), mL Removed, Appearance or Comment.

Summary table with columns: Sample Date, Time, Temp. (°C), Spec. Cond., pH, Turbidity (NTU), Appearance or Comment.

Comments: insufficient volume No Sample
Water level below Pump

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: **MDU Heskett**
Event: **Fall 2022**
Sample ID: **BOR**
Sampling Personal: **J. J. J.**

Weather Conditions: Temp: **60°F** Wind: **N @ 5-10** Precip: **Sunny / Partly Cloudy / Cloudy**

WELL INFORMATION		
Well Locked?	YES NO	
Well Labeled?	YES NO	
Casing Strait?	YES NO	
Grout Seal Intact?	YES NO	Not Visible
Repairs Necessary?		
Casing Diameter:	2"	
Water Level Before Purge:	15.4	ft
Total Depth of Well:		ft
Well Volume:		liters
Depth to Top of Pump:		ft
Water Level After Sample:	15.81	ft
Measurement Method:	Electric Water Level Indicator	

SAMPLING INFORMATION		
Purging Method:	Bladder	Control Settings:
Sampling Method:	Bladder	Purge: 5 Sec.
Dedicated Equipment?	YES NO	Recover: 55 Sec.
Duplicate Sample?	YES NO	PSI: 2.0
Duplicate Sample ID:		
Bottle List:		
1 Liter Raw	4- 1L Nitric	
500mL Nitric		
500mL Nitric (filtered)		
250mL Sulfuric		

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10		(ft)	ml/Min		Clarity, Color, Odor, Ect.
17 Oct 22	1508	Start of Well Purge									
	1528	9.91	5887	7.04	0.22	89.7	1.35	15.68	100.0	2000.0	Clear
	1533	9.88	5885	7.04	0.21	80.7	1.34	15.71	100.0	500.0	Clear
	1538	9.98	5886	7.05	0.17	76.9	1.05	15.73	100.0	500.0	Clear
	1543	9.87	5892	7.05	0.16	75.7	1.15	15.75	100.0	500.0	Clear

Well Stabilized? **(YES)** **NO** Total Volume Purged: **3500.0** ml

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment
17 Oct 22	1543	9.87	5892	7.05			1.15				Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet
Surface water Assessment

Company: MDU Lewis & Clark
Event: Fall 2022
Sampling Personal: [Signature]

Weather Conditions: Temp: _____ °F Wind: _____ @ _____ Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	17 Oct 22	1437	2"	22.50	
MW33		1456	2"	44.10	
MW101		1440	2"	38.50	
MW102		1434	2"	19.28	
MW103		1445	2"	35.68	
MW44R		1450	2"	28.91	
MW104		1500	2"	15.54	
MW105		1503	2"	13.53	

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Original Sample	QC Type	Analyte	Analysis Date	QC Result	Original Sample Re Units	Spike Amount	Spike Resu	Spike % Recov	Spike Duplicate	Spike Duplicate RPD (%)	Lower Control Limit	Upper Control Limit	RPD Limit (%)
4458019	MS	Alkalinity, Total	10/20/2022 11:46:06	95.93	<20.5	mg/L	410	393	95.93		80	120	
4458019	MSD	Alkalinity, Total	10/20/2022 12:00:15	95.21	<20.5	mg/L				390	95.21	0.77	20
4470001	MS	Alkalinity, Total	10/20/2022 21:39:14	96.84	389	mg/L	410	786	96.84		80	120	
4470001	MSD	Alkalinity, Total	10/20/2022 21:51:17	81.87	389	mg/L				725	81.87	8.07	20
4519001	MS	Alkalinity, Total	10/20/2022 18:11:25	76.08	896	mg/L	410	1210	76.08		80	120	
4519001	MSD	Alkalinity, Total	10/20/2022 18:26:13	76.23	896	mg/L				1210	76.23	0.00	20
4555002	MS	Alkalinity, Total	10/21/2022 03:41:01	104.7	538	mg/L	410	967	104.7		80	120	
4555002	MSD	Alkalinity, Total	10/21/2022 03:53:08	83.85	538	mg/L				882	83.85	9.19	20
	CRM	Alkalinity, Total	10/20/2022 10:17:14	93.51		mg/L	501	468	93.51		80	120	
	LFB	Alkalinity, Total	10/21/2022 00:54:19	95.55		mg/L	410	392	95.55		90	110	
	LFB	Alkalinity, Total	10/20/2022 15:06:02	93.74		mg/L	410	384	93.74		90	110	
	LFB	Alkalinity, Total	10/20/2022 20:25:27	95		mg/L	410	390	95		90	110	
	LFB	Alkalinity, Total	10/21/2022 05:04:23	95.86		mg/L	410	393	95.86		90	110	
	LFB	Alkalinity, Total	10/20/2022 10:06:08	94.04		mg/L	410	386	94.04		90	110	
	MB	Alkalinity, Total	10/20/2022 20:19:00	<20.5		mg/L as CaCO3							
	MB	Alkalinity, Total	10/20/2022 14:59:18	<20.5		mg/L as CaCO3							
	MB	Alkalinity, Total	10/21/2022 00:47:00	<50		mg/L as CaCO3							
	MB	Alkalinity, Total	10/21/2022 04:57:00	<230		mg/L as CaCO3							
	MB	Alkalinity, Total	10/20/2022 09:51:43	<20.5		mg/L as CaCO3							
4283001	SPK	Arsenic, Dissolved	11/03/2022 10:51:00	102	<0.002	mg/L	0.1	0.1016	102		75	125	
4311001	MS	Arsenic, Dissolved	11/03/2022 11:46:46	99.4		mg/L	0.4	0.513	99.4		75	125	
4311001	MSD	Arsenic, Dissolved	11/03/2022 11:50:56	100		mg/L				0.516	100	0.58	20
4311001	SPK	Arsenic, Dissolved	11/03/2022 11:42:00	95.3		mg/L	0.1	0.2101	95.3		75	125	
4458008	MS	Arsenic, Dissolved	11/03/2022 12:19:32	100	0.0032	mg/L	0.4	0.404	100		75	125	
4458008	MSD	Arsenic, Dissolved	11/03/2022 12:23:40	99.3	0.0032	mg/L				0.4	99.3	1.00	20
4458008	SPK	Arsenic, Dissolved	11/03/2022 12:15:00	105	0.0032	mg/L	0.1	0.1085	105		75	125	
4467001	MS	Arsenic, Dissolved	11/03/2022 13:04:37	102	<0.002	mg/L	0.4	0.41	102		75	125	
4467001	MSD	Arsenic, Dissolved	11/03/2022 13:08:45	101	<0.002	mg/L				0.405	101	1.23	20
4467004	MS	Arsenic, Dissolved	11/03/2022 13:34:18	98.6	<0.002	mg/L	0.4	0.394	98.6		75	125	
4467004	MSD	Arsenic, Dissolved	11/03/2022 13:38:27	99.3	<0.002	mg/L				0.397	99.3	0.76	20
4467004	SPK	Arsenic, Dissolved	11/03/2022 16:08:00	104	<0.002	mg/L	0.1	0.1041	104		75	125	
4467004	SPKD	Arsenic, Dissolved	11/03/2022 16:12:00	103	<0.002	mg/L				0.1028	103	1.26	20
4470002	MS	Arsenic, Dissolved	11/03/2022 14:06:57	96.3	0.0043	mg/L	0.4	0.389	96.3		75	125	
4470002	MSD	Arsenic, Dissolved	11/03/2022 14:11:04	99.5	0.0043	mg/L				0.402	99.5	3.29	20
4470002	SPK	Arsenic, Dissolved	11/03/2022 14:02:00	100	0.0043	mg/L	0.1	0.1046	100		75	125	
4506005	MS	Arsenic, Dissolved	11/03/2022 14:46:44	100		mg/L	0.4	0.4	100		75	125	
4506005	MSD	Arsenic, Dissolved	11/03/2022 14:50:52	102		mg/L				0.407	102	1.73	20
	LFB-MS	Arsenic, Dissolved	11/03/2022 11:30:45	98.1		mg/L	0.1	0.0981	98.1		80	120	
	LFB-MS	Arsenic, Dissolved	11/01/2022 11:21:00	99		mg/L	0.1	0.099	99		85	115	
	LFB-MS	Arsenic, Dissolved	11/03/2022 12:48:12	100		mg/L	0.1	0.1	100		80	120	
	MB	Arsenic, Dissolved	11/03/2022 12:44:04	<0.002		mg/L							
	MB	Arsenic, Dissolved	11/03/2022 11:20:19	<0.002		mg/L							
	MB	Arsenic, Dissolved	11/01/2022 11:11:00	<0.002		mg/L							
4283001	SPK	Barium, Dissolved	11/03/2022 10:51:00	94.9	<0.1	mg/L	0.1	0.1503	94.9		75	125	
4311001	MS	Barium, Dissolved	11/03/2022 11:46:46	76.5		mg/L	0.4	0.486	76.5		75	125	
4311001	MSD	Barium, Dissolved	11/03/2022 11:50:56	88.5		mg/L				0.535	88.5	9.60	20
4311001	SPK	Barium, Dissolved	11/03/2022 11:42:00	93.6		mg/L	0.1	0.2742	93.6		75	125	
4458008	MS	Barium, Dissolved	11/03/2022 12:19:32	98.4	<0.5	mg/L	0.4	0.436	98.4		75	125	
4458008	MSD	Barium, Dissolved	11/03/2022 12:23:40	98.9	<0.5	mg/L				0.438	98.9	0.46	20
4458008	SPK	Barium, Dissolved	11/03/2022 12:15:00	105	<0.5	mg/L	0.1	0.1481	105		75	125	
4467001	MS	Barium, Dissolved	11/03/2022 13:04:37	94.3	0.0063	mg/L	0.4	0.384	94.3		75	125	
4467001	MSD	Barium, Dissolved	11/03/2022 13:08:45	93.7	0.0063	mg/L				0.382	93.7	0.52	20

4467004	MS	Barium, Dissolved	11/03/2022 13:34:18	98.9	<0.002	mg/L	0.4	0.395	98.9			75	125		
4467004	MSD	Barium, Dissolved	11/03/2022 13:38:27	98.7	<0.002	mg/L				0.395	98.7	0.00	75	125	20
4467004	SPK	Barium, Dissolved	11/03/2022 16:08:00	103	<0.002	mg/L	0.1	0.1027	103				75	125	
4467004	SPKD	Barium, Dissolved	11/03/2022 16:12:00	104	<0.002	mg/L				0.1036	104	0.87	75	125	20
4470002	MS	Barium, Dissolved	11/03/2022 14:06:57	95.9	0.0419	mg/L	0.4	0.425	95.9				75	125	
4470002	MSD	Barium, Dissolved	11/03/2022 14:11:04	97.3	0.0419	mg/L				0.431	97.3	1.40	75	125	20
4470002	SPK	Barium, Dissolved	11/03/2022 14:02:00	98.5	0.0419	mg/L	0.1	0.1404	98.5				75	125	
4506005	MS	Barium, Dissolved	11/03/2022 14:46:44	99.2		mg/L	0.4	0.483	99.2				75	125	
4506005	MSD	Barium, Dissolved	11/03/2022 14:50:52	96.6		mg/L				0.473	96.6	2.09	75	125	20
	LFB-MS	Barium, Dissolved	11/03/2022 11:30:45	95		mg/L	0.1	0.095	95				80	120	
	LFB-MS	Barium, Dissolved	11/03/2022 12:48:12	98		mg/L	0.1	0.098	98				80	120	
	LFB-MS	Barium, Dissolved	11/01/2022 11:21:00	97.8		mg/L	0.1	0.0978	97.8				85	115	
	MB	Barium, Dissolved	11/03/2022 12:44:04	<0.002		mg/L									
	MB	Barium, Dissolved	11/01/2022 11:11:00	<0.002		mg/L									
	MB	Barium, Dissolved	11/03/2022 11:20:19	<0.002		mg/L									
4470001	SPK	Boron, Dissolved	10/27/2022 11:57:28	89.7	0.96	mg/L	0.4	1.315	89.7				75	125	
4470001	SPKD	Boron, Dissolved	10/27/2022 11:59:23	86.2	0.96	mg/L				1.301	86.2	1.07	75	125	20
4470002	MS	Boron, Dissolved	10/27/2022 11:08:13	91.3	1.09	mg/L	0.4	1.459	91.3				70	130	
4470002	MSD	Boron, Dissolved	10/27/2022 11:10:08	87.8	1.09	mg/L				1.445	87.8	0.96	70	130	
	LFB-OE	Boron, Dissolved	10/27/2022 10:37:47	99		mg/L	0.4	0.3961	99				85	115	
	LFB-OE	Boron, Dissolved	10/27/2022 10:49:14	98.9		mg/L	0.4	0.3955	98.9				85	115	
	MB	Boron, Dissolved	10/27/2022 10:47:14	<0.1		mg/L									
	MB	Boron, Dissolved	10/27/2022 10:35:50	<0.1		mg/L									
4283001	SPK	Cadmium, Dissolved	11/03/2022 10:51:00	97	<0.0005	mg/L	0.1	0.097	97				75	125	
4311001	MS	Cadmium, Dissolved	11/03/2022 11:46:46	92.7		mg/L	0.4	0.371	92.7				75	125	
4311001	MSD	Cadmium, Dissolved	11/03/2022 11:50:56	94.2		mg/L				0.377	94.2	1.60	75	125	20
4311001	SPK	Cadmium, Dissolved	11/03/2022 11:42:00	87.1		mg/L	0.1	0.0871	87.1				75	125	
4458008	MS	Cadmium, Dissolved	11/03/2022 12:19:32	93.6	0.0007	mg/L	0.4	0.375	93.6				75	125	
4458008	MSD	Cadmium, Dissolved	11/03/2022 12:23:40	92	0.0007	mg/L				0.369	92	1.61	75	125	20
4458008	SPK	Cadmium, Dissolved	11/03/2022 12:15:00	92.1	0.0007	mg/L	0.1	0.0928	92.1				75	125	
4467001	MS	Cadmium, Dissolved	11/03/2022 13:04:37	93.2	<0.0005	mg/L	0.4	0.373	93.2				75	125	
4467001	MSD	Cadmium, Dissolved	11/03/2022 13:08:45	91.6	<0.0005	mg/L				0.366	91.6	1.89	75	125	20
4467004	MS	Cadmium, Dissolved	11/03/2022 13:34:18	94.6	<0.0005	mg/L	0.4	0.378	94.6				75	125	
4467004	MSD	Cadmium, Dissolved	11/03/2022 13:38:27	95.1	<0.0005	mg/L				0.38	95.1	0.53	75	125	20
4467004	SPK	Cadmium, Dissolved	11/03/2022 16:08:00	102	<0.0005	mg/L	0.1	0.1022	102				75	125	
4467004	SPKD	Cadmium, Dissolved	11/03/2022 16:12:00	100	<0.0005	mg/L				0.1002	100	1.98	75	125	20
4470002	MS	Cadmium, Dissolved	11/03/2022 14:06:57	92.3	<0.0005	mg/L	0.4	0.369	92.3				75	125	
4470002	MSD	Cadmium, Dissolved	11/03/2022 14:11:04	93.4	<0.0005	mg/L				0.374	93.4	1.34	75	125	20
4470002	SPK	Cadmium, Dissolved	11/03/2022 14:02:00	93.6	<0.0005	mg/L	0.1	0.0936	93.6				75	125	
4506005	MS	Cadmium, Dissolved	11/03/2022 14:46:44	96.3		mg/L	0.4	0.385	96.3				75	125	
4506005	MSD	Cadmium, Dissolved	11/03/2022 14:50:52	96.5		mg/L				0.386	96.5	0.26	75	125	20
	LFB-MS	Cadmium, Dissolved	11/03/2022 12:48:12	98		mg/L	0.1	0.098	98				80	120	
	LFB-MS	Cadmium, Dissolved	11/03/2022 11:30:45	95.6		mg/L	0.1	0.0956	95.6				80	120	
	LFB-MS	Cadmium, Dissolved	11/01/2022 11:21:00	99.5		mg/L	0.1	0.0995	99.5				85	115	
	MB	Cadmium, Dissolved	11/01/2022 11:11:00	<0.0005		mg/L									
	MB	Cadmium, Dissolved	11/03/2022 11:20:19	<0.0005		mg/L									
	MB	Cadmium, Dissolved	11/03/2022 12:44:04	<0.0005		mg/L									
4479001	MS	Chloride	10/26/2022 12:38:48	116	96.1	mg/L	30	131	116				80	120	
4479001	MSD	Chloride	10/26/2022 12:39:58	116	96.1	mg/L				131	116	0.00	80	120	20
4519004	MS	Chloride	10/26/2022 14:30:22	94	5.3	mg/L	30	33.5	94				80	120	
4519004	MSD	Chloride	10/26/2022 14:31:34	94.1	5.3	mg/L				33.5	94.1	0.00	80	120	20
4594001	MS	Chloride	10/26/2022 15:05:50	101	4.5	mg/L	30	34.9	101				80	120	
4594001	MSD	Chloride	10/26/2022 15:07:01	101	4.5	mg/L				34.8	101	0.29	80	120	20
	LFB	Chloride	10/26/2022 14:50:28	92.5		mg/L	30	27.7	92.5				90	110	

4458014	SPK	Iron, Dissolved	11/01/2022 12:02:28	89.3	<0.1	mg/L	0.4	0.3572	89.3			75	125		
4458014	SPKD	Iron, Dissolved	11/01/2022 12:03:27	90.2	<0.1	mg/L				0.3606	90.2	0.95	75	125	20
4458021	SPK	Iron, Dissolved	11/01/2022 12:12:32	94.6	<0.1	mg/L	0.4	0.3785	94.6				75	125	
4458021	SPKD	Iron, Dissolved	11/01/2022 12:13:32	95.9	<0.1	mg/L				0.3834	95.9	1.29	75	125	20
4470001	SPK	Iron, Dissolved	11/01/2022 12:25:19	89.4	<0.1	mg/L	0.4	0.3577	89.4				75	125	
4470001	SPKD	Iron, Dissolved	11/01/2022 12:26:17	90.9	<0.1	mg/L				0.3636	90.9	1.64	75	125	20
4470002	MS	Iron, Dissolved	11/01/2022 10:25:00	117	1.15	mg/L	0.4	1.614	117				70	130	
4470002	MSD	Iron, Dissolved	11/01/2022 10:26:00	122	1.15	mg/L				1.634	122	1.23	70	130	
4594002	SPK	Iron, Dissolved	11/01/2022 12:37:49	94.4	0.32	mg/L	0.4	0.6991	94.4				75	125	
4594002	SPKD	Iron, Dissolved	11/01/2022 12:38:48	91.9	0.32	mg/L				0.6892	91.9	1.43	75	125	20
	LFB-OE	Iron, Dissolved	11/01/2022 10:09:22	103		mg/L	0.4	0.4132	103				85	115	
	LFB-OE	Iron, Dissolved	11/01/2022 10:22:25	102		mg/L	0.4	0.4071	102				85	115	
	MB	Iron, Dissolved	11/01/2022 10:08:08	<0.1		mg/L									
	MB	Iron, Dissolved	11/01/2022 10:21:09	<0.1		mg/L									
4283001	SPK	Lead, Dissolved	11/03/2022 10:51:00	95.1	<0.0005	mg/L	0.1	0.0951	95.1				75	125	
4311001	MS	Lead, Dissolved	11/03/2022 11:46:46	86.3		mg/L	0.4	0.345	86.3				75	125	
4311001	MSD	Lead, Dissolved	11/03/2022 11:50:56	89.9		mg/L				0.36	89.9	4.26	75	125	20
4311001	SPK	Lead, Dissolved	11/03/2022 11:42:00	85.8		mg/L	0.1	0.0858	85.8				75	125	
4458008	MS	Lead, Dissolved	11/03/2022 12:19:32	91.9	0.0027	mg/L	0.4	0.37	91.9				75	125	
4458008	MSD	Lead, Dissolved	11/03/2022 12:23:40	90.6	0.0027	mg/L				0.365	90.6	1.36	75	125	20
4458008	SPK	Lead, Dissolved	11/03/2022 12:15:00	93.1	0.0027	mg/L	0.1	0.0958	93.1				75	125	
4467001	MS	Lead, Dissolved	11/03/2022 13:04:37	91.3	<0.0005	mg/L	0.4	0.365	91.3				75	125	
4467001	MSD	Lead, Dissolved	11/03/2022 13:08:45	90.4	<0.0005	mg/L				0.362	90.4	0.82	75	125	20
4467004	MS	Lead, Dissolved	11/03/2022 13:34:18	98	<0.0005	mg/L	0.4	0.392	98				75	125	
4467004	MSD	Lead, Dissolved	11/03/2022 13:38:27	98.2	<0.0005	mg/L				0.393	98.2	0.25	75	125	20
4467004	SPK	Lead, Dissolved	11/03/2022 16:08:00	101	<0.0005	mg/L	0.1	0.1008	101				75	125	
4467004	SPKD	Lead, Dissolved	11/03/2022 16:12:00	101	<0.0005	mg/L				0.1013	101	0.49	75	125	20
4470002	MS	Lead, Dissolved	11/03/2022 14:06:57	93.4	0.0008	mg/L	0.4	0.374	93.4				75	125	
4470002	MSD	Lead, Dissolved	11/03/2022 14:11:04	95.2	0.0008	mg/L				0.381	95.2	1.85	75	125	20
4470002	SPK	Lead, Dissolved	11/03/2022 14:02:00	94.5	0.0008	mg/L	0.1	0.0953	94.5				75	125	
4506005	MS	Lead, Dissolved	11/03/2022 14:46:44	97.9		mg/L	0.4	0.392	97.9				75	125	
4506005	MSD	Lead, Dissolved	11/03/2022 14:50:52	97.2		mg/L				0.389	97.2	0.77	75	125	20
	LFB-MS	Lead, Dissolved	11/01/2022 11:21:00	97.2		mg/L	0.1	0.0972	97.2				85	115	
	LFB-MS	Lead, Dissolved	11/03/2022 11:30:45	94.6		mg/L	0.1	0.0946	94.6				80	120	
	LFB-MS	Lead, Dissolved	11/03/2022 12:48:12	97.7		mg/L	0.1	0.0977	97.7				80	120	
	MB	Lead, Dissolved	11/01/2022 11:11:00	<0.0005		mg/L									
	MB	Lead, Dissolved	11/03/2022 11:20:19	<0.0005		mg/L									
	MB	Lead, Dissolved	11/03/2022 12:44:04	<0.0005		mg/L									
4049002	PDS	Magnesium	10/25/2022 12:08:18	101	32.2	mg/L	100	133.3	101				75	125	
4049002	PDSD	Magnesium	10/25/2022 12:09:06	101	32.2	mg/L				133.1	101	0.15	75	125	20
4278001	PDS	Magnesium	10/25/2022 12:25:24	96.3		mg/L	100	145.6	96.3				75	125	
4278001	PDSD	Magnesium	10/25/2022 12:26:11	98		mg/L				147.3	98	1.16	75	125	20
4283001	PDS	Magnesium	10/25/2022 12:48:41	95.9	24.4	mg/L	100	120.3	95.9				75	125	
4283001	PDSD	Magnesium	10/25/2022 12:49:31	96.4	24.4	mg/L				120.8	96.4	0.42	75	125	20
4284001	PDS	Magnesium	10/25/2022 12:55:26	99.6	<1	mg/L	100	99.55	99.6				75	125	
4284001	PDSD	Magnesium	10/25/2022 12:56:29	100	<1	mg/L				100.3	100	0.75	75	125	20
4311001	PDS	Magnesium	10/25/2022 13:10:00	102	<10	mg/L	1000	1023	102				75	125	
4311001	PDSD	Magnesium	10/25/2022 13:11:00	101	<10	mg/L				1009	101	1.38	75	125	20
4448001	DUP	Magnesium	10/25/2022 13:13:23	168.0	168	mg/L						0.00			20
4458008	DUP	Magnesium	10/25/2022 13:22:52	625.2	619	mg/L						1.00			20
4458009	PDS	Magnesium	10/25/2022 13:24:00	98.5	219	mg/L	500	711.2	98.5				75	125	
4458009	PDSD	Magnesium	10/25/2022 13:25:00	99.8	219	mg/L				717.8	99.8	0.92	75	125	20
4458014	DUP	Magnesium	10/25/2022 13:32:17	65.50	62.6	mg/L						4.53			20
4458021	PDS	Magnesium	10/25/2022 13:40:35	98.9	5.87	mg/L	100	104.8	98.9				75	125	

4458021	PDSD	Magnesium	10/25/2022 13:41:32	99.2	5.87	mg/L				105.1	99.2	0.29	75	125	20
4467002	DUP	Magnesium	10/25/2022 13:48:43	546.7	529	mg/L						3.29			20
4470001	DUP	Magnesium	10/25/2022 13:51:59	75.75	77.6	mg/L						2.41			20
4470002	PDS	Magnesium	10/25/2022 13:53:32	96.5	58.6	mg/L	100	155.1	96.5				75	125	
4470002	PDSD	Magnesium	10/25/2022 13:54:25	97	58.6	mg/L				155.6	97	0.32	75	125	20
4477001	PDS	Magnesium	10/25/2022 13:58:22	99.2		mg/L	100	99.22	99.2				75	125	
4477001	PDSD	Magnesium	10/25/2022 13:59:23	99.6		mg/L				99.55	99.6	0.33	75	125	20
4506006	DUP	Magnesium	10/25/2022 14:06:43	25.36	25.4	mg/L						0.16			20
	LFB-MI	Magnesium	10/25/2022 13:08:42	102		mg/L	100	102.5	102				85	115	
	LFB-MI	Magnesium	10/25/2022 13:36:29	104		mg/L	100	103.6	104				85	115	
	MB	Magnesium	10/25/2022 13:07:50	<1		mg/L									
	MB	Magnesium	10/25/2022 13:35:37	<1		mg/L									
4458014	SPK	Manganese, Dissolved	11/01/2022 12:02:28	83.1	0.36	mg/L	0.4	0.6921	83.1				75	125	
4458014	SPKD	Manganese, Dissolved	11/01/2022 12:03:27	81.4	0.36	mg/L				0.685	81.4	1.03	75	125	20
4458021	SPK	Manganese, Dissolved	11/01/2022 12:12:32	94.7	<0.05	mg/L	0.4	0.3788	94.7				75	125	
4458021	SPKD	Manganese, Dissolved	11/01/2022 12:13:32	95.5	<0.05	mg/L				0.3819	95.5	0.82	75	125	20
4470001	SPK	Manganese, Dissolved	11/01/2022 12:25:19	90.6	<0.05	mg/L	0.4	0.3625	90.6				75	125	
4470001	SPKD	Manganese, Dissolved	11/01/2022 12:26:17	93.9	<0.05	mg/L				0.3755	93.9	3.52	75	125	20
4470002	MS	Manganese, Dissolved	11/01/2022 10:25:00	84	0.23	mg/L	0.4	0.5701	84				70	130	
4470002	MSD	Manganese, Dissolved	11/01/2022 10:26:00	84.2	0.23	mg/L				0.571	84.2	46.10	70	130	20
4594002	SPK	Manganese, Dissolved	11/01/2022 12:37:49	98.3	0.10	mg/L	0.4	0.4976	98.3				75	125	
4594002	SPKD	Manganese, Dissolved	11/01/2022 12:38:48	96.6	0.10	mg/L				0.4907	96.6	1.40	75	125	20
	LFB-OE	Manganese, Dissolved	11/01/2022 10:09:22	104		mg/L	0.4	0.414	104				85	115	
	LFB-OE	Manganese, Dissolved	11/01/2022 10:22:25	103		mg/L	0.4	0.4118	103				85	115	
	MB	Manganese, Dissolved	11/01/2022 10:08:08	<0.05		mg/L									
	MB	Manganese, Dissolved	11/01/2022 10:21:09	<0.05		mg/L									
4467004	MS	Mercury, Dissolved	10/28/2022 13:46:00	90.6	<0.0002	mg/L	0.002	0.0018	90.6				70	130	
4467004	MSD	Mercury, Dissolved	10/28/2022 13:46:00	91.8	<0.0002	mg/L				0.0018	91.8	0.00	70	130	20
	LFB	Mercury, Dissolved	10/28/2022 13:46:00	98		mg/L	0.002	0.002	98				85	115	
	LFB	Mercury, Dissolved	11/15/2022 10:45:00	103		mg/L	0.002	0.0021	103				85	115	
	LFB	Mercury, Dissolved	11/15/2022 10:45:00	101		mg/L	0.002	0.002	101				85	115	
	LRB	Mercury, Dissolved	11/15/2022 10:45:00	<0.0002		mg/L									
	LRB	Mercury, Dissolved	10/28/2022 13:46:00	<0.0002		mg/L									
	MB	Mercury, Dissolved	11/15/2022 10:45:00	<0.0002		mg/L									
4283001	SPK	Molybdenum, Dissolved	11/03/2022 10:51:00	105	<0.002	mg/L	0.1	0.1048	105				75	125	
4311001	MS	Molybdenum, Dissolved	11/03/2022 11:46:46	82.1		mg/L	0.4	1.63	82.1				75	125	
4311001	MSD	Molybdenum, Dissolved	11/03/2022 11:50:56	84.5		mg/L				1.64	84.5	0.61	75	125	20
4311001	SPK	Molybdenum, Dissolved	11/03/2022 11:42:00	56.6		mg/L	0.1	1.357	56.6				75	125	
4458008	MS	Molybdenum, Dissolved	11/03/2022 12:19:32	105		mg/L	0.4	0.426	105				75	125	
4458008	MSD	Molybdenum, Dissolved	11/03/2022 12:23:40	102		mg/L				0.414	102	2.86	75	125	20
4458008	SPK	Molybdenum, Dissolved	11/03/2022 12:15:00	115		mg/L	0.1	0.1203	115				75	125	
4467001	MS	Molybdenum, Dissolved	11/03/2022 13:04:37	106	<0.002	mg/L	0.4	0.426	106				75	125	
4467001	MSD	Molybdenum, Dissolved	11/03/2022 13:08:45	106	<0.002	mg/L				0.423	106	0.71	75	125	20
4467004	MS	Molybdenum, Dissolved	11/03/2022 13:34:18	96.5	<0.002	mg/L	0.4	0.386	96.5				75	125	
4467004	MSD	Molybdenum, Dissolved	11/03/2022 13:38:27	97	<0.002	mg/L				0.388	97	0.52	75	125	20
4467004	SPK	Molybdenum, Dissolved	11/03/2022 16:08:00	100	<0.002	mg/L	0.1	0.1004	100				75	125	
4467004	SPKD	Molybdenum, Dissolved	11/03/2022 16:12:00	99.3	<0.002	mg/L				0.0993	99.3	1.10	75	125	20
4470002	MS	Molybdenum, Dissolved	11/03/2022 14:06:57	96.6	0.0428	mg/L	0.4	0.429	96.6				75	125	
4470002	MSD	Molybdenum, Dissolved	11/03/2022 14:11:04	97.9	0.0428	mg/L				0.434	97.9	1.16	75	125	20
4470002	SPK	Molybdenum, Dissolved	11/03/2022 14:02:00	101	0.0428	mg/L	0.1	0.1437	101				75	125	
4506005	MS	Molybdenum, Dissolved	11/03/2022 14:46:44	99.7		mg/L	0.4	0.399	99.7				75	125	
4506005	MSD	Molybdenum, Dissolved	11/03/2022 14:50:52	100		mg/L				0.401	100	0.50	75	125	20
	LFB-MS	Molybdenum, Dissolved	11/03/2022 11:30:45	98.7		mg/L	0.1	0.0987	98.7				80	120	
	LFB-MS	Molybdenum, Dissolved	11/01/2022 11:21:00	104		mg/L	0.1	0.104	104				85	115	

LFB-MS	Molybdenum, Dissolved	11/03/2022 12:48:12	102		mg/L	0.1	0.102	102			80	120		
MB	Molybdenum, Dissolved	11/03/2022 11:20:19	<0.002		mg/L									
MB	Molybdenum, Dissolved	11/01/2022 11:11:00	<0.002		mg/L									
MB	Molybdenum, Dissolved	11/03/2022 12:44:04	<0.002		mg/L									
4223001 MS	Nitrate + Nitrite as N	10/20/2022 09:08:10	96	<0.2	mg/L	1	0.96	96			90	110		
4223001 MSD	Nitrate + Nitrite as N	10/20/2022 09:09:16	96	<0.2	mg/L				0.96	96	0.00	90	110	20
4284001 MS	Nitrate + Nitrite as N	10/20/2022 09:29:12	94	<0.2	mg/L	1	0.94	94			90	110		
4284001 MSD	Nitrate + Nitrite as N	10/20/2022 09:30:17	95	<0.2	mg/L				0.95	95	1.06	90	110	20
4286001 MS	Nitrate + Nitrite as N	10/20/2022 09:45:48	91	<0.2	mg/L	1	0.91	91			90	110		
4286001 MSD	Nitrate + Nitrite as N	10/20/2022 09:46:53	90	<0.2	mg/L				0.9	90	1.10	90	110	20
4458002 MS	Nitrate + Nitrite as N	10/20/2022 10:04:27	74	353	mg/L	100	427	74			90	110		
4458002 MSD	Nitrate + Nitrite as N	10/20/2022 10:05:33	76	353	mg/L				429	76	0.47	90	110	20
4458013 MS	Nitrate + Nitrite as N	10/20/2022 10:21:04	68	<0.2	mg/L	1	0.68	68			90	110		
4458013 MSD	Nitrate + Nitrite as N	10/20/2022 10:22:10	68	<0.2	mg/L				0.68	68	0.00	90	110	20
4467004 MS	Nitrate + Nitrite as N	10/20/2022 10:38:47	95	<0.2	mg/L	1	0.95	95			90	110		
4467004 MSD	Nitrate + Nitrite as N	10/20/2022 10:39:53	96	<0.2	mg/L				0.96	96	1.05	90	110	20
4483002 MS	Nitrate + Nitrite as N	10/20/2022 10:55:23	93	1.09	mg/L	1	2.02	93			90	110		
4483002 MSD	Nitrate + Nitrite as N	10/20/2022 10:56:29	95	1.09	mg/L				2.04	95	0.99	90	110	20
4506001 MS	Nitrate + Nitrite as N	10/20/2022 10:57:36	83	<0.2	mg/L	1	0.83	83			90	110		
4506001 MSD	Nitrate + Nitrite as N	10/20/2022 10:58:42	83	<0.2	mg/L				0.83	83	0.00	90	110	20
4506003 MS	Nitrate + Nitrite as N	10/20/2022 11:07:35	83	<0.2	mg/L	1	0.83	83			90	110		
4506003 MSD	Nitrate + Nitrite as N	10/20/2022 11:08:41	85	<0.2	mg/L				0.85	85	2.38	90	110	20
LFB	Nitrate + Nitrite as N	10/20/2022 10:07:49	96		mg/L	0.5	0.48	96			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 10:25:31	96		mg/L	0.5	0.48	96			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 10:42:09	98		mg/L	0.5	0.49	98			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 11:00:58	94		mg/L	0.5	0.47	94			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 09:49:09	94		mg/L	0.5	0.47	94			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 11:12:03	96		mg/L	0.5	0.48	96			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 09:15:57	96		mg/L	0.5	0.48	96			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 08:54:55	96		mg/L	0.5	0.48	96			90	110		
LFB	Nitrate + Nitrite as N	10/20/2022 09:32:33	96		mg/L	0.5	0.48	96			90	110		
4283001 MS	Phosphorus as P	10/24/2022 08:56:12	103	0.10	mg/L	1	1.13	103			90	110		
4283001 MSD	Phosphorus as P	10/24/2022 08:57:18	106	0.10	mg/L				1.16	106	2.62	90	110	20
4409002 MS	Phosphorus as P	10/24/2022 09:13:44	101	<0.1	mg/L	1	1.01	101			90	110		
4409002 MSD	Phosphorus as P	10/24/2022 09:14:50	103	<0.1	mg/L				1.03	103	1.96	90	110	20
4458002 MS	Phosphorus as P	10/24/2022 09:32:21	101	<0.1	mg/L	1	1.01	101			90	110		
4458002 MSD	Phosphorus as P	10/24/2022 09:33:27	104	<0.1	mg/L				1.04	104	2.93	90	110	20
4458025 MS	Phosphorus as P	10/24/2022 09:48:46	101	<0.1	mg/L	1	1.01	101			90	110		
4458025 MSD	Phosphorus as P	10/24/2022 09:49:52	105	<0.1	mg/L				1.05	105	3.88	90	110	20
4470001 MS	Phosphorus as P	10/24/2022 10:07:23	108	<0.1	mg/L	1	1.08	108			90	110		
4470001 MSD	Phosphorus as P	10/24/2022 10:08:29	111	<0.1	mg/L				1.11	111	2.74	90	110	20
4521002 MS	Phosphorus as P	10/24/2022 10:18:18	90	7.53	mg/L	1	8.43	90			90	110		
4521002 MSD	Phosphorus as P	10/24/2022 10:19:25	114	7.53	mg/L				8.67	114	2.81	90	110	20
LFB	Phosphorus as P	10/24/2022 08:44:10	98		mg/L	0.5	0.49	98			90	110		
LFB	Phosphorus as P	10/24/2022 09:17:02	108		mg/L	0.5	0.54	108			90	110		
LFB	Phosphorus as P	10/24/2022 09:52:04	90		mg/L	0.5	0.45	90			90	110		
MB	Phosphorus as P	10/24/2022 09:15:55	<0.1		mg/L									
MB	Phosphorus as P	10/24/2022 09:50:58	<0.1		mg/L									
MB	Phosphorus as P	10/24/2022 08:43:03	<0.1		mg/L									
4049002 PDS	Potassium	10/25/2022 12:08:18	103		mg/L	100	109.9	103			75	125		
4049002 PDSD	Potassium	10/25/2022 12:09:06	103		mg/L				110.3	103	0.36	75	125	20
4278001 PDS	Potassium	10/25/2022 12:25:24	101		mg/L	100	104.7	101			75	125		
4278001 PDSD	Potassium	10/25/2022 12:26:11	102		mg/L				106	102	1.23	75	125	20
4283001 PDS	Potassium	10/25/2022 12:48:41	98.1	5.29	mg/L	100	103.4	98.1			75	125		

4283001	PDS	Potassium	10/25/2022 12:49:31	100	5.29	mg/L				105.6	100	2.11	75	125	20	
4284001	PDS	Potassium	10/25/2022 12:55:26	101	1.65	mg/L		100	102.5	101			75	125		
4284001	PDS	Potassium	10/25/2022 12:56:29	101	1.65	mg/L					102.8	101	0.29	75	125	20
4311001	PDS	Potassium	10/25/2022 13:10:00	101	162	mg/L		1000	1174	101			75	125		
4311001	PDS	Potassium	10/25/2022 13:11:00	99.2	162	mg/L					1154	99.2	1.72	75	125	20
4448001	DUP	Potassium	10/25/2022 13:13:23	17.95	18.0	mg/L							0.28			20
4458008	DUP	Potassium	10/25/2022 13:22:52	34.40	34.2	mg/L							0.58			20
4458009	PDS	Potassium	10/25/2022 13:24:00	102	21.2	mg/L		500	531.5	102				75	125	
4458009	PDS	Potassium	10/25/2022 13:25:00	104	21.2	mg/L					541.5	104	1.86	75	125	20
4458014	DUP	Potassium	10/25/2022 13:32:17	11.71	11.5	mg/L							1.81			20
4458021	PDS	Potassium	10/25/2022 13:40:35	100	4.09	mg/L		100	104.1	100				75	125	
4458021	PDS	Potassium	10/25/2022 13:41:32	102	4.09	mg/L					105.8	102	1.62	75	125	20
4467002	DUP	Potassium	10/25/2022 13:48:43	5.280	5.17	mg/L							2.10			20
4470001	DUP	Potassium	10/25/2022 13:51:59	2.720	2.79	mg/L							2.54			20
4470002	PDS	Potassium	10/25/2022 13:53:32	102	8.83	mg/L		100	111.3	102				75	125	
4470002	PDS	Potassium	10/25/2022 13:54:25	102	8.83	mg/L					111.1	102	0.18	75	125	20
4477001	PDS	Potassium	10/25/2022 13:58:22	99.4		mg/L		100	101.1	99.4				75	125	
4477001	PDS	Potassium	10/25/2022 13:59:23	99.6		mg/L					101.3	99.6	0.20	75	125	20
4506006	DUP	Potassium	10/25/2022 14:06:43	7.990	8.12	mg/L							1.61			20
	LFB-MI	Potassium	10/25/2022 13:08:42	103		mg/L		100	103.4	103				85	115	
	LFB-MI	Potassium	10/25/2022 13:36:29	105		mg/L		100	105.1	105				85	115	
	MB	Potassium	10/25/2022 13:07:50	<1		mg/L										
	MB	Potassium	10/25/2022 13:35:37	<1		mg/L										
4283001	SPK	Selenium, Dissolved	11/03/2022 10:51:00	93.4	<0.005	mg/L		0.1	0.0934	93.4				75	125	
4311001	MS	Selenium, Dissolved	11/03/2022 11:46:46	98		mg/L		0.4	0.476	98				75	125	
4311001	MSD	Selenium, Dissolved	11/03/2022 11:50:56	102		mg/L					0.49	102	2.90	75	125	20
4311001	SPK	Selenium, Dissolved	11/03/2022 11:42:00	95.2		mg/L		0.1	0.179	95.2				75	125	
4458008	MS	Selenium, Dissolved	11/03/2022 12:19:32	97.2	0.8087	mg/L		0.4	1.2	97.2				75	125	
4458008	MSD	Selenium, Dissolved	11/03/2022 12:23:40	102	0.8087	mg/L					1.22	102	1.65	75	125	20
4458008	SPK	Selenium, Dissolved	11/03/2022 12:15:00	108	0.8087	mg/L		0.1	0.9164	108				75	125	
4467001	MS	Selenium, Dissolved	11/03/2022 13:04:37	94.2	0.0334	mg/L		0.4	0.408	94.2				75	125	
4467001	MSD	Selenium, Dissolved	11/03/2022 13:08:45	93.2	0.0334	mg/L					0.404	93.2	0.98	75	125	20
4467004	MS	Selenium, Dissolved	11/03/2022 13:34:18	97.7	<0.005	mg/L		0.4	0.391	97.7				75	125	
4467004	MSD	Selenium, Dissolved	11/03/2022 13:38:27	98.4	<0.005	mg/L					0.393	98.4	0.51	75	125	20
4467004	SPK	Selenium, Dissolved	11/03/2022 16:08:00	103	<0.005	mg/L		0.1	0.1031	103				75	125	
4467004	SPKD	Selenium, Dissolved	11/03/2022 16:12:00	102	<0.005	mg/L					0.1022	102	0.88	75	125	20
4470002	MS	Selenium, Dissolved	11/03/2022 14:06:57	96.1	0.0086	mg/L		0.4	0.393	96.1				75	125	
4470002	MSD	Selenium, Dissolved	11/03/2022 14:11:04	95.6	0.0086	mg/L					0.391	95.6	0.51	75	125	20
4470002	SPK	Selenium, Dissolved	11/03/2022 14:02:00	95.2	0.0086	mg/L		0.1	0.1038	95.2				75	125	
4506005	MS	Selenium, Dissolved	11/03/2022 14:46:44	101		mg/L		0.4	0.403	101				75	125	
4506005	MSD	Selenium, Dissolved	11/03/2022 14:50:52	101		mg/L					0.403	101	0.00	75	125	20
	LFB-MS	Selenium, Dissolved	11/01/2022 11:21:00	97.8		mg/L		0.1	0.0978	97.8				85	115	
	LFB-MS	Selenium, Dissolved	11/03/2022 11:30:45	92.7		mg/L		0.1	0.0927	92.7				80	120	
	LFB-MS	Selenium, Dissolved	11/03/2022 12:48:12	97		mg/L		0.1	0.097	97				80	120	
	MB	Selenium, Dissolved	11/03/2022 11:20:19	<0.005		mg/L										
	MB	Selenium, Dissolved	11/03/2022 12:44:04	<0.005		mg/L										
	MB	Selenium, Dissolved	11/01/2022 11:11:00	<0.005		mg/L										
4283001	SPK	Silver, Dissolved	11/03/2022 10:51:00	98.7	<0.0005	mg/L		0.1	0.0987	98.7				75	125	
4311001	MS	Silver, Dissolved	11/03/2022 11:46:46	40.9		mg/L		0.4	0.164	40.9				75	125	
4311001	MSD	Silver, Dissolved	11/03/2022 11:50:56	40.2		mg/L					0.161	40.2	1.85	75	125	20
4311001	SPK	Silver, Dissolved	11/03/2022 11:42:00	87.9		mg/L		0.1	0.0879	87.9				75	125	
4458008	MS	Silver, Dissolved	11/03/2022 12:19:32	44.2	<0.0005	mg/L		0.4	0.177	44.2				75	125	
4458008	MSD	Silver, Dissolved	11/03/2022 12:23:40	42	<0.0005	mg/L					0.168	42	5.22	75	125	20
4458008	SPK	Silver, Dissolved	11/03/2022 12:15:00	93.5	<0.0005	mg/L		0.1	0.0935	93.5				75	125	

4467001	MS	Silver, Dissolved	11/03/2022 13:04:37	42.4	<0.0005	mg/L	0.4	0.17	42.4			75	125		
4467001	MSD	Silver, Dissolved	11/03/2022 13:08:45	42.6	<0.0005	mg/L				0.171	42.6	0.59	75	125	20
4467004	MS	Silver, Dissolved	11/03/2022 13:34:18	41.2	<0.0005	mg/L	0.4	0.165	41.2				75	125	
4467004	MSD	Silver, Dissolved	11/03/2022 13:38:27	43	<0.0005	mg/L				0.172	43	4.15	75	125	20
4467004	SPK	Silver, Dissolved	11/03/2022 16:08:00	98.4	<0.0005	mg/L	0.1	0.0984	98.4				75	125	
4467004	SPKD	Silver, Dissolved	11/03/2022 16:12:00	101	<0.0005	mg/L				0.101	101	2.61	75	125	20
4470002	MS	Silver, Dissolved	11/03/2022 14:06:57	40.5	<0.0005	mg/L	0.4	0.162	40.5				75	125	
4470002	MSD	Silver, Dissolved	11/03/2022 14:11:04	41.9	<0.0005	mg/L				0.168	41.9	3.64	75	125	20
4470002	SPK	Silver, Dissolved	11/03/2022 14:02:00	96.5	<0.0005	mg/L	0.1	0.0965	96.5				75	125	
4506005	MS	Silver, Dissolved	11/03/2022 14:46:44	43.8		mg/L	0.4	0.175	43.8				75	125	
4506005	MSD	Silver, Dissolved	11/03/2022 14:50:52	42.4		mg/L				0.169	42.4	3.49	75	125	20
	LFB-MS	Silver, Dissolved	11/01/2022 11:21:00	104		mg/L	0.1	0.104	104				85	115	
	LFB-MS	Silver, Dissolved	11/03/2022 11:30:45	101		mg/L	0.1	0.101	101				80	120	
	LFB-MS	Silver, Dissolved	11/03/2022 12:48:12	103		mg/L	0.1	0.103	103				80	120	
	MB	Silver, Dissolved	11/03/2022 11:20:19	<0.0005		mg/L									
	MB	Silver, Dissolved	11/03/2022 12:44:04	<0.0005		mg/L									
	MB	Silver, Dissolved	11/01/2022 11:11:00	<0.0005		mg/L									
4049002	PDS	Sodium	10/25/2022 12:08:18	101		mg/L	100	133.7	101				75	125	
4049002	PDSD	Sodium	10/25/2022 12:09:06	102		mg/L				134.6	102	0.67	75	125	20
4278001	PDS	Sodium	10/25/2022 12:25:24	102	15.8	mg/L	100	117.6	102				75	125	
4278001	PDSD	Sodium	10/25/2022 12:26:11	102	15.8	mg/L				118.3	102	0.59	75	125	20
4283001	PDS	Sodium	10/25/2022 12:48:41	91.9	91.5	mg/L	100	183.4	91.9				75	125	
4283001	PDSD	Sodium	10/25/2022 12:49:31	92.7	91.5	mg/L				184.2	92.7	0.44	75	125	20
4284001	PDS	Sodium	10/25/2022 12:55:26	78.2	352	mg/L	100	430.2	78.2				75	125	
4284001	PDSD	Sodium	10/25/2022 12:56:29	80.1	352	mg/L				432.1	80.1	0.44	75	125	20
4311001	PDS	Sodium	10/25/2022 13:10:00	81.3	2560	mg/L	1000	3370	81.3				75	125	
4311001	PDSD	Sodium	10/25/2022 13:11:00	80.3	2560	mg/L				3360	80.3	0.30	75	125	20
4448001	DUP	Sodium	10/25/2022 13:13:23	340.0	336	mg/L						1.18			20
4458008	DUP	Sodium	10/25/2022 13:22:52	1143	1120	mg/L						2.03			20
4458009	PDS	Sodium	10/25/2022 13:24:00	85	1070	mg/L	500	1491	85				75	125	
4458009	PDSD	Sodium	10/25/2022 13:25:00	85.2	1070	mg/L				1492	85.2	0.07	75	125	20
4458014	DUP	Sodium	10/25/2022 13:32:17	86.31	83.3	mg/L						3.55			20
4458021	PDS	Sodium	10/25/2022 13:40:35	84.6	295	mg/L	100	379.3	84.6				75	125	
4458021	PDSD	Sodium	10/25/2022 13:41:32	83.4	295	mg/L				378.1	83.4	0.32	75	125	20
4467002	DUP	Sodium	10/25/2022 13:48:43	605.5	582	mg/L						3.96			20
4470001	DUP	Sodium	10/25/2022 13:51:59	77.97	79.1	mg/L						1.44			20
4470002	PDS	Sodium	10/25/2022 13:53:32	86	188	mg/L	100	273.7	86				75	125	
4470002	PDSD	Sodium	10/25/2022 13:54:25	87.1	188	mg/L				274.8	87.1	0.40	75	125	20
4477001	PDS	Sodium	10/25/2022 13:58:22	77.9	387	mg/L	100	464.6	77.9				75	125	
4477001	PDSD	Sodium	10/25/2022 13:59:23	75.9	387	mg/L				462.6	75.9	0.43	75	125	20
4506006	DUP	Sodium	10/25/2022 14:06:43	126.2	128	mg/L						1.42			20
	LFB-MI	Sodium	10/25/2022 13:08:42	105		mg/L	100	104.9	105				85	115	
	LFB-MI	Sodium	10/25/2022 13:36:29	106		mg/L	100	105.5	106				85	115	
	MB	Sodium	10/25/2022 13:35:37	<1		mg/L									
	MB	Sodium	10/25/2022 13:07:50	<1		mg/L									
4458015	DUP	Specific Conductance	10/20/2022 16:08:46	0.0000	9554	umhos/cm									
4458020	DUP	Specific Conductance	10/21/2022 09:20:00	1.1080	1	umhos/cm						10.25			20
4483001	DUP	Specific Conductance	10/20/2022 13:21:54	589.00	590	umhos/cm						0.17			20
4519002	DUP	Specific Conductance	10/20/2022 18:51:08	1932.0	1935	umhos/cm						0.16			20
4519005	DUP	Specific Conductance	10/20/2022 22:56:11	1765.0	1767	umhos/cm						0.11			20
4553001	DUP	Specific Conductance	10/21/2022 02:27:32	1392.0	1394	umhos/cm						0.14			20
	CRM-C	Specific Conductance	10/21/2022 01:36:18	101		umhos/cm	1409	1429	101				95	105	
	CRM-C	Specific Conductance	10/20/2022 21:07:40	101		umhos/cm	1409	1424	101				95	105	
	CRM-C	Specific Conductance	10/21/2022 09:20:00	100		umhos/cm	1409	1408	100				95	105	

CRM-C	Specific Conductance	10/21/2022 09:20:00	100		umhos/cm	1409	1412	100				95	105	
CRM-C	Specific Conductance	10/20/2022 15:48:07	101		umhos/cm	1409	1420	101				95	105	
CRM-C	Specific Conductance	10/21/2022 05:46:48	102		umhos/cm	1409	1431	102				95	105	
CRM-C	Specific Conductance	10/20/2022 11:22:17	100		umhos/cm	1409	1409	100				95	105	
4458002 MS	Sulfate	10/26/2022 09:08:52	92.9	5640	mg/L	5000	10300	92.9				85	115	
4458002 MSD	Sulfate	10/26/2022 09:09:57	93.1	5640	mg/L				10300	93.1	0.00	85	115	20
4458008 MS	Sulfate	10/26/2022 09:35:21	85.7	5660	mg/L	5000	9950	85.7				85	115	
4458008 MSD	Sulfate	10/26/2022 09:36:26	85.1	5660	mg/L				9920	85.1	0.30	85	115	20
4458019 MS	Sulfate	10/26/2022 09:50:49	96.8	<5	mg/L	100	96.8	96.8				85	115	
4458019 MSD	Sulfate	10/26/2022 09:51:55	98.8	<5	mg/L				98.8	98.8	2.04	85	115	20
4483001 MS	Sulfate	10/26/2022 10:08:29	97.6	24.0	mg/L	100	122	97.6				85	115	
4483001 MSD	Sulfate	10/26/2022 10:09:34	94	24.0	mg/L				118	94	3.33	85	115	20
4519001 MS	Sulfate	10/26/2022 10:28:21	94.5	203	mg/L	500	675	94.5				85	115	
4519001 MSD	Sulfate	10/26/2022 10:29:27	99.1	203	mg/L				698	99.1	3.35	85	115	20
4519006 MS	Sulfate	10/26/2022 10:54:52	92.1	576	mg/L	500	1040	92.1				85	115	
4519006 MSD	Sulfate	10/26/2022 10:55:58	90.9	576	mg/L				1030	90.9	0.97	85	115	20
4594001 MS	Sulfate	10/26/2022 11:13:39	97.4	62.9	mg/L	200	258	97.4				85	115	
4594001 MSD	Sulfate	10/26/2022 11:14:43	107	62.9	mg/L				276	107	6.74	85	115	20
4594005 MS	Sulfate	10/26/2022 11:32:26	85.4	195	mg/L	200	366	85.4				85	115	
4594005 MSD	Sulfate	10/26/2022 11:31:21	88.2	195	mg/L				372	88.2	1.63	85	115	20
LFB	Sulfate	10/26/2022 09:54:07	99.7		mg/L	100	99.7	99.7				85	115	
LFB	Sulfate	10/26/2022 09:13:16	98.9		mg/L	100	98.9	98.9				85	115	
LFB	Sulfate	10/26/2022 09:30:56	96.1		mg/L	100	96.1	96.1				85	115	
LFB	Sulfate	10/26/2022 08:54:30	102		mg/L	100	102	102				85	115	
LFB	Sulfate	10/26/2022 11:34:39	93.4		mg/L	100	93.4	93.4				85	115	
LFB	Sulfate	10/26/2022 11:20:16	90.7		mg/L	100	90.7	90.7				85	115	
LFB	Sulfate	10/26/2022 11:01:29	98.8		mg/L	100	98.8	98.8				85	115	
LFB	Sulfate	10/26/2022 10:34:57	99.4		mg/L	100	99.4	99.4				85	115	
LFB	Sulfate	10/26/2022 10:11:47	98		mg/L	100	98	98				85	115	
MB	Sulfate	10/26/2022 08:53:23	<5		mg/L									
MB	Sulfate	10/26/2022 11:40:10	<5		mg/L									
MB	Sulfate	10/26/2022 11:19:10	<5		mg/L									
MB	Sulfate	10/26/2022 09:29:49	<5		mg/L									
MB	Sulfate	10/26/2022 10:26:09	<5		mg/L									
MB	Sulfate	10/26/2022 09:12:10	<5		mg/L									
MB	Sulfate	10/26/2022 10:47:08	<5		mg/L									
MB	Sulfate	10/26/2022 09:53:01	<5		mg/L									
MB	Sulfate	10/26/2022 10:57:04	<5		mg/L									
4458015 DUP	pH	10/20/2022 16:08:46	7.66	7.6	units						0.79			20
4483001 DUP	pH	10/20/2022 13:21:54	7.31	7.8	units						6.48			20
4519002 DUP	pH	10/20/2022 18:51:08	7.26	7.3	units						0.55			20
4519005 DUP	pH	10/20/2022 22:56:11	7.33	7.4	units						0.95			20
4553001 DUP	pH	10/21/2022 02:27:32	8.65	8.8	units						1.72			20
CRM-PH	pH	10/21/2022 05:41:30	98.33		units	6	5.9	98.33				98.33	101.67	
CRM-PH	pH	10/20/2022 16:55:16	99		units	6	5.9	99				98.33	101.67	
CRM-PH	pH	10/20/2022 15:42:54	99		units	6	5.9	99				98.33	101.67	
CRM-PH	pH	10/21/2022 01:31:04	98.67		units	6	5.9	98.67				98.33	101.67	
CRM-PH	pH	10/20/2022 10:27:41	99.67		units	6	6	99.67				98.33	101.67	
CRM-PH	pH	10/20/2022 21:02:26	98.5		units	6	5.9	98.5				98.33	101.67	



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Workorder Summary

Workorder Comments

All analytes with dilution factors greater than 1 (displayed in DF column) required dilution due to matrix or high concentration of target analyte unless otherwise noted and reporting limits (RDL column) have been adjusted accordingly.

Sample Comments

4523003 (Dup1) - Sample

Time sampled was not supplied by the client.

4523004 (Field Blank (FB)) - Sample

Time sampled was not supplied by the client.

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**Account #:** 2800**Client:** Montana-Dakota Utilities - Bismarck**Analytical Results**

Lab ID: 4523001 **Date Collected:** 10/17/2022 12:30 **Matrix:** Groundwater
Sample ID: MW13 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 1.0**Contract Lab****Method: Contracted Result**

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		
Radium 228	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 4523002 **Date Collected:** 10/17/2022 15:43 **Matrix:** Groundwater
Sample ID: MW80R **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 1.0

Contract Lab

Method: Contracted Result

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		
Radium 228	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 4523003 **Date Collected:** 10/17/2022 **Matrix:** Groundwater
Sample ID: Dup1 **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service

Temp @ Receipt (C): 1.0

Contract Lab

Method: Contracted Result

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		
Radium 228	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Analytical Results

Lab ID: 4523004 **Date Collected:** 10/17/2022 **Matrix:** Groundwater
Sample ID: Field Blank (FB) **Date Received:** 10/19/2022 08:20 **Collector:** MVTL Field Service
Temp @ Receipt (C): 1.0 **Received on Ice:** No

Contract Lab

Method: Contracted Result

Parameter	Results	Units	RDL	DF	Prepared	Analyzed	By	Cert	Qual
Radium 226	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		
Radium 228	See Attached			1	11/29/2022 09:02	11/29/2022 09:02	SUBu		

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



November 22, 2022

Claudette Carroll

2616 E Broadway Ave
Bismarck, North Dakota 58501

Re: Routine Analysis - Radiochemistry
Work Order: 598417
SDG: 4523

Dear Claudette Carroll:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 27, 2022. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,

Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: BL6613
Enclosures





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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

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Case Narrative



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Client: Montana-Dakota Utilities - Bismarck

Receipt Narrative
for
Minnesota Valley Testing Laboratories, Inc.
SDG: 4523
Work Order: 598417

November 22, 2022

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on October 27, 2022 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
598417001	MW13
598417002	MW80R
598417003	Dup 1
598417004	Field Blank

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.


Jordan Melton for
Delaney Stone
Project Manager



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Chain of Custody and Supporting Documentation

Page 3 of 20 SDG: 4523

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Account #: 2800


Client: Montana-Dakota Utilities - Bismarck

518417

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Chain of Custody Record

SDG&S23

 LABORATORIES, Inc. 2616 E Broadway Ave Bismarck, ND 58501 Phone: (701) 258-9720 Toll Free: (800) 279-6885 Fax: (701) 258-9724		WO #4523									
Company Name and Address: MVTL 2616 E Broadway Bismarck, ND 58501		Account #: Contact: Claudette	Phone #: 701-258-9720 Fax #: For faxed report check box <input type="checkbox"/> E-mail: ccarroll@mvtl.com For e-mail report check box <input type="checkbox"/>								
Billing Address (indicate if different from above): PO Box 249 New Ulm, MN 56073		Name of Sampler: Quote Number Project Name/Number:	Date Submitted: 20-Oct-22 Purchase Order #: BL6613 Analysis								
Sample Information						Bottle Type				Analysis Required	
IML Lab Number	MVTL Lab Number	Client Sample ID	Sample Type	Date Sampled	Time Sampled	Untreated	1000 ml HNO3	VOC Vials Unpreserved	Glass Jar		Other
	4523001	MW13	GW	17-Oct-22	1230	4					Ra226 & Ra228
	4523002	MW80R	GW	17-Oct-22	1543	4					Ra226 & Ra228
	4523003	Dup 1	GW	17-Oct-22		4					Ra226 & Ra228
	4523004	Field Blank	GW	18-Oct-22	3	4					Ra226 & Ra228
All results must be reported as a numerical value											
Transferred by:		Date:	Time:	Sample Condition:	Received by:		Date:		Temp:		
T. Olson		20-Oct-22	1700		Dhyasia Lamm		10/27/22		1000		
2.											

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

GEL Laboratories LLC SAMPLE RECEIPT & REVIEW FORM
Client: MVTL SDGAR/COC/Work Order: 598417
Received By: Thyasia Tatum Date Received:
Carrier and Tracking Number: 12 555 901 03 6965 4366
Suspected Hazard Information:
A) Shipped as a DOT Hazardous?
B) Did the client designate the samples are to be received as radioactive?
C) Did the RSO classify the samples as radioactive?
D) Did the client designate samples are hazardous?
E) Did the RSO identify possible hazards?
Sample Receipt Criteria:
1 Shipping containers received intact and sealed?
2 Chain of custody documents included with shipment?
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?
4 Daily check performed and passed on IR temperature gun?
5 Sample containers intact and sealed?
6 Samples requiring chemical preservation at proper pH?
7 Do any samples require Volatile Analysis?
8 Samples received within holding time?
9 Sample ID's on COC match ID's on bottles?
10 Date & time on COC match date & time on bottles?
11 Number of containers received match number indicated on COC?
12 Are sample containers identifiable as GEL provided by use of GEL labels?
13 COC form is properly signed in relinquished/received sections?
Comments (Use Continuation Form if needed):
12 555 901 03 7099 9770
PM (or PMA) review: Initials Date Page of

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Laboratory Certifications

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List of current GEL Certifications as of 22 November 2022

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (A133904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-3
New Hampshire NELAP	2054
New Jersey NELAP	SC0002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

Radiological Analysis

Page 8 of 20 SDG: 4523

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Case Narrative



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Client: Montana-Dakota Utilities - Bismarck

Radiochemistry
Technical Case Narrative
Minnesota Valley Testing Laboratories, Inc.
SDG #: 4523
Work Order #: 598417

Product: GFPC Ra228, Liquid
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 5
Analytical Batch: 2336359

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
598417001	MW13
598417002	MW80R
598417003	Dup 1
598417004	Field Blank
1205232602	Method Blank (MB)
1205232603	598417001(MW13) Sample Duplicate (DUP)
1205232604	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Lucas Cell, Ra226, Liquid
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 15
Analytical Batch: 2336349

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
598417001	MW13
598417002	MW80R
598417003	Dup 1
598417004	Field Blank
1205232576	Method Blank (MB)
1205232577	598417001(MW13) Sample Duplicate (DUP)
1205232578	598417001(MW13) Matrix Spike (MS)
1205232579	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

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Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205232578 (MW13MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.



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Account #: 2800

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GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MVTL001 Minnesota Valley Testing Laboratories, Inc.
Client SDG: 4523 GEL Work Order: 598417

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:  **Name:** Theresa Austin
Date: 28 NOV 2022 **Title:** Group Leader



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Sample Data Summary



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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

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Certificate of Analysis

Report Date: November 28, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: MW13
Sample ID: 598417001
Matrix: Ground Water
Collect Date: 17-OCT-22 12:30
Receive Date: 27-OCT-22
Collector: Client

Project: MVTL00121
Client ID: MVTL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.367	+/-0.899	1.63	3.00	pCi/L		CT2	11/22/22	1033	2336359		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.332	+/-0.226	0.254	1.00	pCi/L		LXP1	11/28/22	0834	2336349		2
The following Analytical Methods were performed:													
Method	Description	Analyst Comments											
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits							
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			74.4	(15%-125%)							

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:
DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: November 28, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: MW80R
Sample ID: 598417002
Matrix: Ground Water
Collect Date: 17-OCT-22 15:43
Receive Date: 27-OCT-22
Collector: Client

Project: MVTL00121
Client ID: MVTL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.278	+/-1.14	2.07	3.00	pCi/L		CT2	11/22/22	1033	2336359		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.684	+/-0.326	0.382	1.00	pCi/L		LXP1	11/28/22	0834	2336349		2
The following Analytical Methods were performed:													
Method	Description	Analyst Comments											
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits							
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			81.6	(15%-125%)							

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:
DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Account #: 2800

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Certificate of Analysis

Report Date: November 28, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: Dup 1 Project: MVTL00121
Sample ID: 598417003 Client ID: MVTL001
Matrix: Ground Water
Collect Date: 17-OCT-22 12:00
Receive Date: 27-OCT-22
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.14	+/-1.34	2.27	3.00	pCi/L		CT2	11/22/22	1033	2336359		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		3.44	+/-0.656	0.374	1.00	pCi/L		LXP1	11/28/22	0834	2336349		2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	EPA 903.1 Modified	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			82.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: November 28, 2022

Company :
Address : 2616 E Broadway Ave

Bismarck, North Dakota 58501
Contact: Claudette Carroll
Project: Routine Analysis - Radiochemistry

Client Sample ID: Field Blank
Sample ID: 598417004
Matrix: Ground Water
Collect Date: 18-OCT-22 15:00
Receive Date: 27-OCT-22
Collector: Client

Project: MVTL00121
Client ID: MVTL001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.114	+/-1.08	2.01	3.00	pCi/L		CT2	11/22/22	1033	2336359		1
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.298	+/-0.283	0.443	1.00	pCi/L		LXP1	11/28/22	0834	2336349		2
The following Analytical Methods were performed:													
Method	Description	Analyst Comments											
1	EPA 904.0/SW846 9320 Modified												
2	EPA 903.1 Modified												
Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits							
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			79.9	(15%-125%)							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Client: Montana-Dakota Utilities - Bismarck

Quality Control Summary

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QC Summary

Report Date: November 28, 2022

Page 1 of 2

Contact: 2616 E Broadway Ave
Bismarck, North Dakota
Claudette Carroll

Workorder: 598417

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2336359										
QC1205232603	598417001	DUP									
Radium-228	U	0.367	U	1.03	pCi/L	N/A		N/A	CT2	11/22/22	10:32
	Uncertainty	+/-0.899		+/-1.31							
QC1205232604	LCS										
Radium-228	65.4			60.2	pCi/L		92	(75%-125%)		11/22/22	10:33
	Uncertainty			+/-4.84							
QC1205232602	MB										
Radium-228			U	0.641	pCi/L					11/22/22	10:32
	Uncertainty			+/-1.21							
Rad Ra-226											
Batch	2336349										
QC1205232577	598417001	DUP									
Radium-226		0.332		0.387	pCi/L	15.2		(0% - 100%)	LXP1	11/28/22	08:34
	Uncertainty	+/-0.226		+/-0.254							
QC1205232579	LCS										
Radium-226	26.5			21.3	pCi/L		80.2	(75%-125%)		11/28/22	08:34
	Uncertainty			+/-1.51							
QC1205232576	MB										
Radium-226			U	0.354	pCi/L					11/28/22	08:34
	Uncertainty			+/-0.306							
QC1205232578	598417001	MS									
Radium-226	130	0.332		101	pCi/L		77.3	(75%-125%)		11/28/22	08:34
	Uncertainty	+/-0.226		+/-7.92							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

GEL LABORATORIES LLC

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QC Summary

Workorder: 598417

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
J											
J											
K											
L											
M											
M											
N/A											
N1											
ND											
NJ											
Q											
R											
U											
UI											
UJ											
UL											
X											
Y											
^											
h											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where the duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck

	Minnesota Valley Testing Laboratories 2616 E. Broadway Ave Bismarck, ND 58501 (701) 258-9720	Montana - Dakota Utilities - Bis W0: 4523 	Chain of Custody Record
	Report To: MDU Attn: Todd Peterson Address: 400 N. 4th St Bismarck, ND 58501 Phone: 701-425-2427 Email: Todd.Peterson@mdu.com	CC:	Project Name: MDU Heskett Event: Fall 2022 Sampled By: <i>Jerry [Signature]</i>

Lab Number	Sample Information				Sample Containers								Field Readings				Analysis Required
	Sample ID	Date	Time	Sample Type	1	2	3	4	5	6	7	8	9	10			
001	MW13	17 Oct 22	1230	GW	4										Rad 226 & 228		
—	MW1-90	18 Oct 22	1205	GW	4	X											
—	MW2-90	18 Oct 22	1202	GW	4	X											
—	MW3-90	18 Oct 22	1158	GW	4	X											
002	MW80R	17 Oct 22	1543	GW	4												
003	Dup 1	17 Oct 22	NA	GW	4												
004	Field Blank (FB)	18 Oct 22	NA	GW	4												

Comments: # 18 Oct 22

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>[Signature]</i>	19 Oct 22 0820	Log In Walk In #2	1.0 TM562 / TM805	C. Cantor	19 Oct 22 0820
2					

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.

Report Date: Tuesday, November 29, 2022 2:53:40 PM



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.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Fall 2022
 Sample ID: 13
 Sampling Personal: [Signature]

Weather Conditions: Temp: 50 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION			
Well Locked?	YES	NO	
Well Labeled?	YES	NO	
Casing Strait?	YES	NO	
Grout Seal Intact?	YES	NO	Not Visible
Repairs Necessary?			
Casing Diameter:	2"		
Water Level Before Purge:	30.63 ft		
Total Depth of Well:	— ft		
Well Volume:	— liters		
Depth to Top of Pump:	— ft		
Water Level After Sample:	32.84 ft		
Measurement Method:	Electric Water Level Indicator		

SAMPLING INFORMATION		
Purging Method:	Bladder	
Sampling Method:	Bladder	
Dedicated Equipment?	YES	NO
Duplicate Sample?	YES	NO
Duplicate Sample ID:	Dup 1	
Bottle List:		
1 Liter Raw	4- 1L Nitric	
500mL Nitric		
500mL Nitric (filtered)		
250mL Sulfuric		

Control Settings:
 Purge: 5 Sec.
 Recover: 55 Sec.
 PSI: 30

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate ml/Min	ml Removed	Appearance or Comment Clarity, Color, Odor, Ect.
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					clear, slightly turbid, turbid
17 Oct 22	1155	Start of Well Purge									
	1215	8.76	9761	7.03	3.59	151.2	2.69	32.00	100.0	2000.0	Clear
	1220	8.82	9754	7.03	3.37	151.5	1.41	32.59	100.0	500.0	Clear
	1225	8.73	9761	7.03	3.31	152.5	1.02	32.68	100.0	500.0	Clear
	1230	8.73	9773	7.03	3.28	151.9	0.57	32.75	100.0	500.0	Clear

Well Stabilized? (YES) NO Total Volume Purged: 3500.0 ml

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment Clarity, Color, Odor, Ect.
17 Oct 22	1230	8.73	9773	7.03	0.57	Clear

Comments:

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

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 www.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
 Event: Fall 2022
 Sample ID: 3-90
 Sampling Personal: Jy [signature]

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION	
Well Locked?	YES NO
Well Labeled?	YES NO
Casing Strait?	YES NO
Grout Seal Intact?	YES NO <u>Not Visible</u>
Repairs Necessary?	
Casing Diameter:	2"
Water Level Before Purge:	<u>Below Pump</u> ft
Total Depth of Well:	ft
Well Volume:	liters
Depth to Top of Pump:	<u>20.22</u> ft
Water Level After Sample:	ft
Measurement Method:	Electric Water Level Indicator

SAMPLING INFORMATION	
Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	
Bottle List:	
1 Liter Raw	4- 1L Nitric
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	

Control Settings:	
Purge:	Sec.
Recover:	Sec.
PSI:	

FIELD READINGS

Stabilization Parameters (3 Consecutive)	Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate (ml/Min)	mL Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10	(ft)	ml/Min		clear, slightly turbid, turbid
Start of Well Purge										
[Empty table rows for field readings]										

Well Stabilized? YES NO Total Volume Purged: _____ mL

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
18 Oct 22	1158					Clarity, Color, Odor, Ect.

Comments: insufficient volume No Sample
 Water level below Pump

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 www.MVTL.com



Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



2616 E. Broadway Ave, Bismarck, ND
 Phone: (701) 258-9720

Field Datasheet
 Groundwater Assessment

Company: MDU Heskett
 Event: Fall 2022
 Sample ID: BOR
 Sampling Personal: JTB

Weather Conditions: Temp: 60°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION		
Well Locked?	YES	NO
Well Labeled?	YES	NO
Casing Strait?	YES	NO
Grout Seal Intact?	YES	NO
Repairs Necessary?	Not Visible	
Casing Diameter:	2"	
Water Level Before Purge:	15.4	ft
Total Depth of Well:	—	
Well Volume:	—	
Depth to Top of Pump:	—	
Water Level After Sample:	15.81	ft
Measurement Method:	Electric Water Level Indicator	

SAMPLING INFORMATION		
Purging Method:	Bladder	
Sampling Method:	Bladder	
Dedicated Equipment?	YES	NO
Duplicate Sample?	YES	NO
Duplicate Sample ID:	←	
Bottle List:		
1 Liter Raw	4- 1L Nitric	
500mL Nitric		
500mL Nitric (filtered)		
250mL Sulfuric		
Control Settings:		
Purge:	5	Sec.
Recover:	55	Sec.
PSI:	2.0	

FIELD READINGS

Stabilization Parameters (3 Consecutive)	Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate ml/Min	ml Removed	Appearance or Comment Clarity, Color, Odor, Ect.
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10				clear, slightly turbid, turbid
17 Oct 22	1508	Start of Well Purge								
	1528	9.91	5887	7.04	0.22	89.7	15.68	100.0	2000.0	Clear
	1533	9.88	5885	7.04	0.21	80.7	15.71	100.0	500.0	Clear
	1538	9.98	5886	7.05	0.17	76.9	15.73	100.0	500.0	Clear
	1543	9.87	5892	7.05	0.16	75.7	15.75	100.0	500.0	Clear

Well Stabilized? YES NO Total Volume Purged: 3500.0 mL

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment Clarity, Color, Odor, Ect.
17 Oct 22	1543	9.87	5892	7.05	1.15	Clear

Comments:

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Account #: 2800

Client: Montana-Dakota Utilities - Bismarck



Field Datasheet

Surface water Assessment

Company: MDU Lewis & Clark

Event: Fall 2022

Sampling Personal: *[Signature]*

2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Weather Conditions: Temp: °F Wind: @ Precip: Sunny / Partly Cloudy / Cloudy

Well ID	Date	Time	Casing Diameter	Water Level (ft)	Comments
MW70	17 Oct 22	1437	2"	22.50	
MW33		1456	2"	44.10	
MW101		1440	2"	38.50	
MW102		1434	2"	19.28	
MW103		1445	2"	35.68	
MW44R		1450	2"	26.91	
MW104		1500	2"	15.54	
MW105		1503	2"	13.53	

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Report Date: Tuesday, November 29, 2022 2:53:40 PM

Laboratory Reports and Field Sheets: MW1-90

Appendix A
MW1-90 Water Quality Analytical Data Summary
2017 - 2021
2022 Annual Monitoring Report
Heskett CCR Groundwater Compliance

Location			MW1-90	MW1-90	MW1-90	MW1-90	MW1-90	MW1-90	MW1-90	MW1-90	MW1-90
Date			6/22/2017	10/05/2017	4/04/2018	10/04/2018	4/03/2019	9/18/2019	4/01/2020	9/14/2020	3/23/2021
Sample Type			N	N	N	N	N	N	N	N	N
Data Status			No QC	No QC	No QC	No QC	No QC	No QC	No QC	Validated	Validated
Parameter	Analysis Location	Units									
General Parameters											
Chloride	Lab	mg/l	84.4	87.8	90.6	86.2	81.2	76.6	75.4	89.9	82.7
Fluoride	Lab	mg/l	1.04	1.02	1.03	1.03	1.06	1.10	1.03	1.08	1.03
Solids, total dissolved	Lab	mg/l	9440	8900	9810	9490	9740	10300	11000	11200	12200
Sulfate, as SO4	Lab	mg/l	6610	5900	6900	6480	6730	7120	7720	7880	7030
pH	Field	pH units	6.8	6.9	6.88	6.74	6.64	6.87	6.83	6.80	6.89
Total Metals											
Antimony	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.001 U
Arsenic	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.002 U
Barium	Lab	mg/l	--	--	--	--	--	--	--	--	0.0082
Beryllium	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.0005 U
Boron	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.5 U
Cadmium	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.0005 U
Calcium	Lab	mg/l	407	424	405	406	412	447	421	408	397
Chromium	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.002 U
Cobalt	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.002 U
Lead	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.0005 U
Lithium	Lab	mg/l	--	--	--	--	--	--	--	--	0.690
Mercury	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.0002 U
Molybdenum	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.002 U
Selenium	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.005 U
Thallium	Lab	mg/l	--	--	--	--	--	--	--	--	< 0.0005 U

-- Not analyzed/Not available.

N: Sample Type: Normal

U: The analyte was analyzed for, but was not detected.

ND: The result was less than the uncertainty and/or the minimum detectable concentration.

q: The combined radium result includes both detected and not detected values.

No QC: Laboratory data has been excluded from Barr QA/QC procedures.

Validated: Laboratory data has been evaluated following Barr QA/QC procedures and/or project-specific data review requirements. Field data has been verified for transcription errors, consistency and completeness.



CASE NARRATIVE

MVTL Lab Reference No/SDG: 201782-1684
Client: Montana Dakota Utilities
Location: MDU Heskett
Project Identification: NDDH June 2017
MVTL Laboratory Identifications: 17-W2506
Page 1 of 1

Table with 2 columns: MDU Sample Identification (1-90) and MVTL Laboratory # (17-W2506)

I. RECEIPT

- All samples were received at the laboratory on 23 Jun17 at 823.
Samples were collected and hand delivered by MVTL Field Service personnel to the laboratory.
Samples were received on ice and evidence of cooling had begun.
Temperature of samples upon receipt was 1.7°C.
All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.
No other exceptions on sample receipt were encountered on this sample set unless noted here.

II. HOLDING TIMES

- With the exception of laboratory pH, all holding times were met for both preparation and analysis unless noted here.

III. METHODS

- Approved methodology was followed for all sample analyses.
Methods 6010D and Method 6020B were used to analyze the metals.

IV. ANALYSIS

- All acceptance criteria was met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/matrix duplicates unless noted here and/or flagged on the individual analytical laboratory report.
For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.
One alkalinity matrix spike duplicate recovery was outside the acceptable limits. Recovery for the matrix spike was acceptable. RPD for the recoveries of the matrix spike duplicate and the matrix spike was within limits. No further action was taken.
Recovery for one lead matrix spike was outside of the acceptable limits. Recovery of the matrix spike duplicate was acceptable. RPD for the recoveries of the matrix spike/matrix spike duplicate was acceptable. No further action was taken.

All laboratory data has been approved by MVTL Laboratories.

SIGNED: Claudette Carroll DATE: 12 JUN 17
Claudette Carroll - MVTL Bismarck Laboratory Manager



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MEMBER
ACIL

Quality Control Report

Lab ID: 17-W2506

Project: MDU Heskett

Work Order: 201782-1684

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
Arsenic - Dissolved mg/l	0.1000	100	80-120	0.100 0.100	17W2578q 17W2584q	< 0.002 0.0029	0.0965 0.1098	96 107	75-125 75-125	0.0965 0.1098	0.0991 0.1091	99 106	2.7 0.6	20 20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40 0.40	100 100	80-120 80-120	5.00	17W2506q	< 0.5	5.25	105	75-125	5.25	5.40	108	2.8	20	- -	- -	< 0.1
Boron - Dissolved mg/l	0.40	105	80-120	0.300 0.600	17-W2477 17-W2506	< 0.1 0.26	0.26 0.88	87 103	75-125 75-125	0.26 0.88	0.26 0.86	87 100	0.0 2.3	20 20	- -	- -	< 0.1 < 0.1
Cadmium - Dissolved mg/l	0.1000	105	80-120	0.100 0.100	17W2578q 17W2584q	< 0.0005 < 0.0005	0.0924 0.1090	92 109	75-125 75-125	0.0924 0.1090	0.0952 0.1112	95 111	3.0 2.0	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	20.0	108	80-120	500 100	17W2504q 17W2518q	530 4.0	980 104	90 100	75-125 75-125	980 104	975 105	89 101	0.5 1.0	20 20	- -	- -	< 1 < 1
Chloride mg/l	30.0	88	80-120	60.0 600	17-W2661 17-M1596	5.3 222	58.8 758	89 89	80-120 80-120	58.8 758	56.8 803	86 97	3.5 5.8	20 20	- -	- -	< 1 < 1
Chromium - Dissolved mg/l	0.1000	98	80-120	0.100 0.100	17W2578q 17W2584q	< 0.002 < 0.002	0.0900 0.0960	90 96	75-125 75-125	0.0900 0.0960	0.0926 0.0966	93 97	2.8 0.6	20 20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	-	-	-	-	-	-	-	-	-	9558	9558	-	0.0	20	-	-	-
Fluoride mg/l	0.50 0.50	106 106	90-110 90-110	0.500	17-W2503	0.27	0.70	86	80-120	0.70	0.70	86	0.0	20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40 0.40	105 102	80-120 80-120	5.00	17W2506q	< 0.5	5.25	105	75-125	5.25	5.35	107	1.9	20	- -	- -	< 0.1
Lead - Dissolved mg/l	0.1000	99	80-120	0.100 0.100	17W2578q 17W2584q	< 0.0005 < 0.0005	0.0738 0.1000	74 100	75-125 75-125	0.0738 0.1000	0.0792 0.0968	79 97	7.1 3.3	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	20.0	109	80-120	500 100	17W2504q 17W2518q	246 1.8	720 101	95 99	75-125 75-125	720 101	715 100	94 98	0.7 1.0	20 20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40 0.40	105 105	80-120 80-120	5.00	17W2506q	< 0.25	5.30	106	75-125	5.30	5.40	108	1.9	20	- -	- -	< 0.05
Mercury - Dissolved mg/l	0.0020	100	85-115	0.002	17-W2506	< 0.0002	0.0019	95	70-130	0.0019	0.0019	95	0.0	20	-	-	< 0.0002

Quality Control Report

Lab ID: 17-W2506

Project: MDU Heskett

Work Order: 201782-1684

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
Molybdenum - Dissolved mg/l	0.40 0.40	102 102	80-120 80-120	5.00	17W2506q	< 0.5	5.45	109	75-125	5.45	5.60	112	2.7	20	- -	- -	< 0.1
Nitrate-Nitrite as N mg/l	0.50	108	90-110	1.00	17-W2505	< 0.1	1.10	110	90-110	1.10	1.06	106	3.7	20	-	-	< 0.1
pH units	-	-	-	-	-	-	-	-	-	7.4	7.4	-	0.0	20	-	-	-
Phosphorus as P - Total mg/l	0.50	102	90-110	1.00	17-W2506	< 0.1	0.98	98	90-110	0.98	1.03	103	5.0	20	-	-	< 0.1
Potassium - Total mg/l	10.0	91	80-120	100 20.0	17W2504q 17W2518q	12.8 2.7	107 23.7	94 105	75-125 75-125	107 23.7	106 23.6	93 104	0.9 0.4	20 20	- -	- -	< 1 < 1
Selenium - Dissolved mg/l	0.1000	108	80-120	0.100 0.100	17W2578q 17W2584q	< 0.005 0.0737	0.1173 0.1864	117 113	75-125 75-125	0.1173 0.1864	0.1233 0.1857	123 112	5.0 0.4	20 20	- -	- -	< 0.002
Silver - Dissolved mg/l	0.1000	102	80-120	0.100	17W2584q	< 0.0005	0.0938	94	75-125	0.0938	0.0962	96	2.5	20	-	-	< 0.0005
Sodium - Total mg/l	20.0	100	80-120	500 500	17W2504q 17W2518q	585 625	1000 1070	83 89	75-125 75-125	1000 1070	1010 1050	85 85	1.0 1.9	20 20	- -	- -	< 1 < 1
Sulfate mg/l	100	110	80-120	100	17-W2505	< 5	99.4	99	80-120	99.4	99.1	99	0.3	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410 410	97 97	90-110 90-110	410	17-W2504	506	832	80	80-120	832	825	78	0.8	20	92	80-120	< 20 < 20

Approved by: C. Cantor
 12 JUL 17



Laboratories, Inc.

2616 E. Broadway
Bismarck, ND 58501
Phone (701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: June 2017	Work Order Number: <i>82-1684</i>
Report To: MDU Attn: Samantha Marshall Address: 400 N. 4th St Bismarck, ND 58501 phone: 701-222-7829 email:	Carbon Copy: Attn: Address:	Name of Sampler(s): <i>Jerry [Signature]</i>

Sample Information					Bottle Type				Field Parameters			Analysis
Lab Number	Sample ID	Date	Time	Sample Type	1 liter	500mL Nitric	500mL Nitric (filtered)	250 mL Sulfuric	Temp (°C)	Spec. Cond.	pH	Analysis Required
<i>W2506</i>	<i>1-910</i>	<i>22 June 17</i>	<i>1627</i>	<i>GW</i>	<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>	<i>10.72</i>	<i>9375</i>	<i>6.78</i>	MDU List AA

Comments:

Relinquished By:		Sample Condition:	
Name:	Date/Time	Location:	Temp (°C)
<i>[Signature]</i>	<i>23 June 17</i>	<i>Log In</i>	<i>101.7</i>
	<i>0823</i>	<i>Walk In #2</i>	<i>TM562 / TM588</i>
1			
2			

Received by:	
Name:	Date/Time
<i>Angel Simonson</i>	<i>23 June 17 0823</i>



CASE NARRATIVE

MVTL Lab Reference No/SDG: 201782-2798
Client: Montana Dakota Utilities
Location: MDU Heskett
Project Identification: NDDH October 2017
MVTL Laboratory Identifications: 17-W4319

Page 1 of 1

Table with 2 columns: MDU Sample Identification, MVTL Laboratory #. Row 1: 1-90, 17-W4319

I. RECEIPT

- All samples were received at the laboratory on 6 Oct 2017 at 0800.
Samples were collected and hand delivered by MVTL Field Service personnel to the laboratory.
Samples were received on ice and evidence of cooling had begun.
Temperature of samples upon receipt was 4.2°C.
All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.
No other exceptions on sample receipt were encountered on this sample set unless noted here.

II. HOLDING TIMES

- With the exception of laboratory pH, all holding times were met for both preparation and analysis unless noted here.

III. METHODS

- Approved methodology was followed for all sample analyses.
Methods 6010D and Method 6020B were used to analyze the metals.

IV. ANALYSIS

- All acceptance criteria was met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/matrix duplicates unless noted here and/or flagged on the individual analytical laboratory report.
For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.

All laboratory data has been approved by MVTL Laboratories.

SIGNED: Claudette Carroll DATE: 11/17/17
Claudette Carroll - MVTL Bismarck Laboratory Manager



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Quality Control Report

Lab ID: 17-W4319

Project: MDU Heskett

Work Order: 201782-2798

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
Arsenic - Dissolved mg/l	0.1000	105	80-120	0.100 0.100	17W4312q 17W4318q	< 0.002 < 0.002	0.1109 0.1059	111 106	75-125 75-125	0.1109 0.1059	0.1115 0.1098	112 110	0.5 3.6	20 20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40	108	80-120	5.00	17W4319q	< 0.5	4.34	87	75-125	4.34	4.64	93	6.7	20	-	-	< 0.1
Boron - Dissolved mg/l	0.40	105	80-120	0.400	17-W4420	0.49	0.85	90	75-125	0.85	0.84	88	1.2	20	- -	- -	< 0.1 < 0.1
Cadmium - Dissolved mg/l	0.1000	108	80-120	0.100 0.100	17W4312q 17W4318q	< 0.0005 < 0.0005	0.1015 0.1092	102 109	75-125 75-125	0.1015 0.1092	0.1014 0.1082	101 108	0.1 0.9	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	20.0	104	80-120	500	17W4313q	480	985	101	75-125	985	985	101	0.0	20	- -	- -	< 1 < 1
Chloride mg/l	30.0 30.0	89 90	80-120 80-120	30.0	17-W4318	< 1	26.8	89	80-120	26.8	25.6	85	4.6	20	- -	- -	< 1 < 1
Chromium - Dissolved mg/l	0.1000	98	80-120	0.100 0.100	17W4312q 17W4318q	< 0.002 < 0.002	0.1004 0.0966	100 97	75-125 75-125	0.1004 0.0966	0.1006 0.0992	101 99	0.2 2.7	20 20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	- -	- -	- -	- -	- -	- -	- -	- -	- -	5276 13891	4990 13928	- -	5.6 0.3	20 20	- -	- -	- -
Fluoride mg/l	0.50	94	90-110	0.500 0.500	17-W4311 17-W4314	0.22 0.93	0.65 1.36	86 86	80-120 80-120	0.65 1.36	0.66 1.37	88 88	1.5 0.7	20 20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40	105	80-120	5.00	17W4319q	< 0.5	4.13	83	75-125	4.13	4.46	89	7.7	20	-	-	< 0.1
Lead - Dissolved mg/l	0.1000	102	80-120	0.100 0.100	17W4312q 17W4318q	< 0.0005 < 0.0005	0.0920 0.1002	92 100	75-125 75-125	0.0920 0.1002	0.0905 0.1000	90 100	1.6 0.2	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	20.0	111	80-120	500	17W4313q	238	745	101	75-125	745	745	101	0.0	20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40	108	80-120	5.00	17W4319q	< 0.25	4.20	84	75-125	4.20	4.52	90	7.3	20	-	-	< 0.05
Mercury - Dissolved mg/l	0.0020	100	85-115	0.002 0.002	17-W4312 17-W4417	< 0.0002 < 0.0002	0.0019 0.0019	95 95	70-130 70-130	0.0019 0.0019	0.0019 0.0019	95 95	0.0 0.0	20 20	- -	- -	< 0.0002
Molybdenum - Dissolved mg/l	0.40	105	80-120	5.00	17W4319q	< 0.5	4.18	84	75-125	4.18	4.50	90	7.4	20	-	-	< 0.1
Nitrate-Nitrite as N mg/l	0.50	94	90-110	1.00	17-W4312	0.20	1.13	93	90-110	1.13	1.21	101	6.8	20	-	-	< 0.1

Quality Control Report

Lab ID: 17-W4319

Project: MDU Heskett

Work Order: 201782-2798

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
pH units	-	-	-	-	-	-	-	-	-	12.2	12.1	-	0.8	20	-	-	-
	-	-	-	-	-	-	-	-	-	7.4	7.5	-	1.3	20	-	-	-
Phosphorus as P - Total mg/l	0.50	104	90-110	1.00 2.00	17-W4317 17-W4327	0.05 7.48	1.13 9.46	108 99	90-110 90-110	1.13 9.46	1.06 9.68	101 110	6.4 2.3	20 20	-	-	< 0.1
Potassium - Total mg/l	10.0	95	80-120	100	17W4313q	12.2	110	98	75-125	110	111	99	0.9	20	-	-	< 1 < 1
Selenium - Dissolved mg/l	0.1000	92	80-120	0.400	17-W4504Q	0.0301	0.4540	106	75-125	0.4540	0.4584	107	1.0	20	-	-	< 0.002
Silver - Dissolved mg/l	0.1000	93	80-120	0.100 0.100	17W4312q 17W4318q	< 0.0005 < 0.0005	0.0919 0.1026	92 103	75-125 75-125	0.0919 0.1026	0.0936 0.1053	94 105	1.8 2.6	20 20	-	-	< 0.0005
Sodium - Total mg/l	20.0	108	80-120	500	17W4313q	620	1040	84	75-125	1040	1100	96	5.6	20	-	-	< 1 < 1
Sulfate mg/l	100	89	80-120	4000	17-W4316	2960	7040	102	80-120	7040	6920	99	1.7	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410	92	90-110	410 410	17-D3598 17-W4312	189 489	554 841	89 86	80-120 80-120	554 841	556 841	90 86	0.4 0.0	20 20	89	80-120	< 20 < 20

Approved by: _____

C. Gaudet

NOV 17



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 www.mvtl.com



CERTIFICATE of ANALYSIS - STATE

Samantha Marshall
 Montana Dakota Utilities
 400 N 4th St
 Bismarck ND 58501

Report Date: 26 Oct 17
 Lab Number: 17-W4319
 Work Order #: 82-2798
 Account #: 002800
 Date Sampled: 5 Oct 17 12:47
 Date Received: 6 Oct 17 8:00
 Sampled By: MVTL Field Services

Project Name: MDU Heskett

PO #: 165275

Sample Description: 1-90

Temp at Receipt: 4.2C ROI

Event and Year: October 2017

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Metal Digestion				EPA 200.2	6 Oct 17	EMS
Conductivity (EC)	9645	umhos/cm	1	SM2510-B	9 Oct 17 17:00	SVS
pH - Field	6.85	units	NA	SM 4500 H+ B	5 Oct 17 12:47	DJN
pH	* 7.3	units	0.1	SM4500 H+ B	9 Oct 17 17:00	SVS
Temperature - Field	11.4	Degrees C	NA	SM 2550B	5 Oct 17 12:47	DJN
Total Alkalinity	293	mg/l CaCO3	20	SM2320-B	10 Oct 17 17:00	SVS
Bicarbonate	293	mg/l CaCO3	20	SM2320-B	10 Oct 17 17:00	SVS
Carbonate	< 20	mg/l CaCO3	20	SM2320-B	10 Oct 17 17:00	SVS
Hydroxide	< 20	mg/l CaCO3	20	SM2320-B	10 Oct 17 17:00	SVS
Conductivity - Field	9736	umhos/cm	1	EPA 120.1	5 Oct 17 12:47	DJN
Tot Dis Solids(Summation)	8900	mg/l	12.5	SM1030-F	19 Oct 17 10:53	Calculated
Total Hardness as CaCO3	4620	mg/l	NA	SM2340-B	16 Oct 17 14:30	Calculated
Cation Summation	155	meq/L	NA	SM1030-F	16 Oct 17 14:30	Calculated
Anion Summation	131	meq/L	NA	SM1030-F	19 Oct 17 10:53	Calculated
Percent Error	8.13	%	NA	SM1030-F	19 Oct 17 10:53	Calculated
Sodium Adsorption Ratio	9.09		NA	USDA 20b	16 Oct 17 14:30	Calculated
Fluoride	1.02	mg/l	0.10	SM4500-F-C	9 Oct 17 17:00	SVS
Sulfate	5900	mg/l	5.00	ASTM D516-07	10 Oct 17 16:14	RAG
Chloride	87.8	mg/l	1.0	SM4500-Cl-E	11 Oct 17 15:17	RAG
Nitrate-Nitrite as N	4.02	mg/l	0.10	EPA 353.2	19 Oct 17 10:53	EMS
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	11 Oct 17 11:10	EMS
Mercury - Dissolved	< 0.0002	mg/l	0.0002	EPA 245.1	13 Oct 17 12:55	EV
Calcium - Total	424	mg/l	1.0	6010D	16 Oct 17 14:30	SZ
Magnesium - Total	865	mg/l	1.0	6010D	16 Oct 17 14:30	SZ
Sodium - Total	1420	mg/l	1.0	6010D	16 Oct 17 14:30	SZ
Potassium - Total	23.6	mg/l	1.0	6010D	16 Oct 17 14:30	SZ
Barium - Dissolved	< 0.5 @	mg/l	0.10	6010D	10 Oct 17 17:00	SZ
Iron - Dissolved	< 0.5 @	mg/l	0.10	6010D	10 Oct 17 17:00	SZ
Manganese - Dissolved	< 0.25 @	mg/l	0.05	6010D	10 Oct 17 17:00	SZ
Molybdenum - Dissolved	< 0.5 @	mg/l	0.10	6010D	10 Oct 17 17:00	SZ
Boron - Dissolved	< 0.5 @	mg/l	0.10	6010D	13 Oct 17 14:23	SZ
Arsenic - Dissolved	< 0.002	mg/l	0.0020	6020B	25 Oct 17 12:42	BT
Cadmium - Dissolved	< 0.0005	mg/l	0.0005	6020B	25 Oct 17 12:42	BT
Chromium - Dissolved	< 0.002	mg/l	0.0020	6020B	25 Oct 17 12:42	BT
Lead - Dissolved	< 0.0005	mg/l	0.0005	6020B	25 Oct 17 12:42	BT

RL = Method Reporting Limit

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: ND # ND-00016



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Page: 2 of 2

CERTIFICATE of ANALYSIS - STATE

Samantha Marshall
Montana Dakota Utilities
400 N 4th St
Bismarck ND 58501

Report Date: 26 Oct 17
Lab Number: 17-W4319
Work Order #: 82-2798
Account #: 002800
Date Sampled: 5 Oct 17 12:47
Date Received: 6 Oct 17 8:00
Sampled By: MVTl Field Services

Project Name: MDU Heskett

PO #: 165275

Sample Description: 1-90

Temp at Receipt: 4.2C ROI

Event and Year: October 2017

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Selenium - Dissolved	0.0048 mg/l		0.0020	6020B	25 Oct 17 16:35	BT
Silver - Dissolved	< 0.0005 mg/l		0.0005	6020B	24 Oct 17 17:52	BT

* Holding time exceeded

Approved by:

Claudette K Carroll

*CC
1 NOV 17*

Claudette K. Carroll, Laboratory Manager, Bismarck, ND

RL = Method Reporting Limit

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: ND # ND-00016



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
Event: 2017
Sample ID: 1-90
Sampling Personal: Damen Nieson

Weather Conditions: Temp: 50 °F Wind: Light Precip: Sunny / Partly Cloudy / Cloudy

Well Information

Well Locked?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Well Labeled?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Casing Straight?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Grout Seal Intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<u>Not visible</u>
Repairs Necessary:			
Casing Diameter:	<u>2"</u>		
Water Level Before Purge:	<u>11.76</u>	ft	
Total Well Depth:	<u>-</u>	ft	
Well Volume:	<u>-</u>	liters	
Depth to Top of Pump:	<u>-</u>	ft	
Water Level After Sample:	<u>11.83</u>	ft	
Measurement Method:	<u>Electric Water Level Indicator</u>		

Sampling Information

Purging Method:	<u>Bladder</u>		Control Settings	
Sampling Method:	<u>Bladder</u>		Purge:	<u>5</u> sec.
Dedicated Equip?:	<input checked="" type="checkbox"/>	No <input type="checkbox"/>	Recover:	<u>55</u> sec.
Duplicate Sample?:	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	PSI:	<u>15</u>
Duplicate Sample ID:	<u>-</u>		Pumping Rate:	<u>180</u> mL/min
Purge Date:	<u>5/06/17</u>	Time Purging Began:	<u>1222</u> am/pm	
Well Purged Dry?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Time Purged Dry:	<u>-</u> am/pm
Sample Date:	<u>5/06/17</u>	Time of Sampling:	<u>1247</u> am/pm	
Bottle List:	<u>1L Raw, 500mL Nitric, 500mL Nitric (filtered), 250 mL Sulfuric</u>			

Field Measurements

SEQ #	Stabilization (3 consecutive) Time	Temp (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±20 mV	Turbidity (NTU) ±10%	Water Level (ft) 0.25 ft	mL Removed	Discription: Clarity, Color, Odor, Ect.
1	1227	11.21	9815	6.85	3.27	271.6	0.82	11.80	500	<u>cl</u>
2	1232	11.17	9768	6.85	2.33	269.0	0.46	11.83	500	<u>cl</u>
3	1237	11.32	9774	6.86	1.80	266.6	0.26	11.83	500	<u>cl</u>
4	1242	11.34	9742	6.86	1.71	266.8	0.27	11.83	500	<u>cl</u>
5	1247	11.37	9736	6.85	1.68	265.5	0.33	11.83	500	<u>cl</u>
6										
7										
8										
9										
10										

Stabilized: Yes No
Comments: (circled Yes)

Total Volume Removed: 2500 mL

**Laboratories, Inc.**2616 E. Broadway
Bismarck, ND 58501
Phone (701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: October 2017	Work Order Number: 82-2798
Report To: MDU Attn: Samantha Marshall Address: 400 N. 4th St Bismarck, ND 58501 phone: 701-222-7829 email:	Carbon Copy: Attn: Address:	Name of Sampler(s): Darren Wieswaag

Lab Number	Sample ID	Sample Information			Bottle Type				Field Parameters			Analysis Required	
		Date	Time	Sample Type	1 liter	500mL Nitric	500mL Nitric (filtered)	250 mL Sulfuric	Temp (°C)	Spec. Cond.	pH		
W4319	1-90	5 Oct 17	1247	GW	X	X	X	X		11.37	978	6.85	MDU List AA

Comments:

Relinquished By:		Sample Condition:	
Name:	Date/Time	Location:	Temp (°C)
1 <i>[Signature]</i>	5 Oct 17 1654	Log In Walk In #2	RJ 4.2 TM562 / TM588
2			

Received by:	
Name:	Date/Time
<i>N Buchanan</i>	6 Oct 17 0800



CASE NARRATIVE

MVTL Lab Reference No/SDG: 201882-0651
Client: Montana Dakota Utilities
Location: MDU Heskett
Project Identification: NDDH Spring 2018
MVTL Laboratory Identifications: 18-W493

Page 1 of 1

Table with 2 columns: MDU Sample Identification, MVTL Laboratory #. Row 1: 1-90, 18-W493

I. RECEIPT

- All samples were received at the laboratory on 5 Apr 2018 at 0800.
Samples were collected and hand delivered by MVTL Field Service personnel to the laboratory.
Samples were received on ice and evidence of cooling had begun.
Temperature of samples upon receipt was 6.4°C.
All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.
No other exceptions on sample receipt were encountered on this sample set unless noted here.

II. HOLDING TIMES

- With the exception of laboratory pH, all holding times were met for both preparation and analysis unless noted here.

III. METHODS

- Approved methodology was followed for all sample analyses.
Methods 6010D and Method 6020B were used to analyze the metals.

IV. ANALYSIS

- All acceptance criteria was met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/matrix duplicates unless noted here and/or flagged on the individual analytical laboratory report.
For some analytes, the reported results were elevated due to instrument performance at the lower limit of quantitation (LLOQ).
Recovery for one selenium matrix spike was outside of the acceptable limits. Recovery of the matrix spike duplicate was acceptable. RPD for the recoveries of the matrix spike/matrix spike duplicate was acceptable. No further action was taken.
One alkalinity matrix spike duplicate recovery was outside the acceptable limits. Recovery for the matrix spike was acceptable. RPD for the recoveries of the matrix spike duplicate and the matrix spike was within limits. No further action was taken.

All laboratory data has been approved by MVTL Laboratories.

SIGNED: Claudette Carroll DATE: 4 May 18
Claudette Carroll - MVTL Bismarck Laboratory Manager



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Page: 1 of 2

Quality Control Report

Lab ID: 18-W493

Project:

Work Order: 201882-0651

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
Arsenic - Dissolved mg/l	0.0160	99	80-120	0.100 0.100	18W453q 18W498q	< 0.002 < 0.002	0.1095 0.1060	110 106	75-125 75-125	0.1095 0.1060	0.1082 0.1085	108 108	1.2 2.3	20 20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40	105	80-120	1.00	18W456q	< 0.1	0.90	90	75-125	0.90	0.88	88	2.2	20	-	-	< 0.1
Boron - Dissolved mg/l	0.40	108	80-120	2.00	18-W453	0.63	2.37	87	75-125	2.37	2.46	92	3.7	20	- -	- -	< 0.1 < 0.1
Cadmium - Dissolved mg/l	0.0160	103	80-120	0.100 0.100	18W453q 18W498q	< 0.0005 < 0.0005	0.0954 0.0976	95 98	75-125 75-125	0.0954 0.0976	0.0928 0.0985	93 98	2.8 0.9	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	20.0	108	80-120	500	18W498q	445	960	103	75-125	960	950	101	1.0	20	- -	- -	< 1 < 1
Chloride mg/l	30.0	98	80-120	30.0	18-W499	37.8	67.4	99	80-120	67.4	67.9	100	0.7	20	-	-	< 1
Chromium - Dissolved mg/l	0.0160	92	80-120	0.100 0.100	18W453q 18W498q	< 0.002 < 0.002	0.1036 0.0974	104 97	75-125 75-125	0.1036 0.0974	0.1030 0.0995	103 100	0.6 2.1	20 20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	-	-	-	-	-	-	-	-	-	9600	10602	-	9.9	20	-	-	-
Fluoride mg/l	0.50	102	90-110	0.500	18-M652	0.76	1.26	100	80-120	1.26	1.24	96	1.6	20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40	105	80-120	1.00	18W456q	< 0.1	0.82	82	75-125	0.82	0.82	82	0.0	20	-	-	< 0.1
Lead - Dissolved mg/l	0.0160	97	80-120	0.100 0.100	18W453q 18W498q	< 0.001 < 0.001	0.0830 0.0841	83 84	75-125 75-125	0.0830 0.0841	0.0820 0.0860	82 86	1.2 2.2	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	20.0	108	80-120	500	18W498q	210	720	102	75-125	720	715	101	0.7	20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40	108	80-120	1.00	18W456q	0.09	0.92	83	75-125	0.92	0.97	88	5.3	20	-	-	< 0.05
Mercury - Dissolved mg/l	0.0020	95	85-115	0.002 0.002	18-W497 18-W504	< 0.0002 < 0.0002	0.0018 0.0019	90 95	70-130 70-130	0.0018 0.0019	0.0019 0.0018	95 90	5.4 5.4	20 20	- -	- -	< 0.0002
Molybdenum - Dissolved mg/l	0.40	102	80-120	1.00	18W456q	< 0.1	0.86	86	75-125	0.86	0.86	86	0.0	20	-	-	< 0.1
Nitrate-Nitrite as N mg/l	0.50	102	90-110	10.0	18-W453	5.90	15.4	95	90-110	15.4	15.3	94	0.7	20	-	-	< 0.1
pH units	- -	- -	- -	- -	- -	- -	- -	- -	- -	8.8 7.2	8.5 7.3	- -	3.5 1.4	20 20	- -	- -	- -

Quality Control Report

Lab ID: 18-W493

Project:

Work Order: 201882-0651

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
Phosphorus as P - Total mg/l	0.50	106	90-110	5.00 2.00	18-D1046 18-W392	10.9 4.35	15.8 6.26	98 96	90-110 90-110	15.8 6.26	16.4 6.22	110 93	3.7 0.6	20 20	- -	- -	< 0.1
Potassium - Total mg/l	10.0	92	80-120	100	18W498q	12.3	112	100	75-125	112	110	98	1.8	20	- -	- -	< 1 < 1
Selenium - Dissolved mg/l	0.0160	106	80-120	0.100 0.100	18W453q 18W498q	0.0451 0.1217	0.1802 0.2216	135 100	75-125 75-125	0.1802 0.2216	0.1678 0.2369	123 115	7.1 6.7	20 20	- -	- -	< 0.005
Silver - Dissolved mg/l	0.0160	97	80-120	0.100 0.100	18-W453 18-W498	< 0.0005 < 0.0005	0.0832 0.0850	83 85	75-125 75-125	0.0832 0.0850	0.0814 0.0846	81 85	2.2 0.5	20 20	- -	- -	< 0.0005
Sodium - Total mg/l	20.0	96	80-120	500	18W498q	550	1040	98	75-125	1040	1020	94	1.9	20	- -	- -	< 1 < 1
Sulfate mg/l	100	104	80-120	4000	18-M875	744	5330	115	80-120	5330	5180	111	2.9	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410	100	90-110	410 410	18-D1074 18-W476	717 110	1036 436	78 80	80-120 80-120	1036 436	1049 435	81 79	1.2 0.2	20 20	99	80-120	< 20 < 20

Approved by: C. Campbell
 4 May 18



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Page: 2 of 2

CERTIFICATE of ANALYSIS - STATE

Samantha Marshall
Montana Dakota Utilities
400 N 4th St
Bismarck ND 58501

Report Date: 1 May 18
Lab Number: 18-W493
Work Order #: 82-0651
Account #: 002800
Date Sampled: 4 Apr 18 16:11
Date Received: 5 Apr 18 8:00
Sampled By: MVTL Field Services

Sample Description: 1-90
Sample Site: MDU Heskett Active Ash
Event and Year: Spring 2018

Temp at Receipt: 6.4C ROI

As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
--------------------	-----------	------------------	---------------	---------

* Holding time exceeded

^ Elevated result due to instrument performance at the lower limit of quantification (LLOQ).

Approved by:

CC
Claudette K Carroll 4 May 18

Claudette K. Carroll, Laboratory Manager, Bismarck, ND

RL = Method Reporting Limit

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: ND # ND-00016



Laboratories, Inc.

2616 E. Broadway
Bismarck, ND 58501
Phone (701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Spring 2018	Work Order Number: <i>201882-0651</i>
Report To: MDU Attn: Samantha Marshall Address: 400 N. 4th St Bismarck, ND 58501 phone: 701-222-7829 email:	Carbon Copy: Attn: Address:	Name of Sampler(s): <i>Darren Nieswaag</i>

Sample Information					Bottle Type				Field Parameters			Analysis
Lab Number	Sample ID	Date	Time	Sample Type	1 liter	500mL Nitric	500mL Nitric (filtered)	250 mL Sulfuric	Temp (°C)	Spec. Cond.	pH	Analysis Required
<i>W 493</i>	1-90	<i>4 April 18</i>	<i>1600</i>	GW	X	X	X	X	<i>6.50</i>	<i>9529</i>	<i>6.88</i>	MDU List AA

Comments:

Relinquished By:		Sample Condition:	
Name:	Date/Time	Location:	Temp (°C)
<i>Darren Nieswaag</i>	<i>4 APR 18</i> <i>1700</i>	Log In <i>Walk In #2</i>	<i>ROJ 6.4</i> <i>TM562 / TM588</i>
1			
2			

Received by:	
Name:	Date/Time
<i>M. Buckman</i>	<i>5 April 18</i> <i>0800</i>



CASE NARRATIVE

MVTL Lab Reference No/SDG: 201882-2618
Client: Montana Dakota Utilities
Location: MDU Heskett
Project Identification: NDDH Fall 2018
MVTL Laboratory Identifications: 18-W3260
Page 1 of 1

Table with 2 columns: MDU Sample Identification, MVTL Laboratory #. Row 1: 1-90, 18-W3260

I. RECEIPT

- All samples were received at the laboratory on 4 Oct 2018 at 1307.
Samples were collected and hand delivered by MVTL Field Service personnel to the laboratory.
Samples were received on ice and evidence of cooling had begun.
Temperature of samples upon receipt was 3.1°C.
All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.
No other exceptions on sample receipt were encountered on this sample set unless noted here.

II. HOLDING TIMES

- With the exception of laboratory pH, all holding times were met for both preparation and analysis unless noted here.

III. METHODS

- Approved methodology was followed for all sample analyses.
Methods 6010D and Method 6020B were used to analyze the metals.

IV. ANALYSIS

- All acceptance criteria was met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/matrix duplicates unless noted here and/or flagged on the individual analytical laboratory report.
For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.
The recoveries for two selenium matrix spikes/matrix spike duplicates were outside the acceptable limits. RPDs for the recoveries were within limits. Poor recoveries were determined to be due to sample matrix. Data was accepted based on acceptable recovery of the LCS. No further action was taken.

All laboratory data has been approved by MVTL Laboratories.

SIGNED: Claudette Carroll DATE: 25 OCT 18
Claudette Carroll - MVTL Bismarck Laboratory Manager



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Quality Control Report

Lab ID: 18-W3260

Project: MDU Heskett

Work Order: 201882-2618

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
Arsenic - Dissolved mg/l	0.0160	102	80-120	0.100 0.100	18W3261q 18W3266q	< 0.002 < 0.002	0.1150 0.1212	115 121	75-125 75-125	0.1150 0.1212	0.1140 0.1144	114 114	0.9 5.8	20 20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40	110	80-120	0.400	18W3250q	0.12	0.52	100	75-125	0.52	0.53	102	1.9	20	-	-	< 0.1 < 0.1
Boron - Dissolved mg/l	0.40 0.40 0.40 0.40	108 112 108 108	80-120 80-120 80-120 80-120	2.00	18-W3261	0.38	2.38	100	75-125	2.38	2.57	110	7.7	20	- - - -	- - - -	< 0.1
Cadmium - Dissolved mg/l	0.0160	104	80-120	0.100 0.100	18W3261q 18W3266q	< 0.0005 < 0.0005	0.1044 0.1108	104 111	75-125 75-125	0.1044 0.1108	0.1041 0.1037	104 104	0.3 6.6	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	20.0	102	80-120	500	18W3252q	240	705	93	75-125	705	715	95	1.4	20	- -	- -	< 1 < 1
Chloride mg/l	30.0 30.0	98 102	80-120 80-120	30.0	18-W3171	< 2	28.3	94	80-120	28.3	27.7	92	2.1	20	- -	- -	< 2 < 2
Chromium - Dissolved mg/l	0.0160	103	80-120	0.100 0.100	18W3261q 18W3266q	< 0.002 < 0.002	0.1008 0.1093	101 109	75-125 75-125	0.1008 0.1093	0.1010 0.1048	101 105	0.2 4.2	20 20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	1514 1264 6904	1520 1275 7451	- - -	0.4 0.9 7.6	20 20 20	- - -	- - -	- - -
Fluoride mg/l	0.50 0.50	98 100	90-110 90-110	0.500 0.500	18-W3274 18-W3261	< 0.1 0.19	0.58 0.65	116 92	80-120 80-120	0.58 0.65	0.58 0.65	116 92	0.0 0.0	20 20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40	110	80-120	0.400	18W3250q	0.22	0.66	110	75-125	0.66	0.66	110	0.0	20	- -	- -	< 0.1 < 0.1
Lead - Dissolved mg/l	0.0160	100	80-120	0.100 0.100	18W3261q 18W3266q	< 0.0005 < 0.0005	0.0944 0.1024	94 102	75-125 75-125	0.0944 0.1024	0.0932 0.0965	93 96	1.3 5.9	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	20.0	100	80-120	100	18W3252q	100	191	91	75-125	191	189	89	1.1	20	- -	- -	< 1 < 1

Quality Control Report

Lab ID: 18-W3260

Project: MDU Heskett

Work Order: 201882-2618

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
Manganese - Dissolved mg/l	0.40	112	80-120	0.400	18W3250q	< 0.05	0.44	110	75-125	0.44	0.45	112	2.2	20	-	-	< 0.05
Mercury - Dissolved mg/l	0.0020	110	85-115	0.002	18-W3267	< 0.0002	0.0017	85	70-130	0.0017	0.0021	105	21.1	20	-	-	< 0.0002
Molybdenum - Dissolved mg/l	0.40	108	80-120	0.400	18W3250q	< 0.1	0.42	105	75-125	0.42	0.42	105	0.0	20	-	-	< 0.1
Nitrate-Nitrite as N mg/l	0.50	102	90-110	2.00	18-W3261	< 0.1	1.88	94	90-110	1.88	1.80	90	4.3	20	-	-	< 0.1
pH units	-	-	-	-	-	-	-	-	-	8.2	8.2	-	0.0	20	-	-	-
	-	-	-	-	-	-	-	-	-	7.8	7.9	-	1.3	20	-	-	-
	-	-	-	-	-	-	-	-	-	7.0	7.1	-	1.4	20	-	-	-
Phosphorus as P - Total mg/l	0.50	110	90-110	1.00	18-W3180	< 0.1	1.01	101	90-110	1.01	1.04	104	2.9	20	-	-	< 0.1
				1.00	18-W3333	< 0.1	1.05	105	90-110	1.05	1.07	107	1.9	20	-	-	< 0.1
Potassium - Total mg/l	10.0	98	80-120	20.0	18W3252q	8.7	28.2	98	75-125	28.2	27.9	96	1.1	20	-	-	< 1
															-	-	< 1
Selenium - Dissolved mg/l	0.0160	105	80-120	0.100	18W3261q	< 0.005	0.1310	131	75-125	0.1310	0.1300	130	0.8	20	-	-	< 0.005
				0.100	18W3266q	< 0.005	0.1405	140	75-125	0.1405	0.1362	136	3.1	20	-	-	< 0.005
Silver - Dissolved mg/l	0.0160	105	80-120	0.100	18W3261q	< 0.0005	0.0986	99	75-125	0.0986	0.0989	99	0.3	20	-	-	< 0.0005
				0.100	18W3266q	< 0.0005	0.1052	105	75-125	0.1052	0.0966	97	8.5	20	-	-	< 0.0005
Sodium - Total mg/l	20.0	102	80-120	100	18W3252q	119	211	92	75-125	211	207	88	1.9	20	-	-	< 1
															-	-	< 1
Sulfate mg/l	100	94	80-120	500	18-W3252	735	1250	103	80-120	1250	1210	95	3.3	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410	97	90-110	410	18-W3273	276	650	91	80-120	650	647	90	0.5	20	96	80-120	< 20
	410	98	90-110	410	18-W3260	327	710	93	80-120	710	708	93	0.3	20			< 20

Approved by: C. Cantor
 ZSOCT 18



Field Datasheet

Groundwater Assessment

2616 E. Broadway Ave, Bismarck, ND

Phone: (701) 258-9720

Company: MDU Heskett
 Event: Fall 2018
 Sample ID: 1-90
 Sampling Personal: Jerry [Signature]

Weather Conditions: Temp: 40°F Wind: S @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

Well Information

Well Locked?	Yes	<u>No</u>	
Well Labeled?	<u>Yes</u>	No	
Casing Straight?	<u>Yes</u>	No	
Grout Seal Intact?	Yes	No	<u>Not Visible</u>
Repairs Necessary:			
Casing Diameter:	<u>2"</u>		
Water Level Before Purge:	<u>12.01</u>	ft	
Depth to Top of Pump:	<u>—</u> ft		
Water Level After Sample:	<u>12.15</u>	ft	
Measurement Method:	<u>Electric Water Level Indicator</u>		

Sampling Information

Purging Method:	<u>Bladder</u>			
Sampling Method:	<u>Bladder</u>			
Dedicated Equip?:	<u>Yes</u>	No		
Duplicate Sample?:	Yes	<u>No</u>		
Duplicate Sample ID:	<u>—</u>			
Purge Date:	<u>4 Oct 18</u>	Time Purging Began:	<u>1110</u>	<u>am/pm</u>
Well Purged Dry?	Yes	<u>No</u>		
Sample Date:	<u>4 Oct 18</u>	Time of Sampling:	<u>1150</u>	<u>am/pm</u>
Bottle List:	1L Raw	500mL Nitric	500mL Nitric (filtered)	250mL Sulfuric

Control Settings		
Purge:	<u>5</u>	sec.
Recover:	<u>55</u>	sec.
PSI:	<u>10</u>	

Field Measurements

Stabilization (3 consecutive)	Temp (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±20 mV	Turbidity (NTU) ±10%	Water Level (ft) 0.25 ft	Pumping Rate ml/min	mL Removed	Description: Clarity, Color, Odor, Ect. Clear, Slightly Turbid, Turbid	
SEQ #	Time										
1	1115	9.69	9530	6.79	2.06	250.0	0.89	12.11	100.0	500.0	clear
2	1135	9.51	9538	6.75	1.35	255.4	1.08	12.14	100.0	2000.0	clear
3	1140	9.81	9563	6.75	1.26	253.5	0.99	12.19	100.0	500.0	clear
4	1145	9.55	9589	6.77	1.29	235.2	1.02	12.12	100.0	500.0	clear
5	1150	9.71	9592	6.74	1.20	238.4	0.98	12.18	100.0	500.0	clear
6											
7											
8											
9											
10											

Stabilized: Yes No

Total Volume Removed: 4000.0 mL

Comments:

**Laboratories, Inc.**2616 E. Broadway
Bismarck, ND 58501
Phone (701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Fall 2018	Work Order Number: 82-2618
Report To: MDU Attn: Samantha Marshall Address: 5181 Southgate Dr. Billings, MT 59102 phone: 406-896-4227 email:	Carbon Copy: Attn: Address:	Name of Sampler(s): <i>Jerry Ph...</i>

Lab Number	Sample ID	Sample Information			Bottle Type				Field Parameters			Analysis Required		
		Date	Time	Sample Type	1 liter	500mL Nitric	500mL Nitric (filtered)	250 mL Sulfuric	Temp (°C)	Spec. Cond.	pH			
<i>W3260</i>	1-90	<i>4 Oct 18</i>	<i>1150</i>	GW	X	X	X	X			<i>9.71</i>	<i>9592</i>	<i>6.74</i>	MDU List AA

Comments:

Relinquished By:		Sample Condition:	
Name:	Date/Time	Location:	Temp (°C)
<i>[Signature]</i>	<i>4 Oct 18</i> <i>1307</i>	<i>Log In</i> Walk In #2	<i>3.1</i> <i>RO1</i> <i>TM562 / TM588</i>
2			

Received by:	
Name:	Date/Time
<i>[Signature]</i>	<i>4 Oct 2018</i> <i>1307</i>

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Page: 1 of 2

Quality Control Report

Lab ID: 19-W596

Project: MDU Heskett

Work Order: 201982-0660

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
Arsenic - Dissolved mg/l	0.0160	102	80-120	0.100 0.100	19W587q 19W596q	< 0.002 < 0.002	0.1146 0.1124	115 112	75-125 75-125	0.1146 0.1124	0.1066 0.1130	107 113	7.2 0.5	20 20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40	100	80-120	5.00	19W592q	< 0.5	4.98	100	75-125	4.98	4.98	100	0.0	20	-	-	< 0.1
Boron - Dissolved mg/l	0.40 0.40	95 100	80-120 80-120	0.400	19-W588	0.16	0.58	105	75-125	0.58	0.52	90	10.9	20	- -	- -	< 0.1
Cadmium - Dissolved mg/l	0.0160	106	80-120	0.100 0.100	19W587q 19W596q	< 0.0005 < 0.0005	0.1049 0.1001	105 100	75-125 75-125	0.1049 0.1001	0.1030 0.1036	103 104	1.8 3.4	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	20.0	104	80-120	500	19W592q	328	915	117	75-125	915	930	120	1.6	20	- -	- -	< 1 < 1
Chloride mg/l	30.0 30.0	97 97	80-120 80-120	30.0	19-W593	< 1	28.4	95	80-120	28.4	29.6	99	4.1	20	- -	- -	< 1 < 1
Chromium - Dissolved mg/l	0.0160	99	80-120	0.100 0.100	19W587q 19W596q	< 0.002 < 0.002	0.0995 0.1066	100 107	75-125 75-125	0.0995 0.1066	0.0956 0.1041	96 104	4.0 2.4	20 20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	- -	- -	- -	- -	- -	- -	- -	- -	- -	1610 475	1606 471	- -	0.2 0.8	20 20	- -	- -	- -
Fluoride mg/l	0.50	110	90-110	0.500	19-W596	1.06	1.50	88	80-120	1.50	1.50	88	0.0	20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40	102	80-120	5.00	19W592q	< 0.5	5.00	100	75-125	5.00	5.05	101	1.0	20	-	-	< 0.1
Lead - Dissolved mg/l	0.0160	100	80-120	0.100 0.100	19W587q 19W596q	< 0.0005 < 0.0005	0.0944 0.0937	94 94	75-125 75-125	0.0944 0.0937	0.0897 0.0937	90 94	5.1 0.0	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	20.0	104	80-120	500	19W592q	640	1190	110	75-125	1190	1200	112	0.8	20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40	105	80-120	5.00	19W592q	0.29	5.35	101	75-125	5.35	5.40	102	0.9	20	-	-	< 0.05
Mercury - Dissolved mg/l	0.0020	100	85-115	0.002	19-W596	< 0.0002	0.0018	90	70-130	0.0018	0.0018	90	0.0	20	-	-	< 0.0002
Molybdenum - Dissolved mg/l	0.40	100	80-120	5.00	19W592q	< 0.5	4.76	95	75-125	4.76	4.88	98	2.5	20	-	-	< 0.1
Nitrate-Nitrite as N mg/l	0.50	92	90-110	2.00	19-W595	< 0.1	1.78	89	90-110	1.78	1.78	89	0.0	20	-	-	< 0.1

Quality Control Report

Lab ID: 19-W596

Project: MDU Heskett

Work Order: 201982-0660

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
pH units	-	-	-	-	-	-	-	-	-	8.2	8.2	-	0.0	20	-	-	-
	-	-	-	-	-	-	-	-	-	7.3	7.3	-	0.0	20	-	-	-
Phosphorus as P - Total mg/l	0.50	106	90-110	1.00	19-W596	< 0.1	0.92	92	90-110	0.92	0.92	92	0.0	20	-	-	< 0.1
Potassium - Total mg/l	10.0	93	80-120	100	19W592q	15.2	122	107	75-125	122	124	109	1.6	20	-	-	< 1
															-	-	< 1
Selenium - Dissolved mg/l	0.0160	104	80-120	0.100	19W587q	0.0785	0.1966	118	75-125	0.1966	0.1794	101	9.1	20	-	-	< 0.005
				0.100	19W596q	0.0080	0.1424	134	75-125	0.1424	0.1402	132	1.6	20	-	-	< 0.005
Silver - Dissolved mg/l	0.0160	108	80-120	0.100	19W587q	< 0.001	0.1097	110	75-125	0.1097	0.1043	104	5.0	20	-	-	< 0.0005
				0.100	19W596q	< 0.001	0.1079	108	75-125	0.1079	0.1067	107	1.1	20	-	-	< 0.0005
Sodium - Total mg/l	20.0	104	80-120	500	19W592q	635	1180	109	75-125	1180	1180	109	0.0	20	-	-	< 1
															-	-	< 1
Sulfate mg/l	100	102	80-120	100	19-W593	< 5	100	100	80-120	100	102	102	2.0	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410	96	90-110	410	19-D937	401	737	82	80-120	737	776	91	5.2	20	95	80-120	< 20
				410	19-W595	142	518	92	80-120	518	518	92	0.0	20			< 20

Samples were received in good condition on 3 Apr 2019 at 1420.

Temperature upon receipt at the Bismarck laboratory was 6.5°C. Samples were received on ice and evidence of cooling had begun.

All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.

With the exception of pH, all holding times were met.

Approved methodology was followed for all sample analyses.

All acceptance criteria were met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/duplicates unless noted here.

- For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.
- For some analytes, the reported results were elevated due to instrument performance at the lower limit of quantitation (LLOQ).
- The recoveries for one selenium matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. Data was accepted based on acceptable recovery of the LCS. No further action was taken.
- The recoveries for one nitrate matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. Data was accepted based on acceptable recovery of the LCS. No further action was taken.

Approved by: _____

C. Cantor

7 May 19



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Page: 1 of 2

CERTIFICATE of ANALYSIS - STATE

Samantha Davies
 Montana Dakota Utilities
 400 N. 4th
 Bismarck ND 58501

Report Date: 24 Apr 19
 Lab Number: 19-W596
 Work Order #: 82-0660
 Account #: 002800
 Date Sampled: 3 Apr 19 13:10
 Date Received: 3 Apr 19 14:20
 Sampled By: MVTL Field Services

Project Name: MDU Heskett
 Sample Description: 1-90

Temp at Receipt: 6.5C ROI

Event and Year: Spring 2019

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Metal Digestion				EPA 200.2	3 Apr 19	SVS
Conductivity (EC)	9616	umhos/cm	1	SM2510-B	4 Apr 19 17:00	SVS
pH - Field	6.64	units	NA	SM 4500 H+ B	3 Apr 19 13:10	DJN
pH	* 7.2	units	0.1	SM4500 H+ B	4 Apr 19 17:00	SVS
Temperature - Field	6.51	Degrees C	NA	SM 2550B	3 Apr 19 13:10	DJN
Total Alkalinity	322	mg/l CaCO3	20	SM2320-B	4 Apr 19 17:00	SVS
Bicarbonate	322	mg/l CaCO3	20	SM2320-B	4 Apr 19 17:00	SVS
Carbonate	< 20	mg/l CaCO3	20	SM2320-B	4 Apr 19 17:00	SVS
Hydroxide	< 20	mg/l CaCO3	20	SM2320-B	4 Apr 19 17:00	SVS
Conductivity - Field	9342	umhos/cm	1	EPA 120.1	3 Apr 19 13:10	DJN
Tot Dis Solids(Summation)	9740	mg/l	12.5	SM1030-F	11 Apr 19 8:48	Calculated
Total Hardness as CaCO3	4510	mg/l	NA	SM2340-B	4 Apr 19 13:36	Calculated
Cation Summation	154	meq/L	NA	SM1030-F	4 Apr 19 13:36	Calculated
Anion Summation	149	meq/L	NA	SM1030-F	11 Apr 19 8:48	Calculated
Percent Error	1.49	%	NA	SM1030-F	11 Apr 19 8:48	Calculated
Sodium Adsorption Ratio	9.40		NA	USDA 20b	4 Apr 19 13:36	Calculated
Fluoride	1.06	mg/l	0.10	SM4500-F-C	4 Apr 19 17:00	SVS
Sulfate	6730	mg/l	5.00	ASTM D516-07	11 Apr 19 8:48	EV
Chloride	81.2	mg/l	1.0	SM4500-Cl-E	3 Apr 19 15:19	EMS
Nitrate-Nitrite as N	6.05	mg/l	0.10	EPA 353.2	10 Apr 19 9:40	EV
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	5 Apr 19 11:05	EMS
Mercury - Dissolved	< 0.0002	mg/l	0.0002	EPA 245.1	4 Apr 19 13:06	EMS
Calcium - Total	412	mg/l	1.0	6010D	4 Apr 19 13:36	SZ
Magnesium - Total	845	mg/l	1.0	6010D	4 Apr 19 13:36	SZ
Sodium - Total	1450	mg/l	1.0	6010D	4 Apr 19 13:36	SZ
Potassium - Total	23.9	mg/l	1.0	6010D	4 Apr 19 13:36	SZ
Barium - Dissolved	< 0.5 @	mg/l	0.10	6010D	3 Apr 19 17:32	SZ
Iron - Dissolved	< 0.5 @	mg/l	0.10	6010D	3 Apr 19 17:32	SZ
Manganese - Dissolved	< 0.25 @	mg/l	0.05	6010D	3 Apr 19 17:32	SZ
Molybdenum - Dissolved	< 0.5 @	mg/l	0.10	6010D	3 Apr 19 17:32	SZ
Boron - Dissolved	< 0.5 @	mg/l	0.10	6010D	8 Apr 19 14:36	SZ
Arsenic - Dissolved	< 0.002	mg/l	0.0020	6020B	18 Apr 19 14:58	CC
Cadmium - Dissolved	< 0.0005	mg/l	0.0005	6020B	18 Apr 19 14:58	CC
Chromium - Dissolved	< 0.002	mg/l	0.0020	6020B	18 Apr 19 14:58	CC
Lead - Dissolved	< 0.0005	mg/l	0.0005	6020B	18 Apr 19 14:58	CC
Selenium - Dissolved	0.0080	mg/l	0.0050	6020B	18 Apr 19 14:58	CC

RL = Method Reporting Limit

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: ND # ND-00016



Field Datasheet

Groundwater Assessment

2616 E. Broadway Ave, Bismarck, ND

Phone: (701) 258-9720

Company: MDU Heskett
 Event: Spring 2019
 Sample ID: 1-90
 Sampling Personal: Darren Niesvaag

Weather Conditions: Temp: 40 °F Wind: East @ 15 Precip: (Sunny) Partly Cloudy / Cloudy

Well Information

Well Locked?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Well Labeled?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Casing Straight?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Grout Seal Intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Visible
Repairs Necessary:			
Casing Diameter:	2"		
Water Level Before Purge:	10.45		ft
Depth to Top of Pump:	14.35		ft
Water Level After Sample:	10.65		ft
Measurement Method:	Electric Water Level Indicator		

Sampling Information

Purging Method:	Bladder			
Sampling Method:	Bladder			
Dedicated Equip?:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Duplicate Sample?:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Duplicate Sample ID:				
Purge Date:		3 APR 19	Time Purging Began:	12:45 am/pm
Well Purged Dry?		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Time Purged Dry: am/pm
Sample Date:		3 APR 19	Time of Sampling:	1310 am/pm
Bottle List:	1L Raw	500mL Nitric	500mL Nitric (filtered)	250mL Sulfuric

Control Settings	
Purge:	5 sec.
Recover:	55 sec.
PSI:	

Field Measurements

Stabilization (3 consecutive)	Temp (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±20 mV	Turbidity (NTU) ±10%	Water Level (ft) 0.25 ft	Pumping Rate ml/min	mL Removed	Description: Clarity, Color, Odor, Ect. Clear, Slightly Turbid, Turbid	
1	12:45	6.67	9212	6.68	0.82	-266.1	0.80	10.54	100	500	cl
2	12:55	6.57	9302	6.67	0.88	-278.8	1.37	10.73	100	500	cl
3	13:00	6.43	9370	6.65	0.90	-276.6	0.80	10.68	100	500	cl
4	13:05	6.47	9341	6.64	0.87	-273.2	0.84	10.65	100	500	cl
5	13:10	6.51	9342	6.64	0.90	-272.0	0.86	10.65	100	500	cl
6											
7											
8											
9											
10											

Stabilized: Yes No

Total Volume Removed: 2500 mL

Comments:



Laboratories, Inc.

2616 E. Broadway
Bismarck, ND 58501
Phone (701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Spring 2019	Work Order Number: 82- 0660
Report To: MDU Attn: Samantha Davies Address: 5181 Southgate Dr. Billings, MT 59102 phone: 406-896-4227 email:	Carbon Copy: Attn: Address:	Name of Sampler(s): <i>Parren Nieswaag</i>

Sample Information					Bottle Type				Field Parameters			Analysis
Lab Number	Sample ID	Date	Time	Sample Type	1 liter	500mL Nitric	500mL Nitric (filtered)	250 mL Sulfuric	Temp (°C)	Spec. Cond.	pH	Analysis Required
WS46	1-90	3 APR 19	1310	GW	X	X	X	X	6.51	9342	6.64	MDU List AA

Comments:

Relinquished By:		Sample Condition:	
Name:	Date/Time	Location:	Temp (°C)
<i>Parren Nieswaag</i>	3 APR 19 1420	Log In Walk In #2	TM805 TM562 / TM588
1			1026.5
2			

Received by:	
Name:	Date/Time
<i>N. Bachman</i>	3 APR 19 1420



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Amended PO# 5Nov2019 - STATE

Abbie Krebsbach
 Montana Dakota Utilities
 400 N 4th
 Bismarck ND 58501

Report Date: 14 Oct 19
 Lab Number: 19-W3751
 Work Order #: 82-2626
 Account #: 002800
 Date Sampled: 18 Sep 19 10:50
 Date Received: 18 Sep 19 12:50
 Sampled By: MVTL Field Services

Project Name: MDU Heskett

Sample Description: 1-90

Event and Year: Fall 2019

PO #: 175103

Temp at Receipt: 5.5C ROI

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Metal Digestion				EPA 200.2	18 Sep 19	EMS
Conductivity (EC)	9662	umhos/cm	1	SM2510-B	26 Sep 19 6:45	CC
pH - Field	6.87	units	NA	SM 4500 H+ B	18 Sep 19 10:50	JSM
pH	* 7.5	units	0.1	SM4500 H+ B	26 Sep 19 6:45	CC
Temperature - Field	12.5	Degrees C	NA	SM 2550B	18 Sep 19 10:50	JSM
Total Alkalinity	330	mg/l CaCO3	20	SM2320-B	26 Sep 19 6:45	CC
Bicarbonate	330	mg/l CaCO3	20	SM2320-B	26 Sep 19 6:45	CC
Carbonate	< 20	mg/l CaCO3	20	SM2320-B	26 Sep 19 6:45	CC
Hydroxide	< 20	mg/l CaCO3	20	SM2320-B	26 Sep 19 6:45	CC
Conductivity - Field	9739	umhos/cm	1	EPA 120.1	18 Sep 19 10:50	JSM
Tot Dis Solids(Summation)	10300	mg/l	12.5	SM1030-F	27 Sep 19 13:02	Calculated
Total Hardness as CaCO3	4860	mg/l	NA	SM2340-B	27 Sep 19 13:02	Calculated
Cation Summation	163	meq/L	NA	SM1030-F	30 Sep 19 17:31	Calculated
Anion Summation	157	meq/L	NA	SM1030-F	26 Sep 19 6:45	Calculated
Percent Error	1.79	%	NA	SM1030-F	30 Sep 19 17:31	Calculated
Sodium Adsorption Ratio	9.36		NA	USDA 20b	27 Sep 19 13:02	Calculated
Fluoride	1.10	mg/l	0.10	SM4500-F-C	26 Sep 19 6:45	CC
Sulfate	7120	mg/l	5.00	ASTM D516-07	25 Sep 19 9:28	EV
Chloride	76.6	mg/l	1.0	SM4500-Cl-E	19 Sep 19 11:55	EV
Nitrate-Nitrite as N	6.10	mg/l	0.10	EPA 353.2	19 Sep 19 12:30	EV
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	20 Sep 19 10:20	EMS
Mercury - Dissolved	< 0.0002	mg/l	0.0002	EPA 245.1	19 Sep 19 12:23	EMS
Calcium - Total	447	mg/l	1.0	6010D	27 Sep 19 13:02	SZ
Magnesium - Total	910	mg/l	1.0	6010D	27 Sep 19 13:02	SZ
Sodium - Total	1500	mg/l	1.0	6010D	27 Sep 19 13:02	SZ
Potassium - Total	28.2	mg/l	1.0	6010D	27 Sep 19 13:02	SZ
Barium - Dissolved	< 0.5 @	mg/l	0.10	6010D	30 Sep 19 17:31	SZ
Iron - Dissolved	< 0.5 @	mg/l	0.10	6010D	30 Sep 19 17:31	SZ
Manganese - Dissolved	< 0.25 @	mg/l	0.05	6010D	30 Sep 19 17:31	SZ
Molybdenum - Dissolved	< 0.5 @	mg/l	0.10	6010D	30 Sep 19 17:31	SZ
Boron - Dissolved	< 0.5 @	mg/l	0.10	6010D	24 Sep 19 17:54	SZ
Arsenic - Dissolved	< 0.002	mg/l	0.0020	6020B	9 Oct 19 13:03	MDE
Cadmium - Dissolved	< 0.0005	mg/l	0.0005	6020B	9 Oct 19 13:03	MDE
Chromium - Dissolved	< 0.002	mg/l	0.0020	6020B	9 Oct 19 13:03	MDE
Lead - Dissolved	< 0.0005	mg/l	0.0005	6020B	9 Oct 19 13:03	MDE

RL = Method Reporting Limit

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: ND # ND-00016



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Page: 2 of 2

Amended PO# 5Nov2019 - STATE

Abbie Krebsbach
Montana Dakota Utilities
400 N 4th
Bismarck ND 58501

Report Date: 14 Oct 19
Lab Number: 19-W3751
Work Order #: 82-2626
Account #: 002800
Date Sampled: 18 Sep 19 10:50
Date Received: 18 Sep 19 12:50
Sampled By: MVTL Field Services

Project Name: MDU Heskett

PO #: 175103

Sample Description: 1-90

Temp at Receipt: 5.5C ROI

Event and Year: Fall 2019

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Selenium - Dissolved	0.0067	mg/l	0.0050	6020B	9 Oct 19 13:03	MDE
Silver - Dissolved	< 0.0005	mg/l	0.0005	6020B	9 Oct 19 13:03	MDE

* Holding time exceeded

Approved by:

Claudette K. Carroll ^{CC}
7 NOV 19

Claudette K. Carroll, Laboratory Manager, Bismarck, ND

RL = Method Reporting Limit

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: ND # ND-00016



2616 E. Broadway Ave, Bismarck, ND
Phone: (701) 258-9720

Field Datasheet

Groundwater Assessment

Company: MDU Heskett
Event: Fall 2019
Sample ID: 1-90
Sampling Personal: Jerry Meyer

Weather Conditions: Temp: 70°F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

Well Information

Well Locked?	Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/>	
Well Labeled?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Casing Straight?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Grout Seal Intact?	Yes <input type="checkbox"/> No <input type="checkbox"/>	<u>Not Visible</u>
Repairs Necessary:		
Casing Diameter:	<u>2"</u>	
Water Level Before Purge:	<u>11.22</u>	ft
Depth to Top of Pump:	<u> </u>	ft
Water Level After Sample:	<u>11.42</u>	ft
Measurement Method:	<u>Electric Water Level Indicator</u>	

Sampling Information

Purging Method:	<u>Bladder</u>		
Sampling Method:	<u>Bladder</u>		
Dedicated Equip?:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Duplicate Sample?:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Duplicate Sample ID:	<u> </u>		
Purge Date:	<u>18 Sept 19</u>	Time Purging Began:	<u>1025 am/pm</u>
Well Purged Dry?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Time Purged Dry: <u> </u> am/pm
Sample Date:	<u>18 Sept 19</u>	Time of Sampling:	<u>1050 am/pm</u>
Bottle List:	1L Raw	500mL Nitric	500mL Nitric (filtered) 250mL Sulfuric

Control Settings		
Purge:	<u>5</u>	sec.
Recover:	<u>55</u>	sec.
PSI:	<u>15</u>	

Field Measurements

SEQ #	Stabilization (3 consecutive) Time	Temp (°C)	Spec. Cond. ±5%	pH ±0.1	DO (mg/L) ±10%	ORP (mV) ±20 mV	Turbidity (NTU) ±10%	Water Level (ft) 0.25 ft	Pumping Rate ml/min	mL Removed	Description:
											Clarity, Color, Odor, Ect. Clear, Slightly Turbid, Turbid
1	1030	11.64	9607	6.89	2.79	123.9	1.43	11.36	100.0	500.0	Clear
2	1035	12.77	9613	6.90	4.74	128.9	0.82	11.42	100.0	500.0	Clear
3	1040	12.42	9653	6.88	5.54	129.6	0.42	11.52	100.0	500.0	Clear
4	1045	12.42	9692	6.88	5.67	130.1	0.49	11.48	100.0	500.0	Clear
5	1050	12.54	9739	6.87	5.45	130.4	0.50	11.41	100.0	500.0	Clear
6											
7											
8											
9											
10											

Stabilized: Yes No

Total Volume Removed: 2500.0 mL

Comments:



Laboratories, Inc.

2616 E. Broadway
Bismarck, ND 58501
Phone (701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Fall 2019	Work Order Number: 82-2626
Report To: MDU Attn: Abbie Krebsbach Address: 400 N. 4th St. Bismarck, ND 58501 phone: 701-222-7844 email:	Carbon Copy: Attn: Address:	Name of Sampler(s): <i>Jerry</i>

Lab Number	Sample ID	Date	Time	Sample Type	Bottle Type				Field Parameters			Analysis Required	
					1 liter	500mL Nitric	500mL Nitric (filtered)	250 mL Sulfuric	Temp (°C)	Spec. Cond.	pH		
w3751	1-90	18 Sept 19	1050	GW	X	X	X	X		12.54	9739	6.87	MDU List AA

Comments:

Relinquished By:		Sample Condition:	
Name:	Date/Time	Location:	Temp (°C)
<i>Jerry</i>	18 Sept 19 1250	Walk In #2	Rot 5.5 TM562 / TM805
1			
2			

Received by:	
Name:	Date/Time
<i>Tina</i>	18 Sept 2019 1250

Claudette Carroll

From: Peterson, Todd <Todd.Peterson@mdu.com>
Sent: Friday, November 1, 2019 10:32 AM
To: Claudette Carroll
Cc: Dihle, Mark
Subject: RE: Lab invoice and report
Attachments: 201982-2626 MDU ND.pdf; 201982-2611 MDU CCR.pdf

Claudette,

These lab analyses should both have the PO 175103 listed on them. I have the paper copies and can revise them on my end, but can you change the PO number on your copies and resend the corrected PDF analyses.

Thank you!

Todd.

From: Claudette Carroll <ccarroll@mvtl.com>
Sent: Thursday, October 31, 2019 1:29 PM
To: Dihle, Mark <Mark.Dihle@mdu.com>
Cc: Peterson, Todd <Todd.Peterson@mdu.com>
Subject: RE: Lab invoice and report

** WARNING: EXTERNAL SENDER. NEVER click links or open attachments without positive sender verification of purpose. DO NOT provide your user ID or password on sites or forms linked from this email. **

Hi Mark,

Looks like the work was done at MDU Heskett. Attached are the data packages. Let me know if we need to rebill/re-invoice with the correct PO.

Happy Halloween to you as well!

Claudette



**Minnesota Valley Testing
Laboratories, Inc.**

Providing Analytical Excellence Since 1951

ccarroll@mvtl.com
701-258-9720
2616 E. Broadway Ave/Bismarck, ND 58501

From: Dihle, Mark <Mark.Dihle@mdu.com>
Sent: Thursday, October 31, 2019 8:46 AM
To: Claudette Carroll <ccarroll@mvtl.com>
Cc: Peterson, Todd <Todd.Peterson@mdu.com>
Subject: Lab invoice and report

Good Morning!

Todd and I are trying to figure out this invoice, it appears to have the wrong PO attached to it. Please send along the analysis that the invoice is associated with and have a Happy Halloween!

Thanks!

Mark Dihle
Sr. Environmental Scientist
Montana Dakota Utilities
400 North Fourth Street
Bismarck, ND 58501-4092
Bus: 701.222.7865
Fax: 701.222.7845



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Quality Control Report – Amended 7 Nov 19

Lab ID: 19-W3751

Project: MDU Heskett

Work Order: 201982-2626

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
Arsenic - Dissolved mg/l	0.0160	102	80-120	0.100 0.100	19W3762q 19W3763q	< 0.002 < 0.002	0.1162 0.1123	116 112	75-125 75-125	0.1162 0.1123	0.1052 0.1149	105 115	9.9 2.3	20 20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40	102	80-120	1.00	19W3756q	< 0.1	1.04	104	75-125	1.04	0.97	97	7.0	20	-	-	< 0.1
Boron - Dissolved mg/l	0.40	90	80-120	0.400	19-W3756	< 0.1	0.38	95	75-125	0.38	0.39	98	2.6	20	-	-	< 0.1
Cadmium - Dissolved mg/l	0.0160	101	80-120	0.100 0.100	19W3762q 19W3763q	< 0.0005 < 0.0005	0.1048 0.1066	105 107	75-125 75-125	0.1048 0.1066	0.0954 0.1080	95 108	9.4 1.3	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	20.0	114	80-120	100	19W3816q	130	229	99	75-125	229	229	99	0.0	20	- -	- -	< 1 < 1
Chloride mg/l	30.0	91	80-120	30.0	19-W3771	28.0	56.1	94	80-120	56.1	56.5	95	0.7	20	-	-	< 1
Chromium - Dissolved mg/l	0.0160	99	80-120	0.100 0.100	19W3762q 19W3763q	< 0.002 < 0.002	0.0989 0.0977	99 98	75-125 75-125	0.0989 0.0977	0.0884 0.0973	88 97	11.2 0.4	20 20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	- -	- -	- -	- -	- -	- -	- -	- -	- -	3832 7027	3834 7046	- -	0.1 0.3	20 20	- -	- -	- -
Fluoride mg/l	0.50	102	90-110	0.500	19-W3744	0.12	0.63	102	80-120	0.63	0.63	102	0.0	20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40	105	80-120	1.00	19W3756q	< 0.1	1.00	100	75-125	1.00	0.95	95	5.1	20	-	-	< 0.1
Lead - Dissolved mg/l	0.0160	101	80-120	0.100 0.100	19W3762q 19W3763q	< 0.0005 0.0030	0.0944 0.1043	94 101	75-125 75-125	0.0944 0.1043	0.0900 0.1049	90 102	4.8 0.6	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	20.0	112	80-120	100	19W3816q	44.1	148	104	75-125	148	148	104	0.0	20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40	108	80-120	1.00	19W3756q	0.93	1.92	99	75-125	1.92	1.86	93	3.2	20	-	-	< 0.05
Mercury - Dissolved mg/l	0.0020	100	85-115	0.002	19-W3751	< 0.0002	0.0020	100	70-130	0.0020	0.0018	90	10.5	20	-	-	< 0.0002
Molybdenum - Dissolved mg/l	0.40	100	80-120	1.00	19W3756q	< 0.1	1.00	100	75-125	1.00	0.95	95	5.1	20	-	-	< 0.1
Nitrate-Nitrite as N mg/l	0.50	96	90-110	10.0	19-W3751	6.10	17.4	113	90-110	17.4	17.6	115	1.1	20	-	-	< 0.1
pH units	- -	- -	- -	- -	- -	- -	- -	- -	- -	7.5 7.5	7.5 7.5	- -	0.0 0.0	20 20	- -	- -	- -

Quality Control Report – Amended 7 Nov 19

Lab ID: 19-W3751

Project: MDU Heskett

Work Order: 201982-2626

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
Phosphorus as P - Total mg/l	0.50	100	90-110	1.00 1.00	19-W3745 19-W3749	< 0.1 < 0.1	0.96 1.01	96 101	90-110 90-110	0.96 1.01	0.94 0.98	94 98	2.1 3.0	20 20	- -	- -	< 0.1
Potassium - Total mg/l	10.0	100	80-120	20.0	19W3816q	4.8	26.0	106	75-125	26.0	26.2	107	0.8	20	- -	- -	< 1 < 1
Selenium - Dissolved mg/l	0.0160	97	80-120	0.100 0.100	19W3762q 19W3763q	< 0.005 < 0.005	0.1288 0.1323	129 132	75-125 75-125	0.1288 0.1323	0.1170 0.1272	117 127	9.6 3.9	20 20	- -	- -	< 0.005
Silver - Dissolved mg/l	0.0160	104	80-120	0.100 0.100	19W3762q 19W3763q	< 0.0005 < 0.0005	0.0998 0.1090	100 109	75-125 75-125	0.0998 0.1090	0.0936 0.1090	94 109	6.4 0.0	20 20	- -	- -	< 0.0005
Sodium - Total mg/l	20.0	104	80-120	100	19W3816q	129	220	91	75-125	220	218	89	0.9	20	- -	- -	< 1 < 1
Sulfate mg/l	100	100	80-120	100	19-W3750	< 5	107	107	80-120	107	108	108	0.9	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410	95	90-110	410	19-W3743	453	827	91	80-120	827	827	91	0.0	20	92	80-120	< 20 < 20

Samples were received in good condition on 18 Sep 2019 at 1250.

Temperature upon receipt at the Bismarck laboratory was 5.5°C. Samples were received on ice and evidence of cooling had begun.

All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.

With the exception of pH, all holding times were met

Approved methodology was followed for all sample analyses.

All acceptance criteria were met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/duplicates unless noted here.

- For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.
- The recoveries for one nitrate matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. Data was accepted based on acceptable recovery of the LCS. No further action was taken.
- The recoveries for one selenium matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. Data was accepted based on acceptable recovery of the LCS. No further action was taken.
- Recovery for one selenium matrix spike was outside of the acceptable limits. Recovery of the matrix spike duplicate was acceptable. RPD for the recoveries of the matrix spike/matrix spike duplicate was acceptable. No further action was taken.

Reporting

- Per email from Todd Peterson, MDU, sample data package was amended to revise Purchase Order number on reports.

Approved by: C. Campbell



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CERTIFICATE of ANALYSIS - STATE

Todd Peterson
Montana-Dakota Utilities Co.
400 N 4th St
Bismarck ND 58501

Report Date: 23 Apr 20
Lab Number: 20-W567
Work Order #: 82-0755
Account #: 002800
Date Sampled: 1 Apr 20 13:28
Date Received: 2 Apr 20 10:20
Sampled By: MVTL Field Services

Project Name: MDU Heskett Active Ash
Sample Description: 1-90

Temp at Receipt: 5.3C ROI

Event and Year: Spring 2020

Table with 6 columns: As Received Result, Method RL, Method Reference, Date Analyzed, Analyst. Row 1: Silver - Dissolved, < 0.001 + mg/l, 0.0005, 6020B, 23 Apr 20 10:18, CC

* Holding time exceeded

Approved by: Claudette K. Carroll 29 Apr 2020

Claudette K. Carroll, Laboratory Manager, Bismarck, ND

RL = Method Reporting Limit

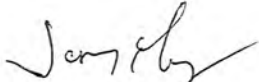
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: ND # ND-00016



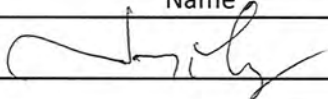
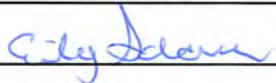
2616 E. Broadway Ave
Bismarck, ND 58501
(701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Spring 2020	Work Order Number: 82-0755
Report To: Montana-Dakota Utilities Attn: Todd Peterson Address: 400 North 4th St. Bismarck, ND 58501 Phone: 701-425-2427 Email: todd.peterson@mdu.com	CC:	Collected By: 

Lab Number	Sample ID	Date	Time	Sample Type	Sample Type				Temp (°C)	Spec. Cond.	pH	Analysis Required
					1 Liter Raw	500 mL Nitric	500 mL Nitric (filtered)	1 Liter Nitric				
W567	1-90	1 Apr 2020	1328	GW	X	X	X	X	5.35	10111	6.83	MDU List AA

Comments:

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
1 	2 Apr 2020 1020	Log In Walk In #2	Rot 5.3 TM562 / TM805		2 Apr 2020 1020
2					



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 1201 Lincoln Highway ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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MEMBER
ACIL

Quality Control Report

Lab ID: 20-W567

Project: MDU Heskett Active Ash

Work Order: 202082-0755

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
Arsenic - Dissolved mg/l	0.1000	98	80-120	0.100 0.100	20W719q 20W718q	0.0050 < 0.002	0.1030 0.1045	98 104	75-125 75-125	0.1030 0.1045	0.1084 0.1020	103 102	5.1 2.4	20 20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40	108	80-120	1.00	20W565q	< 0.1	1.01	101	75-125	1.01	1.02	102	1.0	20	-	-	< 0.1
Boron - Dissolved mg/l	0.40 0.40	100 102	80-120 80-120	2.00	20-W575	0.79	2.42	82	75-125	2.42	2.46	84	1.6	20	- -	- -	< 0.1
Cadmium - Dissolved mg/l	0.1000	103	80-120	0.100 0.100	20W719q 20W718q	< 0.0005 < 0.0005	0.0884 0.0928	88 93	75-125 75-125	0.0884 0.0928	0.0940 0.0917	94 92	6.1 1.2	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	20.0	117	80-120	500	20W566q	477	960	97	75-125	960	970	99	1.0	20	- -	- -	< 1 < 1
Chloride mg/l	30.0 30.0	91 91	80-120 80-120	30.0	20-W570	25.6	55.2	99	80-120	55.2	54.8	97	0.7	20	- -	- -	< 1 < 1
Chromium - Dissolved mg/l	0.1000	99	80-120	0.100 0.100	20W719q 20W718q	< 0.002 < 0.002	0.1056 0.1040	106 104	75-125 75-125	0.1056 0.1040	0.1117 0.1022	112 102	5.6 1.7	20 20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	- -	- -	- -	- -	- -	- -	- -	- -	- -	1482 4529	1474 4494	- -	0.5 0.8	20 20	- -	- -	- -
Fluoride mg/l	0.50	106	90-110	0.500	20-W566	0.98	1.38	80	80-120	1.38	1.41	86	2.2	20	-	-	< 0.1
Iron - Dissolved mg/l	0.40	108	80-120	1.00	20W565q	< 0.1	0.97	97	75-125	0.97	0.97	97	0.0	20	-	-	< 0.1
Lead - Dissolved mg/l	0.1000	97	80-120	0.100 0.100	20W719q 20W718q	0.0019 < 0.0005	0.0844 0.0834	82 83	75-125 75-125	0.0844 0.0834	0.0868 0.0835	85 84	2.8 0.1	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	20.0	116	80-120	500	20W566q	740	1190	90	75-125	1190	1210	94	1.7	20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40	110	80-120	1.00	20W565q	< 0.05	0.94	94	75-125	0.94	0.94	94	0.0	20	-	-	< 0.05
Mercury - Dissolved mg/l	0.0020	85	85-115	0.002	20-W563	< 0.0002	0.0016	80	70-130	0.0016	0.0016	80	0.0	20	-	-	< 0.0002
Molybdenum - Dissolved mg/l	0.40	105	80-120	1.00	20W565q	< 0.1	0.93	93	75-125	0.93	0.94	94	1.1	20	-	-	< 0.1
Nitrate-Nitrite as N mg/l	0.50	108	90-110	1.00	20-W578	< 0.1	1.02	102	90-110	1.02	1.02	102	0.0	20	-	-	< 0.1
pH units	- -	- -	- -	- -	- -	- -	- -	- -	- -	8.4 7.1	8.4 7.2	- -	0.0 1.4	20 20	- -	- -	- -

Quality Control Report

Lab ID: 20-W567

Project: MDU Heskett Active Ash

Work Order: 202082-0755

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
Phosphorus as P - Total mg/l	0.50	106	90-110	1.00 1.00	20-M695 20-W575	< 0.1 < 0.1	1.05 0.97	105 97	90-110 90-110	1.05 0.97	1.06 0.98	106 98	0.9 1.0	20 20	- -	- -	< 0.1
Potassium - Total mg/l	10.0	113	80-120	100	20W566q	26.3	127	101	75-125	127	131	105	3.1	20	- -	- -	< 1 < 1
Selenium - Dissolved mg/l	0.1000	97	80-120	0.100 0.100	20W719q 20W718q	< 0.005 < 0.005	0.0859 0.0934	86 93	75-125 75-125	0.0859 0.0934	0.0893 0.0931	89 93	3.9 0.3	20 20	- -	- -	< 0.005
Silver - Dissolved mg/l	0.1000	107	80-120	0.100 0.100	20W719q 20W718q	< 0.0005 < 0.0005	0.0914 0.0940	91 94	75-125 75-125	0.0914 0.0940	0.0990 0.0938	99 94	8.0 0.2	20 20	- -	- -	< 0.0005
Sodium - Total mg/l	20.0	116	80-120	500	20W566q	800	1250	90	75-125	1250	1260	92	0.8	20	- -	- -	< 1 < 1
Sulfate mg/l	100	97	80-120	100	20-W578	< 5	99.0	99	80-120	99.0	99.2	99	0.2	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410	97	90-110	410 410	20-D995 20-W564	807 454	1160 797	86 84	80-120 80-120	1160 797	1148 796	83 83	1.0 0.1	20 20	93	80-120	< 20 < 20
Total Suspended Solids mg/l	- -	- -	- -	- -	- -	- -	- -	- -	- -	312 49	306 53	- -	1.9 7.8	20 20	- -	- -	< 2

Samples were received in good condition on 2 Apr 2020 at 1020.

Temperature upon receipt at the Bismarck laboratory was 5.3°C.

All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.

With the exception of pH, all holding times were met.

Approved methodology was followed for all sample analyses.

All acceptance criteria were met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/duplicates unless noted here.

- For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.
- For some analytes, the reported results were elevated due to matrix effect on the response of the internal standard.

Approved by: C. [Signature]
 29 Apr 2020



Field Datasheet

Groundwater Assessment

2616 E. Broadway Ave, Bismarck, ND

Phone: (701) 258-9720

Company: MDU Heskett

Event: Spring 2020

Sample ID: 1-90

Sampling Personal: Jerry Ph...

Weather Conditions: Temp: 40 °F Wind: N @ 5-10 Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION

Well Locked?	YES	NO
Well Labeled?	YES	NO
Casing Strait?	YES	NO
Grout Seal Intact?	YES	NO
Repairs Necessary?	Not Visible	
Casing Diameter:	2"	
Water Level Before Purge:	10.76	ft
Total Depth of Well:	—	ft
Well Volume:	—	liters
Depth to Top of Pump:	—	ft
Water Level After Sample:	10.91	ft
Measurement Method:	Electric Water Level Indicator	

SAMPLING INFORMATION

Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO

Control Settings:	
Purge: 3	Sec.
Recover: 27	Sec.
PSI: 15	

Duplicate Sample?	YES NO
Duplicate Sample ID:	—

Bottle List:	
1 Liter Raw	
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate mL/Min	Liters Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					clear, slightly turbid, turbid
1 Apr 2020	1308	Start of Well Purge									
	1313	5.21	9706	6.86	9.16	112.4	4.00	10.76	100.0	500.0	Clear
	1318	5.56	10132	6.83	8.35	131.5	3.07	10.90	100.0	500.0	Clear
	1323	5.46	10119	6.82	8.55	139.8	1.98	10.85	100.0	500.0	Clear
	1328	5.35	10111	6.83	8.22	140.6	2.84	10.90	100.0	500.0	Clear

Well Stabilized? YES NO

Total Volume Purged: 2000.0 Liters mL

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH			Turbidity (NTU)			Appearance or Comment
1 Apr 2020	1328	5.35	10111	6.83			2.84			Clear

Comments:



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Page: 1 of 2

CERTIFICATE of ANALYSIS - STATE

Todd Peterson
Montana-Dakota Utilities Co.
400 N 4th St
Bismarck ND 58501

Report Date: 28 Sep 20
Lab Number: 20-W3477
Work Order #: 82-2545
Account #: 002800
Date Sampled: 14 Sep 20 13:13
Date Received: 14 Sep 20 15:35
Sampled By: MVTL Field Services

Project Name: MDU Heskett

PO #: 180609 OP

Sample Description: 1-90

Temp at Receipt: 5.8C ROI

Event and Year: Fall 2020

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Metal Digestion				EPA 200.2	14 Sep 20	CC
Total Suspended Solids	8	mg/l	2	USGS I3765-85	15 Sep 20 8:50	CC
Conductivity (EC)	10365	umhos/cm	1	SM2510B-11	14 Sep 20 17:00	CC
pH - Field	6.80	units	NA	SM 4500 H+ B	14 Sep 20 13:13	DJN
pH	* 6.9	units	0.1	SM4500-H+-B-11	14 Sep 20 17:00	CC
Temperature - Field	12.6	Degrees C	NA	SM 2550B	14 Sep 20 13:13	DJN
Total Alkalinity	458	mg/l CaCO3	20	SM2320B-11	14 Sep 20 17:00	CC
Bicarbonate	458	mg/l CaCO3	20	SM2320B-11	14 Sep 20 17:00	CC
Carbonate	< 20	mg/l CaCO3	20	SM2320B-11	14 Sep 20 17:00	CC
Hydroxide	< 20	mg/l CaCO3	20	SM2320B-11	14 Sep 20 17:00	CC
Conductivity - Field	10466	umhos/cm	1	EPA 120.1	14 Sep 20 13:13	DJN
Tot Dis Solids (Summation)	11200	mg/l	12.5	SM1030-F	18 Sep 20 10:17	Calculated
Total Hardness as CaCO3	4810	mg/l	NA	SM2340B-11	18 Sep 20 10:17	Calculated
Cation Summation	166	meq/L	NA	SM1030-F	18 Sep 20 10:17	Calculated
Anion Summation	176	meq/L	NA	SM1030-F	17 Sep 20 9:18	Calculated
Percent Error	-2.89	%	NA	SM1030-F	18 Sep 20 10:17	Calculated
Sodium Adsorption Ratio	10.0		NA	USDA 20b	18 Sep 20 10:17	Calculated
Fluoride	1.08	mg/l	0.10	SM4500-F-C	14 Sep 20 17:00	CC
Sulfate	7880	mg/l	5.00	ASTM D516-11	16 Sep 20 10:03	EV
Chloride	89.9	mg/l	1.0	SM4500-CL-E-11	16 Sep 20 11:10	EV
Nitrate-Nitrite as N	6.70	mg/l	0.10	EPA 353.2	17 Sep 20 9:18	EV
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	18 Sep 20 7:54	EMS
Mercury - Dissolved	< 0.0002	mg/l	0.0002	EPA 245.1	18 Sep 20 16:11	MDE
Calcium - Total	408	mg/l	1.0	6010D	18 Sep 20 10:17	MDE
Magnesium - Total	920	mg/l	1.0	6010D	18 Sep 20 10:17	MDE
Sodium - Total	1600	mg/l	1.0	6010D	18 Sep 20 10:17	MDE
Potassium - Total	25.5	mg/l	1.0	6010D	18 Sep 20 10:17	MDE
Iron - Dissolved	< 0.5 @	mg/l	0.10	6010D	15 Sep 20 11:55	MDE
Manganese - Dissolved	< 0.25 @	mg/l	0.05	6010D	15 Sep 20 11:55	MDE
Boron - Dissolved	< 0.5 @	mg/l	0.10	6010D	17 Sep 20 10:54	MDE
Arsenic - Dissolved	< 0.004 +	mg/l	0.0020	6020B	24 Sep 20 12:46	MDE
Cadmium - Dissolved	< 0.0005	mg/l	0.0005	6020B	24 Sep 20 12:46	MDE
Chromium - Dissolved	< 0.004 +	mg/l	0.0020	6020B	24 Sep 20 12:46	MDE
Lead - Dissolved	< 0.0005	mg/l	0.0005	6020B	24 Sep 20 12:46	MDE
Selenium - Dissolved	< 0.01 +	mg/l	0.0050	6020B	24 Sep 20 12:46	MDE

RL = Method Reporting Limit

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: ND # ND-00016



MINNESOTA VALLEY TESTING LABORATORIES, INC.

1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890
 2616 E. Broadway Ave. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724
 1201 Lincoln Highway ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
 www.mvttl.com

MEMBER
ACIL

Quality Control Report

Lab ID: 20-W3477

Project: MDU Heskett

Work Order: 202082-2545

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
Arsenic - Dissolved mg/l	0.0160	103	80-120	0.200 0.200	20-W3477 20-W3477Q	< 0.004 < 0.004	0.2072 0.2072	104 104	75-125 75-125	0.2072	0.2014	101	2.8	20	- -	- -	< 0.002
Barium - Dissolved mg/l	0.40	110	80-120	5.00	20W3477q	< 0.5	4.70	94	75-125	4.70	4.86	97	3.3	20	- -	- -	< 0.1 < 0.1
Boron - Dissolved mg/l	0.40	100	80-120	2.00	20-W3492	0.70	2.36	83	75-125	2.36	2.36	83	0.0	20	- -	- -	< 0.1 < 0.1
Cadmium - Dissolved mg/l	0.0160	102	80-120	0.100	20-W3477	< 0.0005	0.0821	82	75-125	0.0821	0.0871	87	5.9	20	-	-	< 0.0005
Calcium - Total mg/l	20.0	112	80-120	500 500	20M1686q 20W3472q	258 458	745 985	97 105	75-125 75-125	745 985	750 985	98 105	0.7 0.0	20 20	- -	- -	< 1 < 1
Chloride mg/l	30.0 30.0	98 101	80-120 80-120	30.0	20-W3481	4.4	36.4	107	80-120	36.4	36.5	107	0.3	20	- -	- -	< 1 < 1
Chromium - Dissolved mg/l	0.0160	101	80-120	0.200 0.200	20-W3477 20-W3477Q	< 0.004 < 0.004	0.1990 0.1990	100 100	75-125 75-125	0.1990	0.1902	95	4.5	20	- -	- -	< 0.002
Conductivity (EC) umhos/cm	-	-	-	-	-	-	-	-	-	4608	4579	-	0.6	20	-	-	-
Fluoride mg/l	0.50 0.50	102 104	90-110 90-110	0.500	20-W3474	0.13	0.61	96	80-120	0.61	0.62	98	1.6	20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40	110	80-120	5.00	20W3477q	< 0.5	5.15	103	75-125	5.15	5.20	104	1.0	20	- -	- -	< 0.1 < 0.1
Lead - Dissolved mg/l	0.0160	101	80-120	0.100	20-W3477	< 0.0005	0.0834	83	75-125	0.0834	0.0881	88	5.5	20	-	-	< 0.0005
Magnesium - Total mg/l	20.0	108	80-120	500 500	20M1686q 20W3472q	< 5 398	510 890	102 98	75-125 75-125	510 890	515 895	103 99	1.0 0.6	20 20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40	112	80-120	5.00	20W3477q	< 0.25	5.20	104	75-125	5.20	5.25	105	1.0	20	- -	- -	< 0.05 < 0.05
Mercury - Dissolved mg/l	0.0020	95	85-115	0.002 0.002	20-W3495 a44705q	< 0.0002 < 0.0002	0.0019 0.0020	95 100	70-130 70-130	0.0019 0.0020	0.0019 0.0018	95 90	0.0 10.5	20 20	- -	- -	< 0.0002
Molybdenum - Dissolved mg/l	0.40	105	80-120	5.00	20W3477q	< 0.5	5.10	102	75-125	5.10	5.15	103	1.0	20	- -	- -	< 0.1 < 0.1

Quality Control Report

Lab ID: 20-W3477

Project: MDU Heskett

Work Order: 202082-2545

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
Nitrate-Nitrite as N mg/l	0.50	98	90-110	1.00	20-W3444	0.21	1.09	88	90-110	1.09	1.10	89	0.9	20	-	-	< 0.1
pH units	-	-	-	-	-	-	-	-	-	6.8	6.8	-	0.0	20	-	-	-
Phosphorus as P - Total mg/l	0.50	106	90-110	1.00 1.00	20-D2914 20-D2977	2.94 < 0.1	3.96 1.04	102 104	90-110 90-110	3.96 1.04	4.01 1.05	107 105	1.3 1.0	20 20	- -	- -	< 0.1
Potassium - Total mg/l	10.0	106	80-120	100 100	20M1686q 20W3472q	36.6 20.4	138 126	101 106	75-125 75-125	138 126	140 126	103 106	1.4 0.0	20 20	- -	- -	< 1 < 1
Selenium - Dissolved mg/l	0.0160	100	80-120	0.200 0.200	20-W3477 20-W3477Q	< 0.01 < 0.01	0.2217 0.2217	111 111	75-125 75-125	0.2217 0.2217	0.2055	103	7.6	20	- -	- -	< 0.005
Silver - Dissolved mg/l	0.0160	104	80-120	0.100	20-W3477	< 0.0005	0.0788	79	75-125	0.0788	0.0839	84	6.3	20	-	-	< 0.0005
Sodium - Total mg/l	20.0	108	80-120	500 500	20M1686q 20W3472q	525 328	985 810	92 96	75-125 75-125	985 810	1000 810	95 96	1.5 0.0	20 20	- -	- -	< 1 < 1
Sulfate mg/l	100	96	80-120	500	20-W3480	561	1000	88	80-120	1000	974	83	2.6	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410 410	98 97	90-110 90-110	410	20-W3477	458	760	74	80-120	760	743	70	2.3	20	95	80-120	< 20 < 20
Total Suspended Solids mg/l	-	-	-	-	-	-	-	-	-	9	10	-	10.5	*	-	-	< 2

* Data reported based on acceptance criteria of Absolute Difference of ± 3 mg/L.

Samples were received in good condition on 14 Sep 2020 at 1535.

Temperature upon receipt at the Bismarck laboratory was 5.8°C. Samples were received on ice and evidence of cooling had begun.

All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.

With the exception of pH, all holding times were met.

Approved methodology was followed for all sample analyses.

All acceptance criteria were met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/duplicates unless noted here.

- For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.
- For some analytes, the reported results were elevated due to matrix effect on the response of the internal standard.
- The recoveries for one alkalinity matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. LCS was acceptable. No further action was taken.
- The recoveries for one nitrate matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. LCS was acceptable. No further action was taken.

Approved by: C. Casper

20 OCT 2020



Field Datasheet

Groundwater Assessment

2616 E. Broadway Ave, Bismarck, ND

Phone: (701) 258-9720

Company: MDU Heskett

Event: Fall 2020

Sample ID: 1-90

Sampling Personal: Darren Nieswan

Weather Conditions: Temp: 50 °F Wind: East @ 10 Precip: Spiky / Partly Cloudy / Cloudy

WELL INFORMATION

Well Locked?	<u>YES</u>	<u>NO</u>
Well Labeled?	<u>YES</u>	<u>NO</u>
Casing Strait?	<u>YES</u>	<u>NO</u>
Grout Seal Intact?	<u>YES</u>	<u>NO</u>
Repairs Necessary?		<u>Not Visible</u>
Casing Diameter:	<u>2"</u>	
Water Level Before Purge:	<u>12.23</u>	ft
Total Depth of Well:		ft
Well Volume:		liters
Depth to Top of Pump:		ft
Water Level After Sample:	<u>12.31</u>	ft
Measurement Method:	<u>Electric Water Level Indicator</u>	

SAMPLING INFORMATION

Purging Method:	<u>Bladder</u>
Sampling Method:	<u>Bladder</u>
Dedicated Equipment?	<u>YES</u> <u>NO</u>

Control Settings:	
Purge:	<u>2</u> Sec.
Recover:	<u>58</u> Sec.
PSI:	

Duplicate Sample?	<u>YES</u> <u>NO</u>
Duplicate Sample ID:	

Bottle List:	
1 Liter Raw	
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate mL/Min	Liters Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.
Start of Well Purge											
<u>14 Sept 2020</u>	<u>1238</u>										
	<u>1243</u>	<u>12.80</u>	<u>10404</u>	<u>6.79</u>	<u>1.80</u>	<u>274.6</u>	<u>1.23</u>	<u>12.40</u>	<u>100</u>	<u>500</u>	<u>cl</u>
	<u>1258</u>	<u>12.61</u>	<u>10439</u>	<u>6.80</u>	<u>1.72</u>	<u>260.4</u>	<u>0.58</u>	<u>12.28</u>	<u>100</u>	<u>1500</u>	<u>cl</u>
	<u>1303</u>	<u>12.52</u>	<u>10446</u>	<u>6.60</u>	<u>1.73</u>	<u>256.8</u>	<u>0.56</u>	<u>12.28</u>	<u>100</u>	<u>500</u>	<u>cl</u>
	<u>1308</u>	<u>12.61</u>	<u>10437</u>	<u>6.80</u>	<u>1.64</u>	<u>254.8</u>	<u>0.58</u>	<u>12.31</u>	<u>100</u>	<u>500</u>	<u>cl</u>
	<u>1313</u>	<u>12.56</u>	<u>10466</u>	<u>6.80</u>	<u>1.72</u>	<u>247.7</u>	<u>0.46</u>	<u>12.36</u>	<u>100</u>	<u>500</u>	<u>cl</u>

Well Stabilized? YES NO Total Volume Purged: 3500 Liters

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
Clarity, Color, Odor, Ect.						
<u>14 Sept 2020</u>	<u>1313</u>	<u>12.56</u>	<u>10466</u>	<u>6.80</u>	<u>0.46</u>	<u>cl</u>

Comments:



2616 E. Broadway Ave
Bismarck, ND 58501
(701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Fall 2020	Work Order Number: 82-2545
Report To: Montana-Dakota Utilities Attn: Todd Peterson Address: 400 North 4th St. Bismarck, ND 58501 Phone: 701-425-2427 Email: todd.peterson@mdu.com	CC:	Collected By: <i>Dallen Nieswaag</i>

Lab Number	Sample ID	Date	Time	Sample Type	Sample Type				Temp (°C)	Spec. Cond.	pH	Analysis Required
					1 Liter Raw	500 mL Nitric	500 mL Nitric (filtered)	250 mL Sulfuric				
W3477	1-90	14 Sept 2020	1313	GW	X	X	X	X	12.56	10466	6.80	MDU List AA

Comments:

	Relinquished By		Sample Condition		Received By	
	Name	Date/Time	Location	Temp (°C)	Name	Date/Time
1	<i>[Signature]</i>	14 Sept 2020 1535	Log In Walk In #2	TM562 / TM805	<i>[Signature]</i>	14 Sept 2020 1535
2				ROZ S.G.		



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APP III

Page: 1 of 1

CERTIFICATE of ANALYSIS - CCR

Todd Peterson
 Montana-Dakota Utilities Co.
 400 N 4th St
 Bismarck ND 58501

Report Date: 31 Mar 21
 Lab Number: 21-W501
 Work Order #: 82-0597
 Account #: 002800
 Date Sampled: 23 Mar 21 9:29
 Date Received: 23 Mar 21 14:00
 Sampled By: MVTL Field Services

Project Name: MDU Heskett

PO #: 185968 OP

Sample Description: MW1-90

Temp at Receipt: 3.6C ROI

Event and Year: Spring 2021

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
pH - Field	6.89	units	NA	SM 4500 H+ B	23 Mar 21 9:29	DJN
pH	* 7.1	units	0.1	SM4500-H+-B-11	23 Mar 21 17:00	RAA
Temperature - Field	6.26	Degrees C	NA	SM 2550B	23 Mar 21 9:29	DJN
Conductivity - Field	10530	umhos/cm	1	EPA 120.1	23 Mar 21 9:29	DJN
Fluoride	1.03	mg/l	0.10	SM4500-F-C	23 Mar 21 17:00	RAA
Sulfate	7030	mg/l	5.00	ASTM D516-11	24 Mar 21 10:47	SD
Chloride	82.7	mg/l	2.0	SM4500-Cl-E-11	24 Mar 21 8:47	SD
Total Dissolved Solids	12200	mg/l	10	USGS I1750-85	25 Mar 21 14:00	RAA
Calcium - Total	397	mg/l	1.0	6010D	26 Mar 21 10:32	MDE
Boron - Total	< 0.5 @	mg/l	0.10	6010D	24 Mar 21 12:46	MDE

* Holding time exceeded

Approved by:

Claudette K. Carroll

CC
8 April

Claudette K. Carroll, Laboratory Manager, Bismarck, ND

RL = Method Reporting Limit

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: ND # ND-00016

Quality Control Report

Lab ID: 21-W501

Project: MDU Heskett

Work Order: 202182-0597

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 - Total mg/l	0.40	90	80-120	0.400	21-W477	0.36	0.74	95	75-125	0.74	0.72	90	2.7	20	-	-	< 0.1 < 0.1
Calcium - Total mg/l	100	109	80-120	500 2000 500	21D763q 21-M1496 21W501q	34.4 < 20 397	560 2040 900	105 102 101	75-125 75-125 75-125	560 2040 900	560 2040 895	105 102 100	0.0 0.0 0.6	20 20 20	- - -	- - -	< 1 < 1
Chloride mg/l	30.0 30.0	95 95	80-120 80-120	30.0	21-W511	< 2	29.0	97	80-120	29.0	29.0	97	0.0	20	- -	- -	< 2 < 2
Fluoride mg/l	0.50	104	90-110	0.500 0.500	21-D689 21-W507	1.59 0.24	2.05 0.70	92 92	80-120 80-120	2.05 0.70	2.08 0.71	98 94	1.5 1.4	20 20	- -	- -	< 0.1 < 0.1
pH units	- -	- -	- -	- -	- -	- -	- -	- -	- -	12.4 7.2	12.4 7.4	- -	0.0 2.7	20 20	- -	- -	- -
Sulfate mg/l	100	103	80-120	100	21-W503	< 5	100	100	80-120	100	100	100	0.0	20	-	-	< 5
Total Dissolved Solids mg/l	- -	- -	- -	- -	- -	- -	- -	- -	- -	10600 10400	10500 10400	- -	0.9 0.0	20 20	- -	- -	< 10

Samples were received on 23 Mar 2021 at 1400.

Temperature upon receipt at the Bismarck laboratory was 3.6°C.

All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.

With the exception of pH, all holding times were met.

Approved methodology was followed for all sample analyses.

All acceptance criteria were met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/duplicates unless noted here:

- For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.

Approved by: _____

C. Campbell
 9 Apr 21



2616 E. Broadway Ave
Bismarck, ND 58501
(701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Spring 2021	Work Order Number: <i>82-0597</i>
Report To: Montana-Dakota Utilities Attn: Todd Peterson Address: 400 North 4th St. Bismarck, ND 58501 Phone: 701-425-2427 Email: todd.peterson@mdu.com	CC:	Collected By: <i>Darren Nieswaag</i>

Lab Number	Sample ID	Date	Time	Sample Type	Sample Type				Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)	Analysis Required
					1 Liter Raw	500 mL Nitric	500 mL Nitric (filtered)	1 Liter Sulfuric					
<i>W501</i>	MW1-90	<i>23 Mar 21</i>	<i>0929</i>	GW	X	X	X	X	<i>6.26</i>	<i>10530</i>	<i>6.89</i>	<i>0.65</i>	MDU Heskett Spring 2021

Comments:

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>[Signature]</i>	<i>23 Mar 21</i>	<i>Log In</i>			<i>23 Mar 21</i>
	<i>1400</i>	Walk In #2	TM562 / TM805	<i>C. Cant</i>	<i>1400</i>
			<i>ROT 3.6</i>		



Field Datasheet

Groundwater Assessment

2616 E. Broadway Ave, Bismarck, ND

Phone: (701) 258-9720

Company: MDU Heskett

Event: Spring 2021

Sample ID: 1-90

Sampling Personal: Darren Mieswage

Weather Conditions: Temp: 39 °F Wind: Light@ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION

Well Locked?	YES	NO
Well Labeled?	YES	NO
Casing Strait?	YES	NO
Grout Seal Intact?	YES	NO
Repairs Necessary?	<u>Not Visible</u>	
Casing Diameter:	<u>2"</u>	
Water Level Before Purge:	<u>11.99</u> ft	
Total Depth of Well:	ft	
Well Volume:	liters	
Depth to Top of Pump:	ft	
Water Level After Sample:	<u>12.10</u> ft	
Measurement Method:	<u>Electric Water Level Indicator</u>	

SAMPLING INFORMATION

Purging Method:	<u>Bladder</u>	
Sampling Method:	<u>Bladder</u>	
Dedicated Equipment?	<u>YES</u>	NO
Duplicate Sample?	YES	<u>NO</u>
Duplicate Sample ID:	<u>-</u>	
Bottle List:		
1 Liter Raw		
500mL Nitric		
500mL Nitric (filtered)		
250mL Sulfuric		

Control Settings:	
Purge:	<u>2</u> Sec.
Recover:	<u>58</u> Sec.
PSI:	<u>-</u>

FIELD READINGS

Stabilization Parameters (3 Consecutive)		Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate mL/Min	Liters Removed	Appearance or Comment
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10					Clarity, Color, Odor, Ect.
Start of Well Purge											
<u>0904</u>											
0908	<u>6:41</u>	<u>10451</u>	<u>6.88</u>	<u>2.71</u>	<u>20.0</u>	<u>2.34</u>	<u>12.09</u>	<u>100</u>	<u>500</u>	<u>u</u>	
<u>0914</u>	<u>6:16</u>	<u>10507</u>	<u>6.88</u>	<u>1.86</u>	<u>0.7</u>	<u>0.86</u>	<u>12.09</u>	<u>100</u>	<u>500</u>	<u>u</u>	
<u>0919</u>	<u>6:19</u>	<u>10505</u>	<u>6.88</u>	<u>1.82</u>	<u>-5.3</u>	<u>0.70</u>	<u>12.09</u>	<u>100</u>	<u>500</u>	<u>u</u>	
<u>0924</u>	<u>6:24</u>	<u>10533</u>	<u>6.88</u>	<u>1.98</u>	<u>-10.9</u>	<u>0.74</u>	<u>12.12</u>	<u>100</u>	<u>500</u>	<u>u</u>	
<u>0929</u>	<u>6:26</u>	<u>10530</u>	<u>6.89</u>	<u>1.91</u>	<u>-12.2</u>	<u>0.65</u>	<u>12.10</u>	<u>100</u>	<u>500</u>	<u>u</u>	

Well Stabilized? YES NO Total Volume Purged: 2500 Liters

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment
						Clarity, Color, Odor, Ect.
<u>23 Mar 21</u>	<u>0929</u>	<u>6.26</u>	<u>10530</u>	<u>6.89</u>	<u>0.65</u>	<u>u</u>

Comments:



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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



CERTIFICATE of ANALYSIS - CCR

Todd Peterson
Montana-Dakota Utilities Co.
400 N 4th St
Bismarck ND 58501

Report Date: 31 Mar 21
Lab Number: 21-W501
Work Order #: 82-0597
Account #: 002800
Date Sampled: 23 Mar 21 9:29
Date Received: 23 Mar 21 14:00
Sampled By: MVTL Field Services

Project Name: MDU Heskett

PO #: 185968 OP

Sample Description: MW1-90

Temp at Receipt: 3.6C ROI

Event and Year: Spring 2021

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	26 Mar 21 12:11	MDE
Lithium - Total	0.690	mg/l	0.020	6010D	24 Mar 21 13:18	MDE
Antimony - Total	< 0.001	mg/l	0.0010	6020B	26 Mar 21 9:43	CC
Arsenic - Total	< 0.002	mg/l	0.0020	6020B	26 Mar 21 9:43	CC
Barium - Total	0.0082	mg/l	0.0020	6020B	26 Mar 21 9:43	CC
Beryllium - Total	< 0.0005	mg/l	0.0005	6020B	26 Mar 21 9:43	CC
Cadmium - Total	< 0.0005	mg/l	0.0005	6020B	26 Mar 21 9:43	CC
Chromium - Total	< 0.002	mg/l	0.0020	6020B	26 Mar 21 9:43	CC
Cobalt - Total	< 0.002	mg/l	0.0020	6020B	26 Mar 21 9:43	CC
Lead - Total	< 0.0005	mg/l	0.0005	6020B	26 Mar 21 9:43	CC
Molybdenum - Total	< 0.002	mg/l	0.0020	6020B	26 Mar 21 9:43	CC
Selenium - Total	< 0.005	mg/l	0.0050	6020B	26 Mar 21 9:43	CC
Thallium - Total	< 0.0005	mg/l	0.0005	6020B	26 Mar 21 9:43	CC

Approved by:

Claudette K Carroll

CC
8 Apr 21

Claudette K. Carroll, Laboratory Manager, Bismarck, ND

RL = Method Reporting Limit

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: ND # ND-00016



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Quality Control Report

Lab ID: 21-W501

Project: MDU Heskett

Work Order: 202182-0597

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
Antimony - Total mg/l	0.1000	103	80-120	0.400 0.100	21-W474 21-W508	< 0.001 < 0.001	0.4182 0.1006	105 101	75-125 75-125	0.4182 0.1006	0.4300 0.0964	108 96	2.8 4.3	20 20	- -	- -	< 0.001
Arsenic - Total mg/l	0.1000	102	80-120	0.400 0.100	21-W474 21-W508	< 0.002 < 0.002	0.4138 0.0986	103 99	75-125 75-125	0.4138 0.0986	0.4274 0.0968	107 97	3.2 1.8	20 20	- -	- -	< 0.002
Barium - Total mg/l	0.1000	102	80-120	0.400 0.100	21-W474 21-W508	0.0823 0.0094	0.4734 0.1068	98 97	75-125 75-125	0.4734 0.1068	0.4940 0.1032	103 94	4.3 3.4	20 20	- -	- -	< 0.002
Beryllium - Total mg/l	0.1000	102	80-120	0.400 0.100	21-W474 21-W508	< 0.0005 < 0.0005	0.4422 0.1066	111 107	75-125 75-125	0.4422 0.1066	0.4570 0.1018	114 102	3.3 4.6	20 20	- -	- -	< 0.0005
Cadmium - Total mg/l	0.1000	105	80-120	0.400 0.100	21-W474 21-W508	< 0.0005 < 0.0005	0.4026 0.0917	101 92	75-125 75-125	0.4026 0.0917	0.4154 0.0884	104 88	3.1 3.7	20 20	- -	- -	< 0.0005
Chromium - Total mg/l	0.1000	103	80-120	0.400 0.100	21-W474 21-W508	0.0050 < 0.002	0.4008 0.1066	99 107	75-125 75-125	0.4008 0.1066	0.4228 0.1036	104 104	5.3 2.9	20 20	- -	- -	< 0.002
Cobalt - Total mg/l	0.1000	104	80-120	0.400 0.100	21-W474 21-W508	< 0.002 < 0.002	0.3996 0.1050	100 105	75-125 75-125	0.3996 0.1050	0.4198 0.1020	105 102	4.9 2.9	20 20	- -	- -	< 0.002
Lead - Total mg/l	0.1000	102	80-120	0.400 0.100	21-W474 21-W508	< 0.0005 < 0.0005	0.3876 0.0933	97 93	75-125 75-125	0.3876 0.0933	0.4002 0.0895	100 89	3.2 4.2	20 20	- -	- -	< 0.0005
Lithium - Total mg/l	0.400	108	80-120	0.400	21-W477	0.064	0.518	114	75-125	0.518	0.510	112	1.6	20	-	-	< 0.02 < 0.02
Mercury - Total mg/l	0.0020	95	85-115	0.002 0.002	21-W477 21-W516	< 0.0002 < 0.0002	0.0018 0.0019	90 95	70-130 70-130	0.0018 0.0019	0.0019 0.0018	95 90	5.4 5.4	20 20	- -	- -	< 0.0002
Molybdenum - Total mg/l	0.1000	105	80-120	0.400 0.100	21-W474 21-W508	0.0423 < 0.002	0.4670 0.1100	106 110	75-125 75-125	0.4670 0.1100	0.4834 0.1056	110 106	3.5 4.1	20 20	- -	- -	< 0.002

Quality Control Report

Lab ID: 21-W501

Project: MDU Heskett

Work Order: 202182-0597

Analyte	LCS Spike Amt	LCS Rec %	LCS % Rec Limits	Matrix Spike Amt	Matrix Spike ID	Matrix Spike Orig Result	Matrix Spike Result	Matrix Spike Rec %	Matrix Spike % Rec Limits	MSD/ Dup Orig Result	MSD/ Dup Result	MSD Rec %	MSD/ Dup RPD	MSD/ Dup RPD Limit (<)	Known Rec (%)	Known % Rec Limits	Method Blank
Selenium - Total mg/l	0.1000	100	80-120	0.400 0.100	21-W474 21-W508	0.0202 < 0.005	0.4120 0.0908	98 91	75-125 75-125	0.4120 0.0908	0.4472 0.0872	107 87	8.2 4.0	20 20	- -	- -	< 0.005
Thallium - Total mg/l	0.1000	96	80-120	0.400 0.100	21-W474 21-W508	< 0.0005 < 0.0005	0.3684 0.0892	92 89	75-125 75-125	0.3684 0.0892	0.3838 0.0856	96 86	4.1 4.1	20 20	- -	- -	< 0.0005

Samples were received on 23 Mar 2021 at 1400.

Temperature upon receipt at the Bismarck laboratory was 3.6°C.

All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.

All holding times were met.

Approved methodology was followed for all sample analyses.

All acceptance criteria were met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/duplicates unless noted here:

- For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.

Approved by: _____

C. Cantor

9 Apr 21



2616 E. Broadway Ave
Bismarck, ND 58501
(701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Spring 2021	Work Order Number: <i>82-0597</i>
Report To: Montana-Dakota Utilities Attn: Todd Peterson Address: 400 North 4th St. Bismarck, ND 58501 Phone: 701-425-2427 Email: todd.peterson@mdu.com	CC:	Collected By: <i>Darren Nieswaag</i>

Lab Number	Sample ID	Date	Time	Sample Type	Sample Type					Temp (°C)	Spec. Cond.	PH	Turbidity (NTU)	Analysis Required
					1 Liter Raw	500 mL Nitric	500 mL Nitric (filtered)	250 mL Sulfuric	1 Liter Nitric					
<i>WS01</i>	MW1-90	<i>23 Mar 21</i>	<i>0929</i>	GW	X	X	X	X		<i>6.26</i>	<i>10530</i>	<i>6.89</i>	<i>0.65</i>	MDU Heskett Spring 2021

Comments:

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>[Signature]</i>	<i>23 Mar 21</i>	<i>Log In</i>			<i>23 Mar 21</i>
	<i>1400</i>	Walk In #2	TM562 / TM805	<i>C. Cantor</i>	<i>1400</i>
			<i>ROT 3.6</i>		



Field Datasheet

Groundwater Assessment

2616 E. Broadway Ave, Bismarck, ND

Phone: (701) 258-9720

Company: MDU Heskett

Event: Spring 2021

Sample ID: 1-90

Sampling Personal: Darren Nieswager

Weather Conditions: Temp: 39 °F Wind: Light @ Precip: Sunny / Partly Cloudy / Cloudy

WELL INFORMATION

Well Locked?	YES	NO
Well Labeled?	YES	NO
Casing Strait?	YES	NO
Grout Seal Intact?	YES	NO
Repairs Necessary?		Not Visible
Casing Diameter:	2"	
Water Level Before Purge:	11.99 ft	
Total Depth of Well:	ft	
Well Volume:	liters	
Depth to Top of Pump:	ft	
Water Level After Sample:	12.10 ft	
Measurement Method:	Electric Water Level Indicator	

SAMPLING INFORMATION

Purging Method:	Bladder
Sampling Method:	Bladder
Dedicated Equipment?	YES NO
Duplicate Sample?	YES NO
Duplicate Sample ID:	-

Control Settings:	
Purge:	2 Sec.
Recover:	58 Sec.
PSI:	-

Bottle List:	
1 Liter Raw	
500mL Nitric	
500mL Nitric (filtered)	
250mL Sulfuric	

FIELD READINGS

Stabilization Parameters (3 Consecutive)	Temp. (°C)	Spec. Cond.	pH	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water Level (ft)	Pumping Rate mL/Min	Liters Removed	Appearance or Comment Clarity, Color, Odor, Ect.
Purge Date	Time	±0.5°	±5%	±0.1	±10%	±10	(ft)	mL/Min		clear, slightly turbid, turbid
	0904	Start of Well Purge								
	0908	6.41	10451	6.88	2.71	20.0	2.34	12.09	100	500
	0914	6.16	10507	6.88	1.86	0.7	0.86	12.09	100	500
	0919	6.19	10505	6.88	1.82	-5.3	0.70	12.09	100	500
	0924	6.27	10533	6.88	1.98	-10.9	0.74	12.12	100	500
	0929	6.26	10530	6.89	1.91	-12.2	0.65	12.10	100	500

Well Stabilized? YES NO

Total Volume Purged: 2500 Liters

Sample Date	Time	Temp. (°C)	Spec. Cond.	pH	Turbidity (NTU)	Appearance or Comment Clarity, Color, Odor, Ect.
23 Mar 21	0929	6.26	10530	6.89	0.65	

Comments:



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Amended 27Oct21 (Ba, Mo added) - STATE

Todd Peterson
Montana-Dakota Utilities Co.
400 N 4th St
Bismarck ND 58501

Report Date: 13 Sep 21
Lab Number: 21-W3055
Work Order #: 82-2248
Account #: 002800
Date Sampled: 25 Aug 21 8:40
Date Received: 25 Aug 21 9:27
Sampled By: MVTL Field Services

Project Name: MDU Heskett

PO #: 185968 OP

Sample Description: MW1-90

Temp at Receipt: 6.0C ROI

Event and Year: Fall 2021

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Metal Digestion				EPA 200.2	25 Aug 21	RAA
Conductivity (EC)	10748	umhos/cm	1	SM2510B-11	25 Aug 21 18:00	RAA
pH - Field	6.83	units	NA	SM 4500 H+ B	25 Aug 21 8:40	JSM
pH	* 7.2	units	0.1	SM4500-H+-B-11	25 Aug 21 18:00	RAA
Temperature - Field	10.8	Degrees C	NA	SM 2550B	25 Aug 21 8:40	JSM
Total Alkalinity	476	mg/l CaCO3	20	SM2320B-11	25 Aug 21 18:00	RAA
Bicarbonate	476	mg/l CaCO3	20	SM2320B-11	25 Aug 21 18:00	RAA
Carbonate	< 20	mg/l CaCO3	20	SM2320B-11	25 Aug 21 18:00	RAA
Hydroxide	< 20	mg/l CaCO3	20	SM2320B-11	25 Aug 21 18:00	RAA
Conductivity - Field	10619	umhos/cm	1	EPA 120.1	25 Aug 21 8:40	JSM
Tot Dis Solids(Summation)	11000	mg/l	12.5	SM1030-F	1 Sep 21 10:17	Calculated
Total Hardness as CaCO3	4700	mg/l	NA	SM2340B-11	27 Aug 21 12:23	Calculated
Cation Summation	163	meq/L	NA	SM1030-F	27 Aug 21 12:23	Calculated
Anion Summation	173	meq/L	NA	SM1030-F	1 Sep 21 10:17	Calculated
Percent Error	-2.85	%	NA	SM1030-F	1 Sep 21 10:17	Calculated
Sodium Adsorption Ratio	10.0		NA	USDA 20b	27 Aug 21 12:23	Calculated
Fluoride	1.09	mg/l	0.10	SM4500-F-C	25 Aug 21 18:00	RAA
Sulfate	7670	mg/l	5.00	ASTM D516-11	1 Sep 21 10:17	SD
Chloride	98.4	mg/l	2.0	SM4500-Cl-E-11	25 Aug 21 14:06	SD
Nitrate-Nitrite as N	12.6	mg/l	0.20	EPA 353.2	26 Aug 21 10:49	EV
Phosphorus as P - Total	< 0.2	mg/l	0.20	EPA 365.1	27 Aug 21 10:11	SD
Mercury - Dissolved	< 0.0002	mg/l	0.0002	EPA 245.1	31 Aug 21 14:23	MDE
Calcium - Total	398	mg/l	1.0	6010D	27 Aug 21 12:23	SZ
Magnesium - Total	900	mg/l	1.0	6010D	27 Aug 21 12:23	SZ
Sodium - Total	1580	mg/l	1.0	6010D	27 Aug 21 12:23	SZ
Potassium - Total	25.0	mg/l	1.0	6010D	27 Aug 21 12:23	SZ
Barium - Dissolved	< 0.5 @	mg/l	0.10	6010D	26 Aug 21 12:35	MDE
Iron - Dissolved	< 0.5 @	mg/l	0.10	6010D	26 Aug 21 12:35	MDE
Manganese - Dissolved	< 0.25 @	mg/l	0.05	6010D	26 Aug 21 12:35	MDE
Molybdenum - Dissolved	< 0.5 @	mg/l	0.10	6010D	26 Aug 21 12:35	MDE
Boron - Dissolved	< 0.5 @	mg/l	0.10	6010D	26 Aug 21 14:37	SZ
Arsenic - Dissolved	< 0.005 ^	mg/l	0.0020	6020B	9 Sep 21 9:17	MDE
Cadmium - Dissolved	< 0.0005	mg/l	0.0005	6020B	9 Sep 21 9:17	MDE
Chromium - Dissolved	< 0.005 ^	mg/l	0.0020	6020B	9 Sep 21 9:17	MDE
Lead - Dissolved	< 0.0005	mg/l	0.0005	6020B	9 Sep 21 9:17	MDE

RL = Method Reporting Limit

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: ND # ND-00016



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Page: 2 of 2

Amended 27Oct21 (Ba, Mo added) - STATE

Todd Peterson
Montana-Dakota Utilities Co.
400 N 4th St
Bismarck ND 58501

Report Date: 13 Sep 21
Lab Number: 21-W3055
Work Order #: 82-2248
Account #: 002800
Date Sampled: 25 Aug 21 8:40
Date Received: 25 Aug 21 9:27
Sampled By: MVTL Field Services

Project Name: MDU Heskett

PO #: 185968 OP

Sample Description: MW1-90

Temp at Receipt: 6.0C ROI

Event and Year: Fall 2021

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Selenium - Dissolved	0.0072 mg/l		0.0050	6020B	9 Sep 21 9:17	MDE
Silver - Dissolved	< 0.0005 mg/l		0.0005	6020B	9 Sep 21 9:17	MDE

* Holding time exceeded

* Elevated result due to instrument performance at the lower limit of quantification (LLOQ).

Approved by: Claudette K. Carroll *CC* *28OCT21*

Claudette K. Carroll, Laboratory Manager, Bismarck, ND

RL = Method Reporting Limit

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: ND # ND-00016

Quality Control Report

Lab ID: 21-W3055

Project: MDU Heskett

Work Order: 202182-2248

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
Arsenic - Dissolved mg/l	0.0160	104	80-120	0.100 0.100	21W3039q 21W3081q	< 0.005 < 0.005	0.1172 0.1252	117 125	75-125 75-125	0.1172 0.1252	0.1160 0.1182	116 118	1.0 5.8	20 20	- -	- -	< 0.005
Barium - Dissolved mg/l	0.40	108	80-120	5.00	21W3070q	< 0.5	4.95	99	75-125	4.95	4.89	98	1.2	20	- -	- -	< 0.1 < 0.1
Boron - Dissolved mg/l	0.40	102	80-120	0.400	21-W3076	0.51	0.83	80	75-125	0.83	0.82	78	1.2	20	- -	- -	< 0.1 < 0.1
Cadmium - Dissolved mg/l	0.0160	102	80-120	0.100 0.100	21W3039q 21W3081q	< 0.0005 < 0.0005	0.1095 0.1100	110 110	75-125 75-125	0.1095 0.1100	0.1109 0.1132	111 113	1.3 2.9	20 20	- -	- -	< 0.0005
Calcium - Total mg/l	100	105	80-120	100	21W3069q	64.5	156	92	75-125	156	154	90	1.3	20	- -	- -	< 1 < 1
Chloride mg/l	30.0 30.0	95 95	80-120 80-120	30.0 30.0	21-W3049 21-W2964	< 2 31.1	28.5 62.3	95 104	80-120 80-120	28.5 62.3	28.6 62.4	95 104	0.4 0.2	20 20	- -	- -	< 2 < 2
Chromium - Dissolved mg/l	0.0160	102	80-120	0.100 0.100	21W3039q 21W3081q	< 0.005 < 0.005	0.1028 0.1056	103 106	75-125 75-125	0.1028 0.1056	0.1012 0.1050	101 105	1.6 0.6	20 20	- -	- -	< 0.005
Conductivity (EC) umhos/cm	- -	- -	- -	- -	- -	- -	- -	- -	- -	2066 9072	2074 9089	- -	0.4 0.2	20 20	- -	- -	- -
Fluoride mg/l	0.50 0.50	100 100	90-110 90-110	0.500 0.500	21-W3040 21-W3053	0.81 0.30	1.26 0.81	90 102	80-120 80-120	1.26 0.81	1.27 0.90	92 120	0.8 10.5	20 20	- -	- -	< 0.1 < 0.1
Iron - Dissolved mg/l	0.40	110	80-120	5.00	21W3070q	2.64	7.10	89	75-125	7.10	7.00	87	1.4	20	- -	- -	< 0.1 < 0.1
Lead - Dissolved mg/l	0.0160	99	80-120	0.100 0.100	21W3039q 21W3081q	< 0.0005 < 0.0005	0.0994 0.1002	99 100	75-125 75-125	0.0994 0.1002	0.0972 0.0985	97 98	2.2 1.7	20 20	- -	- -	< 0.0005
Magnesium - Total mg/l	100	102	80-120	100	21W3069q	26.9	122	95	75-125	122	120	93	1.7	20	- -	- -	< 1 < 1
Manganese - Dissolved mg/l	0.40	110	80-120	5.00	21W3070q	< 0.25	4.97	99	75-125	4.97	4.88	98	1.8	20	- -	- -	< 0.05 < 0.05



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MEMBER
ACIL

Quality Control Report

Lab ID: 21-W3055

Project: MDU Heskett

Work Order: 202182-2248

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
Mercury - Dissolved mg/l	0.0020	95	85-115	0.002 0.002	21-W3048 21-W3117	< 0.0002 < 0.0002	0.0018 0.0019	90 95	70-130 70-130	0.0018 0.0019	0.0015 0.0017	75 85	18.2 11.1	20 20	- -	- -	< 0.0002
Molybdenum - Dissolved mg/l	0.40	105	80-120	5.00	21W3070q	< 0.5	4.81	96	75-125	4.81	4.78	96	0.6	20	- -	- -	< 0.1 < 0.1
Nitrate-Nitrite as N mg/l	0.50	102	90-110	1.00 1.00	21-W3070 21-W2989	1.32 0.68	2.41 1.74	109 106	90-110 90-110	2.41 1.74	2.41 1.73	109 105	0.0 0.6	20 20	- -	- -	< 0.2
pH units	- -	- -	- -	- -	- -	- -	- -	- -	- -	8.6 7.6	8.6 7.4	- -	0.0 2.7	20 20	- -	- -	- -
Phosphorus as P - Total mg/l	0.50	102	90-110	1.00	21-W3049	< 0.2	1.00	100	90-110	1.00	1.00	100	0.0	20	-	-	< 0.2
Potassium - Total mg/l	100	100	80-120	100	21W3069q	10.0	106	96	75-125	106	104	94	1.9	20	- -	- -	< 1 < 1
Selenium - Dissolved mg/l	0.0160	97	80-120	0.100 0.100	21W3039q 21W3081q	< 0.005 < 0.005	0.1302 0.1310	130 131	75-125 75-125	0.1302 0.1310	0.1221 0.1347	122 135	6.4 2.8	20 20	- -	- -	< 0.005
Silver - Dissolved mg/l	0.0160	101	80-120	0.100 0.100	21W3039q 21W3081q	< 0.0005 < 0.0005	0.0756 0.0718	76 72	75-125 75-125	0.0756 0.0718	0.0765 0.0718	76 72	1.2 0.0	20 20	- -	- -	< 0.0005
Sodium - Total mg/l	100	101	80-120	500	21W3069q	306	775	94	75-125	775	790	97	1.9	20	- -	- -	< 1 < 1
Sulfate mg/l	100	104	80-120	100	21-W3090	60.6	143	82	80-120	143	146	85	2.1	20	-	-	< 5
Total Alkalinity mg/l CaCO3	410 410	92 92	90-110 90-110	410 410	21-W3047 21-W3051	543 579	891 877	85 73	80-120 80-120	891 877	844 828	73 61	5.4 5.7	20 20	93	80-120	< 20 < 20

Quality Control Report

Lab ID: 21-W3055

Project: MDU Heskett

Work Order: 202182-2248

Samples were received in good condition on 25 Aug 2021 at 0927.

Temperature upon receipt at the Bismarck laboratory was 6.0°C. Samples were received on ice and evidence of cooling had begun.

All samples were properly preserved unless noted here and/or flagged on the individual analytical laboratory report.

With the exception of pH, all holding times were met.

Approved methodology was followed for all sample analyses.

All acceptance criteria were met for calibration, method blanks, laboratory control samples, laboratory fortified matrix/duplicates unless noted here:

- For some analytes, the reported results were elevated due to additional dilutions required to minimize the effects of sample matrix.
- For some analytes, the reported results were elevated due to instrument performance at the lower limit of quantitation (LLOQ).
- The recoveries for one silver matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix and the use of HCl in the digestion. Data was accepted based on acceptable recovery of the LCS and/or the post digestion spike. No further action was taken.
- The recoveries for one selenium matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. LCS was acceptable. No further action was taken.
- Recovery for one selenium matrix spike was outside of the acceptable limits. Recovery of the matrix spike duplicate was acceptable. RPD for the recoveries of the matrix spike/matrix spike duplicate was acceptable. LCS was acceptable. No further action was taken.
- The recoveries for one alkalinity matrix spike/matrix spike duplicate were outside the acceptable limits. RPD for the recoveries was within limits. Poor recoveries were determined to be due to sample matrix. LCS was acceptable. No further action was taken.
- Recovery for one alkalinity matrix spike duplicate was outside of the acceptable limits. Recovery of the matrix spike was acceptable. RPD for the recoveries of the matrix spike/matrix spike duplicate was acceptable. LCS was acceptable. No further action was taken.

Approved by: _____

C. Cantor

28 Sep 21

Claudette Carroll

From: Anna Schneider <ASchneider@barr.com>
Sent: Tuesday, October 26, 2021 3:53 PM
To: Claudette Carroll
Cc: Barr Data Management
Subject: Report 202182-2248

Follow Up Flag: Follow up
Flag Status: Flagged

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Claudette,

I took a quick look at the 202182-2248 report. I noted that barium and molybdenum were not included in the report for sample MW1-90. Could please you provide a revised report? It looks like they were included in the EDD.

Thank you,

Anna Schneider

Data Quality Specialist/Data Management Technician
Minneapolis, MN office: 952.832.2771
ASchneider@barr.com
www.barr.com

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(701) 258-9720

Chain of Custody Record

Project Name: MDU Heskett	Event: Fall 2021	Work Order Number: <i>82-2248</i>
Report To: Montana-Dakota Utilities Attn: Todd Peterson Address: 400 North 4th St. Bismarck, ND 58501 Phone: 701-425-2427 Email: todd.peterson@mdu.com	CC:	Collected By: <i>[Signature]</i>

Lab Number	Sample ID	Date	Time	Sample Type	1 Liter Raw	500 mL Nitric	500 mL Nitric (filtered)	1 Liter Nitric	Temp (°C)	Spec. Cond.	pH	Turbidity (NTU)	Analysis Required
<i>W3055</i>	MW1-90	<i>25 Aug 21</i>	<i>0840</i>	GW	X	X	X	X	<i>10.79</i>	<i>10619</i>	<i>6.83</i>	<i>0.52</i>	MDU List AA

Comments: *25 Aug 21*

Relinquished By		Sample Condition		Received By	
Name	Date/Time	Location	Temp (°C)	Name	Date/Time
<i>[Signature]</i>	<i>25 Aug 21</i>	LOG #1 Walk In #2	6.0 TM562 / (TM805)	<i>[Signature]</i>	<i>25 Aug 21</i> <i>0927</i>
	<i>0927</i>				

Appendix B

Alternative Source Demonstration Reports



Alternative Source Demonstration: August 2021 Event

R.M. Heskett Station

Prepared for
Montana-Dakota Utilities Co.

April 2022

Alternative Source Demonstration
August 2021 Event

April 2022

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Certifications

I hereby certify that I, or my agent, have examined this written demonstration and attest that this Coal Combustion Residuals Facility Alternative Source Demonstration (ASD) is accurate and has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR §257.94. I further certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of North Dakota.

Revision	Date	Summary of Revisions
0	April 12, 2022	August 2021 Event Alternative Source Demonstration



Thomas J. Radue

1.0 Introduction

Montana-Dakota Utilities Co. (MDU) owns and operates R.M. Heskett Station (Site), a coal-fired generating station and a gas-fired turbine located in Mandan, Morton County, North Dakota (Figure 1). One CCR (coal combustion residual) unit, as defined by 40 CFR 257.53, is located on the property. The CCR unit contains coal combustion by-products, asbestos wastes generated from construction activity associated with MDU-owned facilities, and ash derived from burning tire-derived fuel (TDF) at the facility.

The CCR Rule (US EPA, 2015) §257.94(e)(2) allows for an alternative source demonstration (ASD) in the event of an identified statistically significant increase (SSI) in a water quality parameter in a downgradient monitoring well over background levels:

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.

The purpose of this work is to evaluate the data collected as part of the August 2021 monitoring event, along with historical data, to demonstrate if the potential SSIs are the results of a “source other than the CCR unit” or due to natural variation in groundwater quality, an error in sampling, analysis, or statistical evaluation.

2.0 August 2021 SSIs

Sampling for the second detection monitoring event in 2021 was conducted August 23-25, 2021. Four potential SSIs over background were identified: sulfate and total dissolved solids (TDS) at MW-104, fluoride at MW2-90, and chloride at MW-105 (see time series plots in Appendix A and prediction limit plots in Appendix B).

Evaluations were undertaken to review potential alternative sources for the SSIs. These evaluations included comparing leaching tests of on-site CCR materials, leachate collected in the Evaporation Pond (non-CCR unit), regional (background) groundwater quality data, and groundwater quality data collected at the site prior to construction of the CCR unit.

Several characteristics of the CCR unit site geology, groundwater monitoring well locations, and historic groundwater quality data prompted consideration of potential alternative sources for the potential SSIs, including elevated water quality parameters in pre-landfill groundwater monitoring data, site-specific geologic conditions, and/or leakage from the Evaporation Pond (non-CCR unit).

A successful demonstration of alternative source(s) for the potential SSIs are discussed in Section 3.0.

2.1 August Sampling Event

Concentrations for potential SSIs observed in August 2021 are presented in Table 1 and are consistent with those observed during the prior seven detection monitoring events.

Table 1. Detection Monitoring Results for Potential SSI Well-Parameter Pairs

Well	Parameter	Interwell Prediction Limit (mg/L)	Detection Monitoring Results (mg/L)							
			April 2018	Oct. 2018	April 2019	Sept. 2019	April 2020	Sept. 2020	March 2021	August 2021
MW-104	Sulfate	7,300	10,700	11,000	11,100	11,300	10,300	10,700	11,000	11,600
MW-104	TDS	10,400	17,400	18,000	17,700	17,200	16,500	17,900	18,000	17,500
MW-105	Chloride	271	333	384	282	290	278	339	261	280
MW2-90	Fluoride	0.98	1.03	1.00	1.02	1.03	0.98	1.01	1.04	1.02

Bolded values indicate concentrations exceed the associated interwell prediction limits.

Trend analysis results indicate:

- Sulfate at MW-104, though above the prediction limit, does not have a statistically significant trend.
- TDS at MW-104 has a statistically significant increasing trend.
- Chloride at MW-105, though above the prediction limit, has a statistically significant decreasing trend.

-
- Fluoride at MW2-90, though above the prediction limit, does not have a statistically significant trend.

Methods used to evaluate potential alternative sources as the basis for water quality parameter concentrations over background from the August 2021 detection monitoring event are discussed in Section 3.0.

2.2 Verification Sampling

No verification sampling was conducted on the potential SSIs.

3.0 Alternative Source Demonstration

Successful demonstrations of alternative sources have previously been documented for the four potential SSIs. The associated ASD Reports (Barr, 2018a; Barr, 2018b; Barr, 2019a; Barr, 2019b; Barr, 2020a; Barr, 2020b; Barr, 2021a; Barr 2021b) documented that each of the SSIs could be explained by natural groundwater quality variability based on concentrations that were either present at the Site before the landfill was constructed, consistent with regional groundwater quality data, and/or associated with a release from the Evaporation Pond (non-CCR unit).

The purpose of this ASD Report is to validate the results of prior findings with the August 2021 data. For each potential SSI, three hypotheses regarding the potential source of the SSI are assessed: 1) a release of leachate from the CCR unit is the source of one or more of the potential SSIs; 2) natural variations of pre-landfill or regional groundwater quality is the source of one or more of the potential SSIs; or 3) a release of leachate from the Evaporation Pond (non-CCR unit) is the source of one or more of the potential SSIs.

3.1 Source Hypothesis #1: CCR Unit Release

To accept the hypothesis that a release of leachate from the CCR unit is the source of one or more of the potential SSIs, it would be assumed that groundwater chemistry at one or more potentially impacted wells (MW2-90, MW-104, and/or MW-105) would be geochemically similar to impacted water from the CCR unit represented by leach tests results. However, if they are geochemically dissimilar, this indicates that a source "other than the CCR unit" may be responsible for the potential SSI. Therefore, major ion chemistry from the CCR monitoring locations (upgradient and downgradient) was compared to CCR Synthetic Precipitation Leaching Procedure (SPLP; EPA Method 1312) data collected July 2011 (Appendix C).

To test this hypothesis, Piper diagrams (Figure 2) were used to visually compare the CCR SPLP results (Appendix C) and the measured groundwater quality at the Site. Piper diagrams are plots of major ion chemistry of water samples (calcium, magnesium, potassium, sodium, chloride, sulfate, and alkalinity) that are used to differentiate between water types and to identify potential mixing of water types. This method is a means to identify or "fingerprint" water samples by their common characteristics (major ions) to assess which types of water are similar or dissimilar to potential source water types (Helsel and Hirsch, 2002). On the Piper diagram depicted in Figure 2, downgradient well compositions are shown as circular points, CCR SPLP compositions as red triangles, and the range of upgradient compositions as a blue polygon.

Downgradient water quality (including the potential SSI parameter-well pairs) is characterized as a Mg-SO₄ type water, whereas the ash SPLP results are Na-SO₄ type water. The major difference observed between the downgradient water quality and the SPLP results is the dominant cation concentration (magnesium vs. sodium). Because water quality data from SSI well-parameter pairs are clustered with data from that of the upgradient wells, which are Na-Mg-SO₄ to Mg-SO₄ type water, rather than near the SPLP results, it indicates that the water chemistry at those locations are more like upgradient groundwater than a potential release from the CCR unit. **Therefore, we reject the hypothesis that the CCR unit is the source of the sulfate and TDS observed at MW-104 and the fluoride at MW2-90.**

3.2 Source Hypothesis #2: Natural Variations of Pre-Landfill or Regional Groundwater Quality

As Source Hypothesis #1 (CCR Unit Release) was rejected as a potential source of the SSIs, natural variations of pre-landfill conditions and/or regional groundwater quality were evaluated for each of the potential SSIs. The second hypothesis evaluated is that concentrations of sulfate and TDS at MW-104 are consistent with historical (pre-landfill) or regional (background) groundwater data. To test this hypothesis, results of the August 2021 detection monitoring event were compared to pre-landfill data and/or regional groundwater quality data from the Cannonball Formation and associated units to determine if natural variation is a potential alternative source for the SSIs.

3.2.1 Chloride at MW-105

Results from groundwater samples collected in 1986 were included in the 1989 Special Use Disposal Site Permit Application (Permit Application; MDU, 1989). The 1986 samples were collected prior to construction of the CCR unit; an aerial photograph from March 30, 1988, shows the area of the CCR unit, which appears undisturbed (Appendix D).

Pre-landfill chloride concentrations collected from groundwater at the Site were measured as high as 558 mg/L (Well 44, 1986), indicating that high chloride concentrations pre-date construction of the CCR unit. Additionally, the North Dakota State Water Commission conducted a groundwater study in Morton County (Ackerman, 1980); 45 wells screened in the Cannonball and Ludlow Formations were sampled for various parameters including chloride. Chloride concentrations ranged from 0 to 500 mg/L (37% of which had concentrations greater than 250 mg/L).

Historic data shows that concentrations of chloride in groundwater at the Site measured prior to the construction of the CCR unit (558 mg/L) as well as regional groundwater quality data (0 to 500 mg/L) are consistent with and/or higher than chloride measured at MW-105 in August 2021 (280 mg/L). This supports the hypothesis that the SSI for chloride at MW-105 is due to a "source other than the CCR unit."

Therefore, we accept the hypothesis that chloride concentrations observed at MW-105 are consistent with regional (background) groundwater data.

3.2.2 Fluoride at MW2-90

Source Hypothesis #2 was tested by comparing fluoride concentrations collected as part of several regional groundwater quality studies on the Cannonball Formation and associated units. A summary of the range of fluoride concentrations in the Cannonball Formation and associated units are included in the table below.

Table 2. Fluoride Concentrations in Morton County, North Dakota

Reference	Fluoride Conc. Range	Formation/Units	Data Source Location
Ackerman, D.J., 1980. Ground-Water Resources of Morton County, North Dakota. North Dakota Geological Survey Bulletin 72, Part III. 51 p.	0.0 to 4.0 mg/L	Cannonball and Ludlow formations, undifferentiated	Morton County
Crosby, O.A. and Klausing, R.L., 1984. Hydrology of Area 47, Northern Great Plains and Rocky Mountain Coal Provinces, North Dakota, South Dakota, and Montana. USGS Water-Resources Investigations Open-File Report 83-221, 93 p.	0.1 to 6.3 mg/L	Entire Fort Union Formation (includes Cannonball Formation)	Morton County

The Ackerman study provides summary statistics for the fluoride concentrations observed in Morton County. Forty-six samples were analyzed for fluoride; of those, 20 (or 43%) had concentrations greater than 1.3 mg/L (Ackerman, 1980). The fluoride concentration observed at MW-2-90 in August 2021 (1.02 mg/L) is within the range of values consistent with naturally occurring concentrations of fluoride associated with the Cannonball Formation in Morton County. **Therefore, we accept the hypothesis that fluoride concentrations observed at MW-2-90 are consistent with regional (background) groundwater data.**

3.2.3 Sulfate and TDS at MW-104

Analyses of groundwater samples collected prior to construction of the CCR unit included in the Permit Application notes that high sulfate and TDS was observed at the Site. Maximum sulfate and TDS concentrations reported in 1986 (pre-landfill) were 11,632 mg/L and 14,917 mg/L, respectively, in Well 60 (approximately 700 feet southwest of MW-104), with similar concentrations observed two years later. Sulfate concentrations reported in August 2021 at MW-104 (11,600 mg/L) are within range of historically observed concentrations (Figure 3), but TDS concentrations (17,500 mg/L) are near the upper end of concentrations historically observed (Figure 4). Figures 3 and 4 show the range of sulfate and TDS concentrations, respectively, across the Site, including recent and historical monitoring well data.

The mineralogy of the underlying Fort Union Formation may yield an explanation for the elevated sulfate concentrations (which leads to elevated TDS concentrations). The dominant lithology observed at the Site is unconsolidated silt in a clay matrix with interspersed fine to medium-grained sand (10% to 30%). Small gypsum crystals are documented discontinuously throughout the upper 30 feet of the surface materials, which have been presumed to be the result of diagenetic processes which occur above the water table during alternating wetting and drying cycles (Groenewold et al., 1983). Gypsum is a hydrated calcium sulfate mineral that can be a source of high sulfate concentrations in groundwater.

The boring log for MW-104 (Appendix E) notes gypsum present throughout the upper layer of the screened interval. Boring logs for other CCR wells and pre-landfill wells note gypsum occurrences across the Site (Appendix E). The water level and screened interval in MW-104 are within the gypsum-bearing unit. In other wells with lower sulfate and TDS concentrations, the water levels and/or screened units are

below the documented gypsum occurrences. As groundwater fluctuates and surface water infiltration occurs, periodic dissolution of gypsum into the water column may occur, resulting in elevated sulfate concentrations (and therefore elevated TDS, too).

Based on presence of gypsum in native subsurface deposits and documentation of elevated sulfate and TDS in pre-landfill groundwater, the hypothesis that the SSI for sulfate and TDS at MW-104 may be due to natural conditions (a “source other than the CCR unit”) is possible. However, a statistically significant increasing trend for TDS at MW-104 was observed. Natural/background groundwater can be affected by seasonality and/or site-wide aquifer changes, resulting in trending data; two other monitoring wells at the site have statistically significant increasing trends at the site: upgradient well MW-13 and downgradient well MW2-90 (conversely, MW-13 has a long-term (late 1980s to present) statistically significant decreasing trend). Seasonality was not detected in TDS or sulfate at MW-104. **Sulfate and TDS concentrations at MW-104 may be due to natural conditions; however, additional source considerations were evaluated.**

3.3 Source Hypothesis #3: Evaporation Pond Release

Two conditions are necessary to accept the hypothesis that a release of Evaporation Pond water is the source of one or more of the potential SSIs: (1) mechanism of release (such as an issue with Evaporation Pond liner integrity) and (2) geochemically similar groundwater chemistry at one or more of the potentially impacted wells with water from the Evaporation Pond. Based on proximity, only the SSIs observed at MW-104 (TDS and sulfate) are being evaluated for this potential source.

3.3.1 TDS and Sulfate at MW-104

A statistically significant increasing trend in TDS was observed at MW-104 following the August 2021 detection monitoring event. The only statistically significant trend observed for other Appendix III parameters at this location was for fluoride. Past ASD Reports (Barr, 2019b; Barr, 2020a; Barr, 2020b; Barr, 2021) attributed elevated sulfate and TDS concentrations at MW-104 to either natural conditions or a release from the Evaporation Pond. MW-104 is located between the CCR unit and the Evaporation Pond (a non-CCR unit). The Evaporation Pond was constructed to collect surface water run-off from the Site as well as leachate from the CCR Unit. Due to the relative proximity of MW-104 to the Evaporation Pond, an evaluation was conducted to assess the Evaporation Pond liner integrity, potential impacts to downgradient wells, and determine the geochemical feasibility of Evaporation Pond water contributing to the conditions observed at MW-104.

Liner Integrity Evaluation

In the 2010 Annual Report for the Special Waste Disposal Permit (SP-087), it was noted that erosion was encountered at the Evaporation Pond. More specifically, “cuts in the banks of the pond ranged from 8 to 24-inches. Erosion was caused from storm water running into the evaporation pond from closed Slots and the haul road” (MDU, 2011). No repairs were made at that time due to standing water in the pond. Similar erosional features were noted in the 2011 and 2012 Annual Reports, citing erosion cuts of 8 to 48-inches (MDU, 2012 and MDU, 2013). These erosion cuts were repaired in 2013 during the construction of Slot 10. Additionally, the 2013 Annual Report stated that “the west wall of the evaporation pond was raised and

graded to reroute storm water that accumulates outside of the ash disposal area from the cover of Phase I ash disposal site away from the pond during rain events” (MDU, 2014).

These reports did not specify if the erosional cuts were 8 to 48-inches wide or 8 to 48-inches deep. Based on the Phase I Development “as-constructed” Plan Sheets (January and November 1990), the Evaporation Pond was built with a 3-foot-thick compacted clay liner (MDU, 1989 Exhibit 6-B). If the erosional cuts were up to 48-inches deep, then the cuts would extend through the entirety of the liner thickness, creating a conduit for Evaporation Pond water to enter the groundwater. Additionally, no details were provided on the materials used for repairing the Evaporation Pond (i.e., if the liner was impacted, were the erosion cuts filled in with a comparable clay liner material).

Additionally, the integrity of the Evaporation Pond liner may have been compromised due to cation exchange. Time series plots of groundwater quality at nearby well MW1-90 (Appendix F) show an increase in sodium; this increase is most apparent at MW1-90 between 2012 and 2021. The Evaporation Pond liner may be composed of a clay with sodium as its main interlayer cation (e.g., sodium-montmorillonite and/or sodium-bentonite, which are common in the area (Groenewold et al., 1983)), and cation exchange processes can occur between the sodium in the clay and positively charged cations concentrated in the evaporation pond water (calcium, magnesium, potassium, and aluminum), increasing the concentration of dissolved sodium as it is released from the clay structure. Over time this exchange may decrease swelling potential and increase hydraulic conductivity of the clay constituting the pond liner, resulting in increased leakage of Evaporation Pond water.

Downgradient Impacts

The base of the Evaporation Pond sits at approximately 1675 feet above MSL whereas historical groundwater elevations in MW-104 and MW1-90 remain below 1675 feet MSL. Therefore, any water leaking from the Evaporation Pond would report radially downward into the groundwater, toward both MW-104 and MW1-90, reaching both wells downgradient of the Pond.

As MW-104 was installed on August 20, 2015, it is not possible to determine if the erosional cuts observed in the early 2010s impacted the water quality at this location. However, data has consistently been collected from nearby well MW1-90, also downgradient of the Evaporation Pond. As seen in the time series plots (Appendix F; 1990-2021), in approximately 2010 concentrations of chloride, sulfate, TDS, magnesium, sodium, and specific conductance at MW1-90 began increasing more rapidly. To a lesser extent, changes in concentrations were observed around this same time for potassium, nitrogen, and total alkalinity. This timing corresponds to when the erosional cuts at the Evaporation Pond were first observed in the Annual Monitoring Reports. The increasing trends have since continued, despite reports of the erosional cuts being repaired in 2013, except for chloride, which has since leveled off and is now decreasing.

Geochemical Feasibility

A simple mixing model was developed in April 2019 (Barr, 2019b) to determine the potential of producing a similar water quality observed at MW-104 (and MW1-90, as a historical analogue) when mixing Evaporation Pond water with unimpacted upgradient water. This mixing model was conducted in

Geochemist's Workbench® v.12.0, using data from water samples collected from the Evaporation Pond and upgradient monitoring well MW-103. The mixing model assumes a starting concentration equal to the upgradient groundwater concentrations and then iteratively mixes it with incremental amounts of Evaporation Pond water. The upgradient groundwater concentrations used in the model were from a sample from upgradient monitoring well MW-103 collected in April 2019, which is assumed to represent the long-term composition of groundwater in that vicinity due to the fairly stable concentrations of major ions exhibited in samples from MW-103 (Appendix A). The Evaporation Pond concentrations used in the model were from a sample collected from the pond in September 2014, which is assumed for the purposes of the model to represent a typical Evaporation Pond water composition during the period when the pond liner was compromised.

The results of the model are provided in Appendix G. Figure G.1 shows the results of the mixing model on a Piper diagram for MW-103. Downgradient wells MW-104 and MW1-90 are shown as gray and green diamonds, respectively. The blue line represents the various possible outcomes when mixing the upgradient water quality with the Evaporation Pond. The black circles represent specific proportions (1-part upgradient water to 0.01-, 0.05-, 0.1-, 0.5-, and 1-part Evaporation Pond water). Figure G.2 shows the results as Stiff plots. Table G.1 provides the numerical inputs and results of the various mixing proportions.

As shown on Figure G.1, the downgradient well compositions are similar to the chemistry anticipated if the Evaporation Pond is mixing with upgradient groundwater emanating from the proximity of monitoring well MW-103. The path of the mixing reaction from MW-103 to the Evaporation Pond transects MW-104 when 1-part upgradient (MW-103) water is mixed with as little as 0.05-part Evaporation Pond water. Therefore, it appears plausible that a relatively small portion of Evaporation Pond water would be needed to "impact" groundwater from upgradient to get a similar chemistry as observed downgradient in MW-104. The geometry of the Stiff plots in Figure G.2 shows the similarity in anionic concentrations and calcium in the mixing models.

Based on the description of erosional features extending upwards of 48 inches into the liner of the Evaporation Pond in 2010-2013 corresponding with the increased concentrations of several parameters observed in downgradient monitoring well MW1-90, it is possible that a release from the Evaporation Pond occurred starting in approximately 2011. Furthermore, the results of the geochemical model along with the general proximity and hydraulic position of MW-104 relative to the Evaporation Pond supports the hypothesis that the SSI for TDS and sulfate at MW-104 is due to a "source other than the CCR unit." **Therefore, we accept the hypothesis that TDS and sulfate concentrations observed at MW-104 are consistent with a potential release from the Evaporation Pond, a non CCR unit.**

4.0 Conclusions

Four SSIs were identified from the August 2021 detection monitoring event. This report demonstrates that a “source other than the CCR unit” caused the potential SSIs (natural variation in regional and/or pre-landfill groundwater quality and the Evaporation Pond), as allowed by §257.94(e)(2). The results of this alternative source demonstration are summarized in the table below.

Table 3. Summary of SSIs and Alternative Sources

Well	Parameter	Report Section	Evidence for Alternative Source
MW-104	Sulfate	3.2.2, 3.3.1	Natural variability and/or Other (Evaporation Pond, a non CCR unit)
MW-104	Total Dissolved Solids	3.2.2, 3.3.1	Natural Variability and/or Other (Evaporation Pond, a non CCR unit)
MW-105	Chloride	3.2.1	Natural variability (pre-landfill values and geologic background)
MW-2-90	Fluoride	3.2.1	Natural variability (pre-landfill values and geologic background)

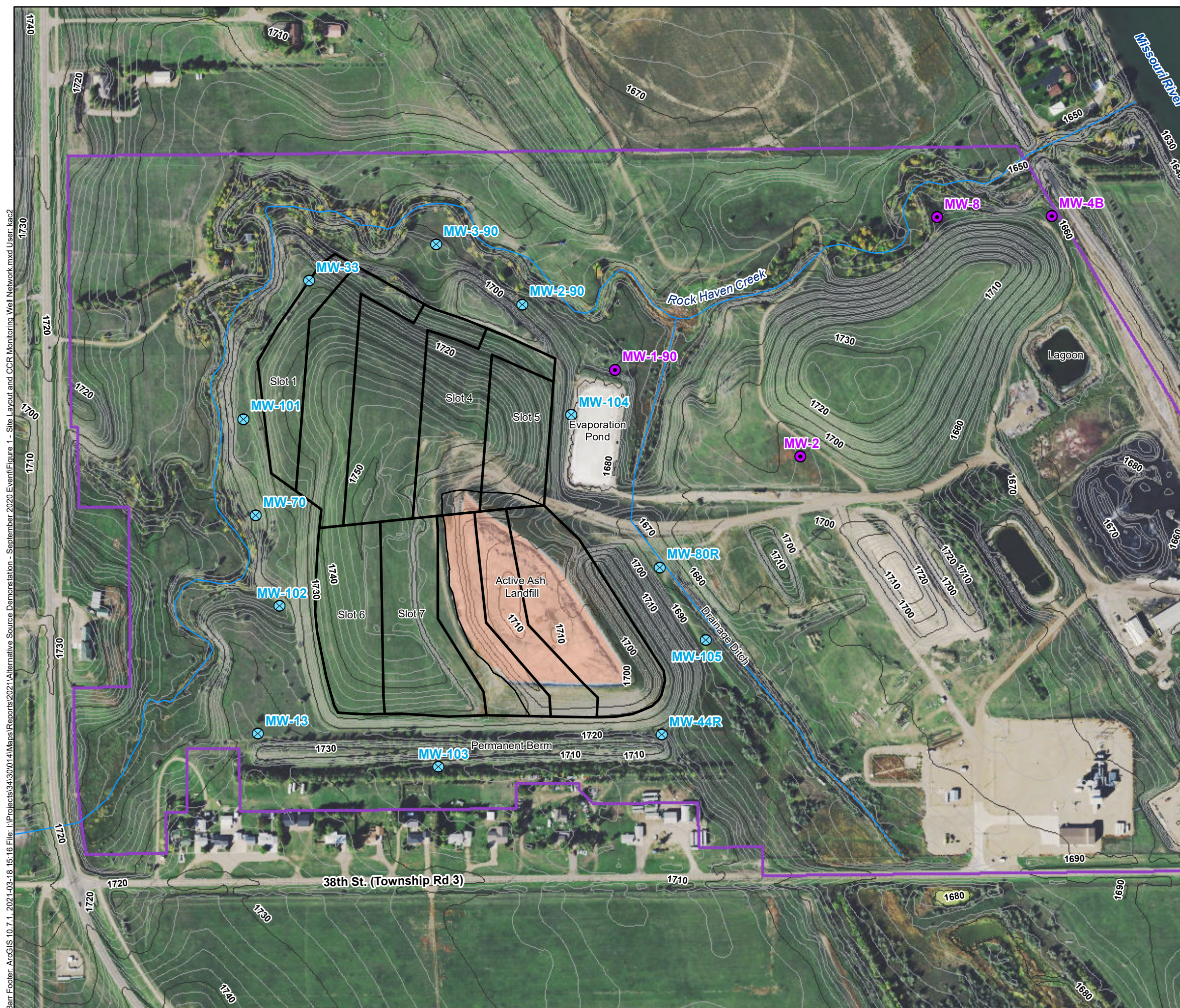
Based on the foregoing, the alternative source demonstration presented herein meets the requirements of CCR Rule §257.94(e)(2). As coal unit operations ended in early March 2022, MDU will work with the North Dakota Department of Environmental Quality (NDDEQ) on closure options for the Evaporation Pond as it is regulated under a permit through the NDDEQ.

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US EPA, 2015, Hazardous and Solid Waste Management Systems; Management of Coal Combustion Residuals from Electric Utility, CFR Parts 257 and 261, Federal Register, Vol. 80, No. 74, April 17, 2015

Figures



Barr Footer: ArcGIS 10.7.1, 2021-03-18 15:16 File: I:\Projects\341300\14\Maps\Reports\2021\Alternative Source Demonstration - September 2020 Event\Figure 1 - Site Layout and CCR Monitoring Well Network.mxd User: kac2



- Monitoring Well Location
- Monitoring Well Location - Water Level Only
- Existing Slot Boundaries
- Streams
- Property Line
- 10ft Contours
- 2ft Contours
- Active Portion of Landfill

Image Source: 2021 Statewide Imagery (ND GIS Hub)

CAD Data Source: Slot Linework.dwg

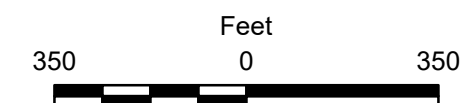
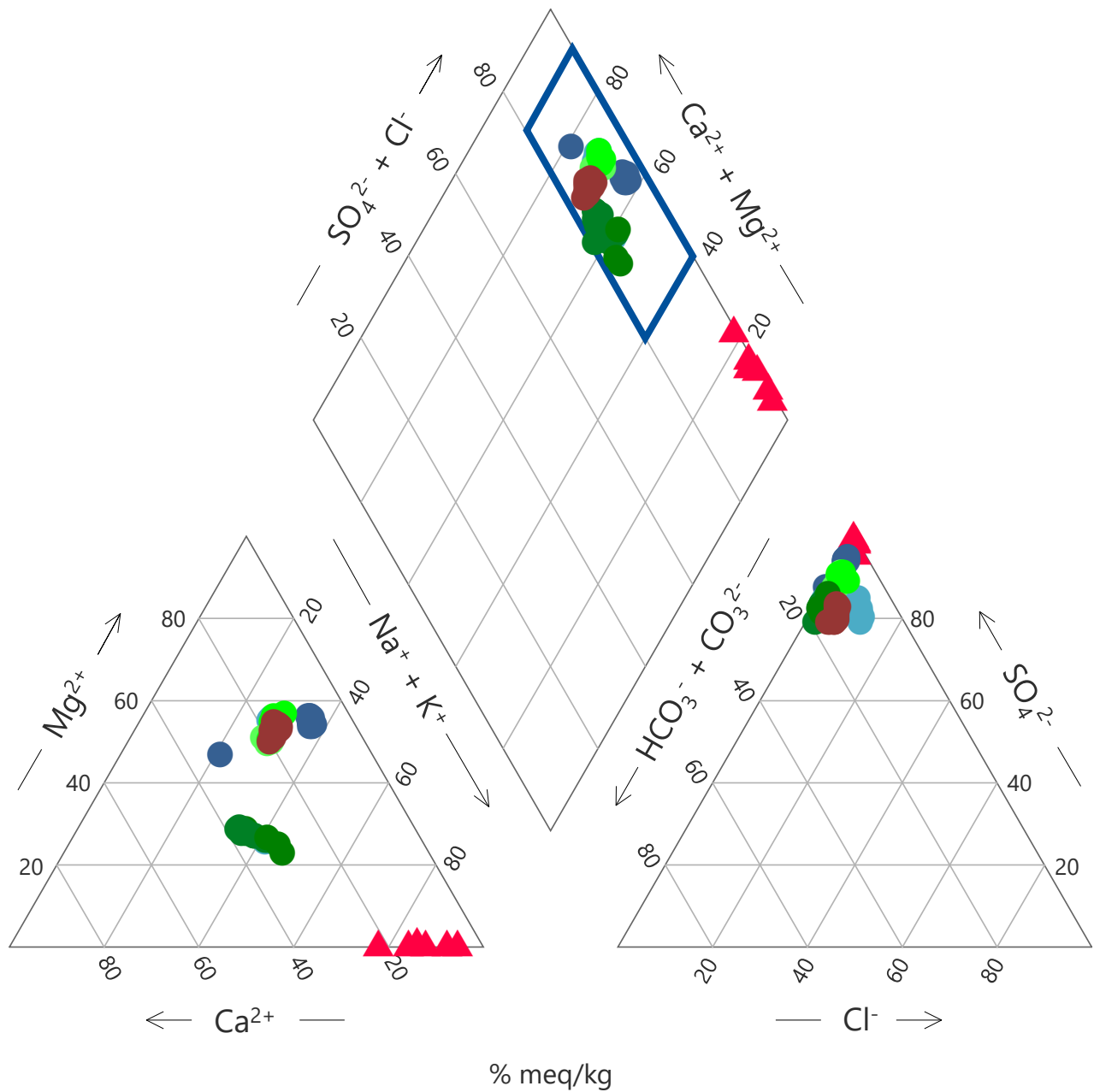


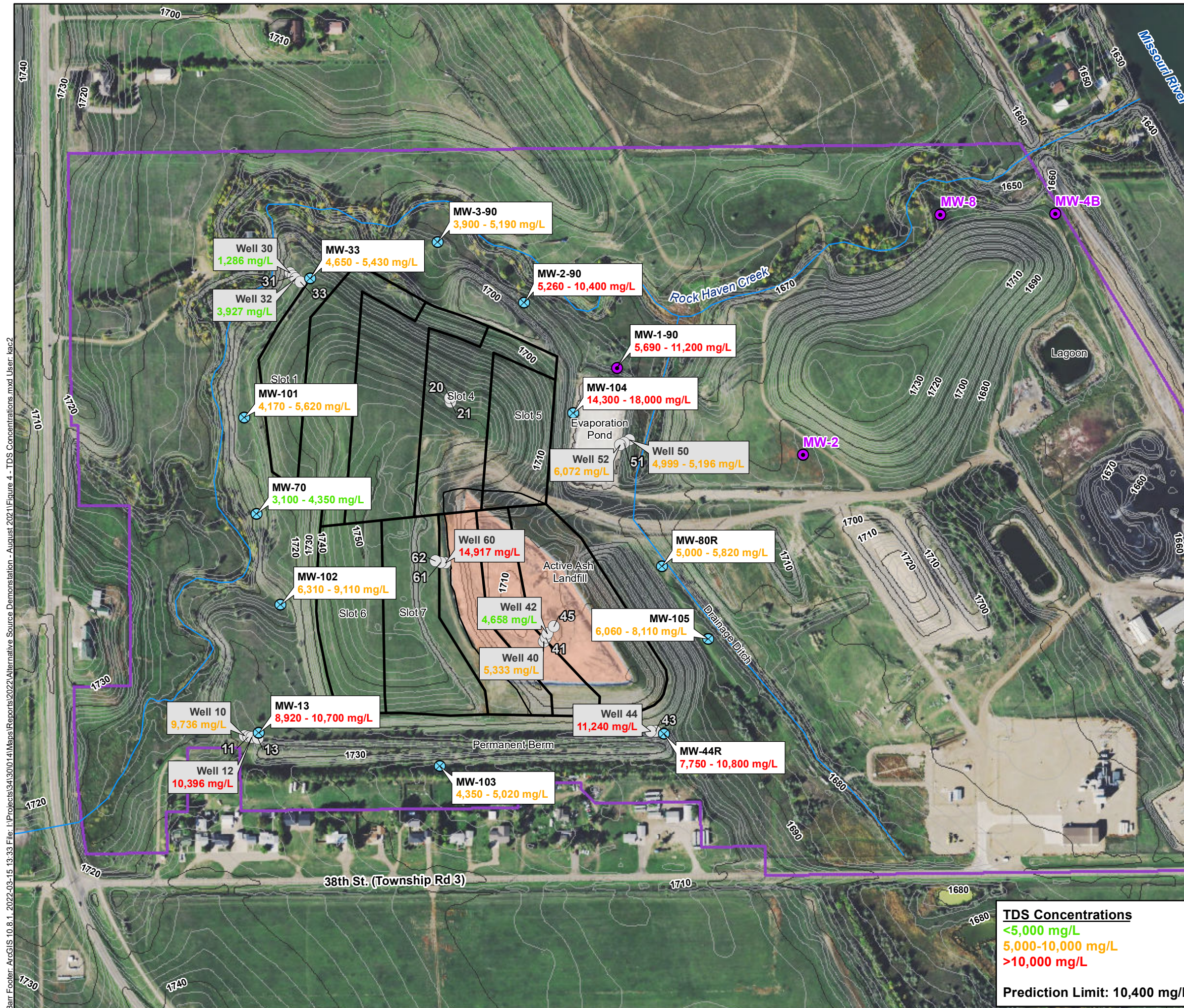
Figure 1

**SITE LAYOUT AND CCR
MONITORING WELL NETWORK**
R. M. Heskett Station
Alternative Source Demonstration:
August 2021 Event
Montana Dakota Utilities
Mandan, North Dakota



- MW104
- MW105
- MW2-90
- MW3-90
- MW80R
- Upgradient
- ▲ Ash SPLP

Figure 2
 PIPER PLOT
 R.M. Heskett Station
 Alternative Source Demonstration
 August 2021 Event
 Montana Dakota Utilities
 Mandan, North Dakota



- Monitoring Well Location
- Monitoring Well Location - Water Level Only
- Pre-Landfill Wells (Approximate)
- Existing Slot Boundaries
- Streams
- Property Line
- 10ft Contours
- 2ft Contours
- Active Portion of Landfill

Image Source: 2021 Statewide Imagery (ND GIS Hub)

CAD Data Source: Slot Linework.dwg
 Pre-Landfill well concentrations are from 9/11/1986, 11/21/1986 (MDU, 1989), and CCR Rule monitoring well concentrations are from 2016-2019.

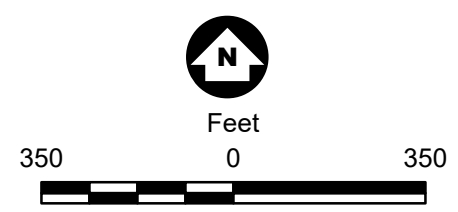


Figure 4

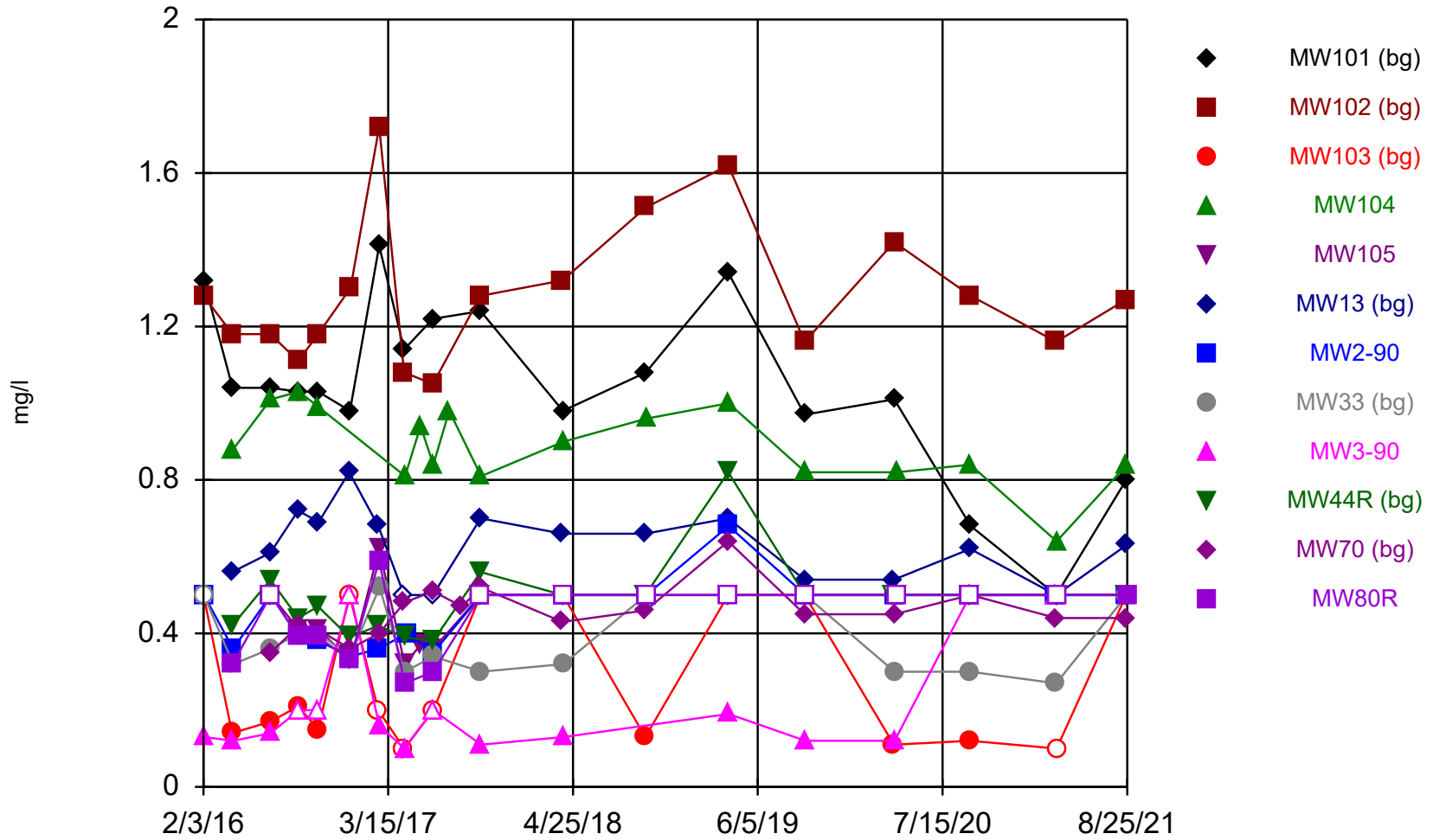
TDS CONCENTRATIONS
 R. M. Heskett Station
 Alternative Source Demonstration:
 August 2021 Event
 Montana Dakota Utilities
 Mandan, North Dakota

Barr Footer: ArcGIS 10.8.1, 2022-03-15 13:33 File: I:\Projects\04130014\Maps\Reports\2022\Alternative Source Demonstration - August 2021\Figure 4 - TDS Concentrations.mxd User: kac2

Appendix A

Appendix III Time Series Plots

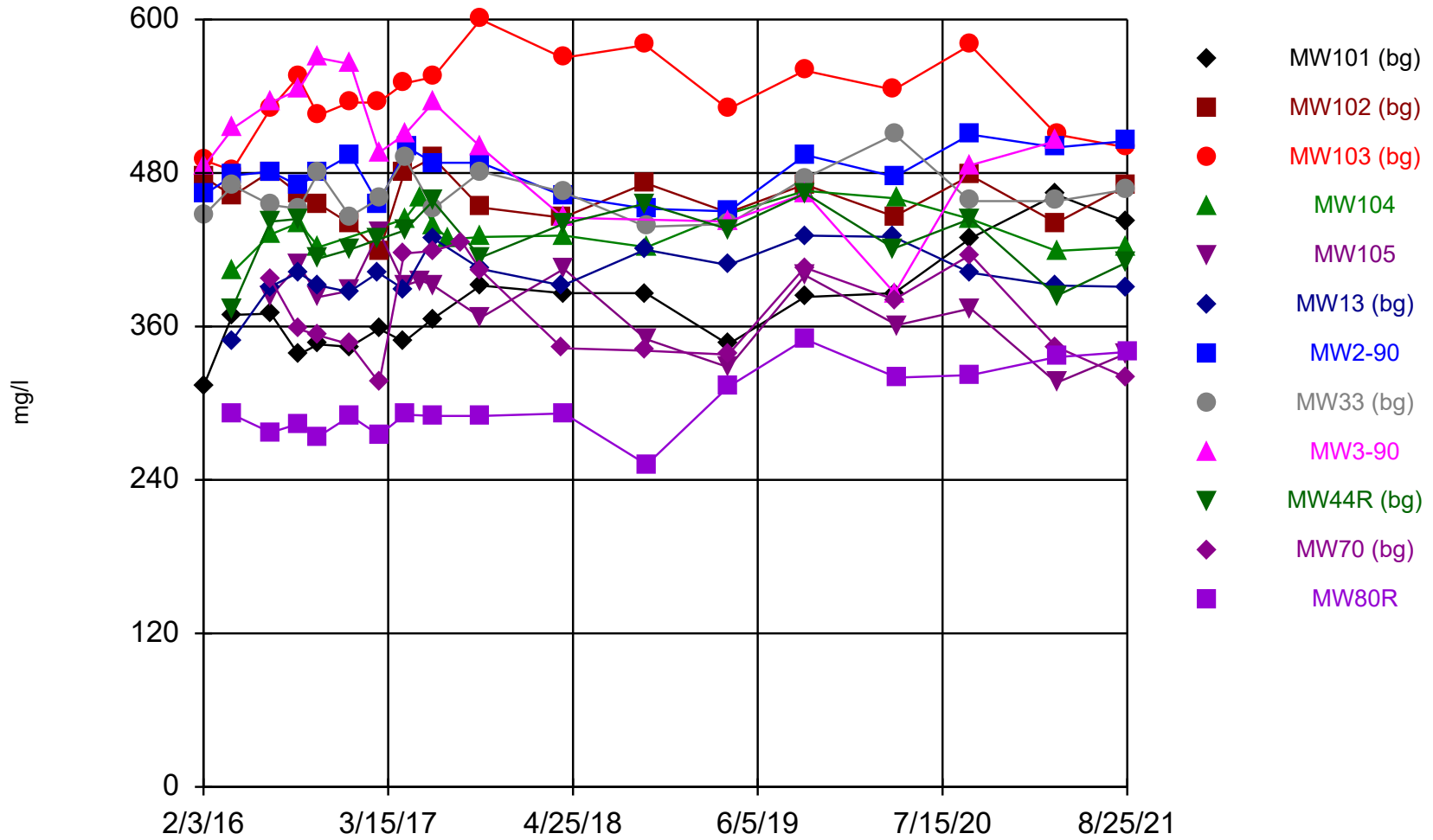
Boron, total



Time Series Analysis Run 12/15/2021 12:45 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

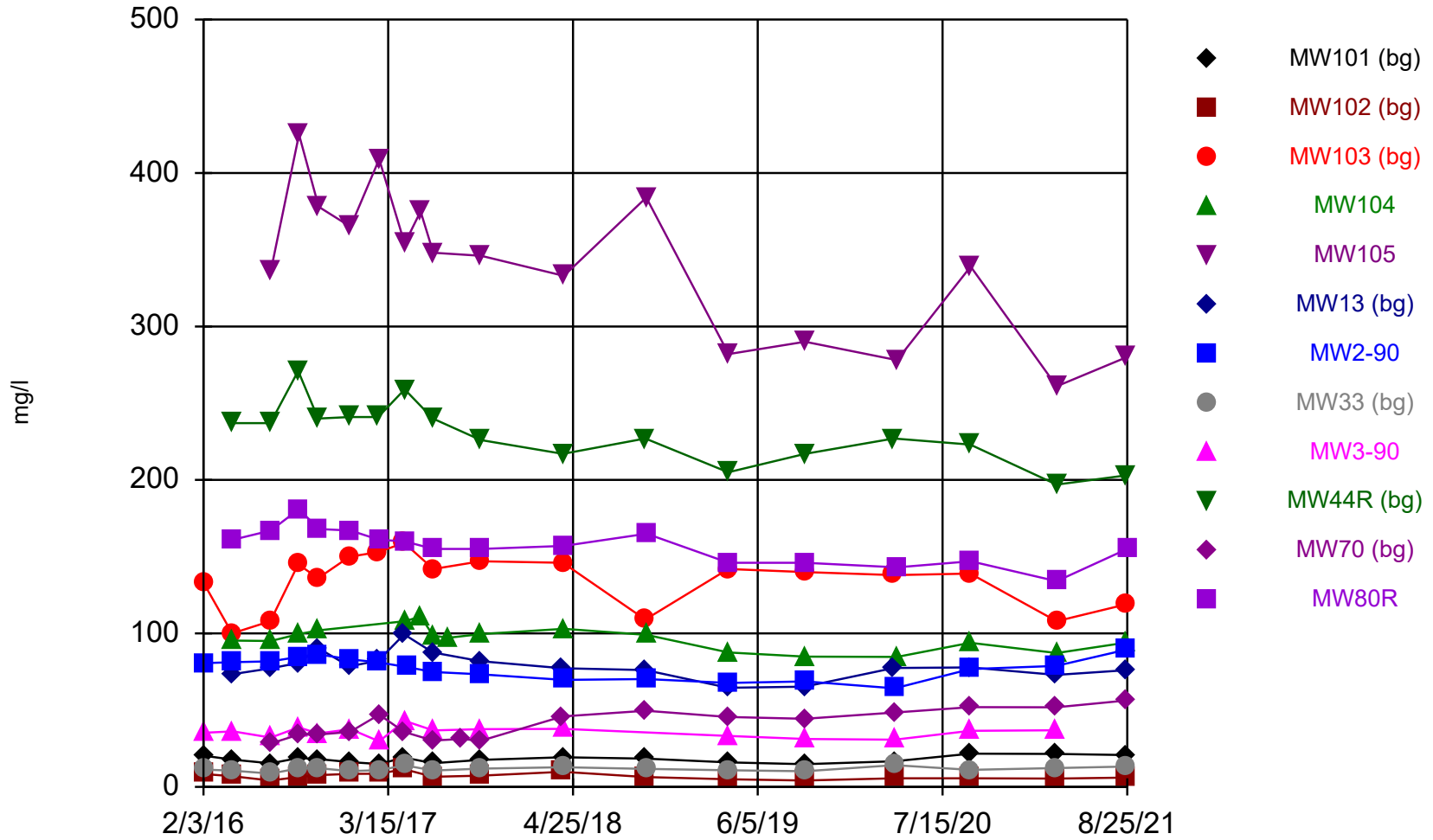
Calcium, Total



Time Series Analysis Run 12/15/2021 12:45 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

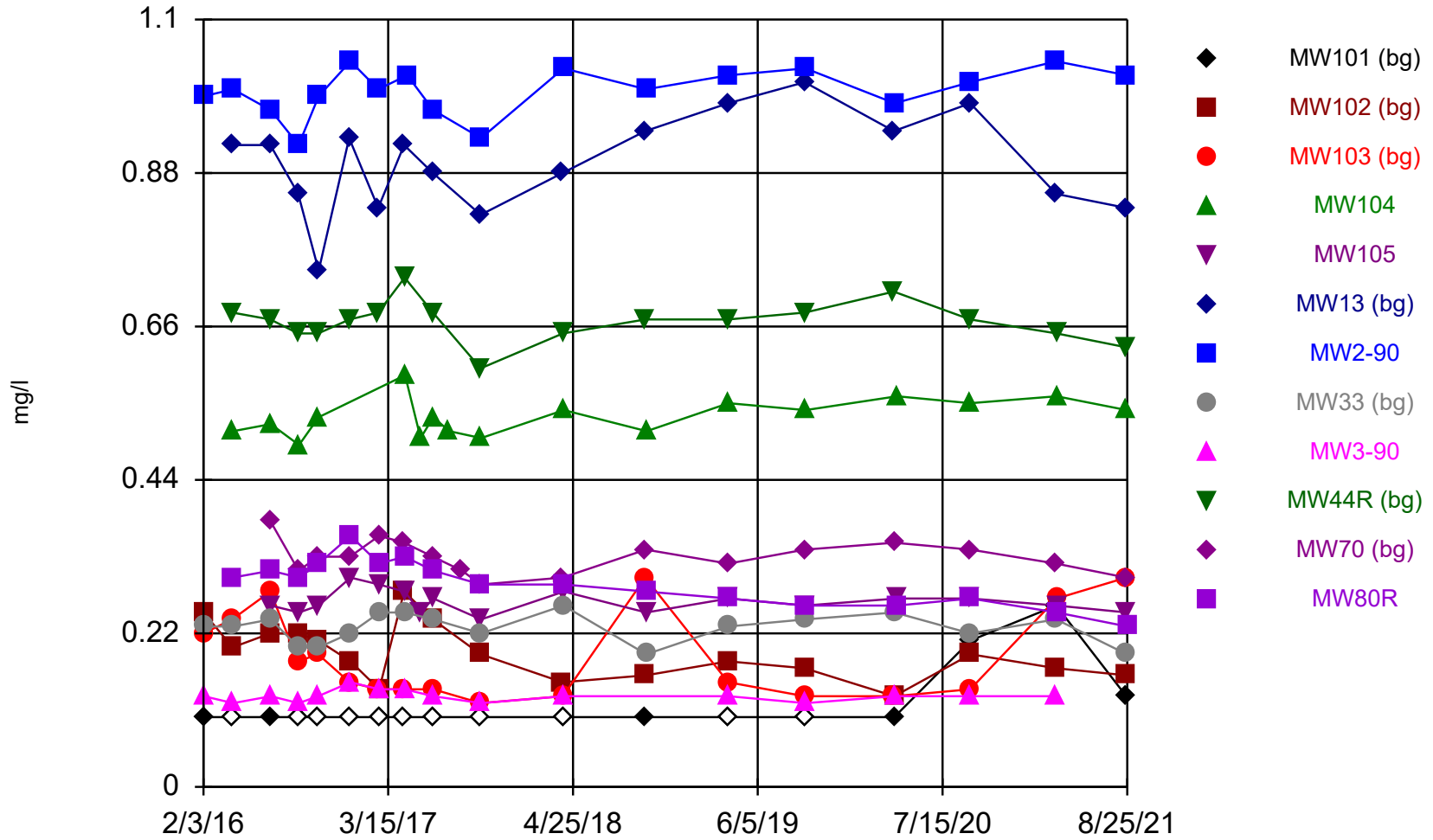
Chloride



Time Series Analysis Run 12/15/2021 12:45 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

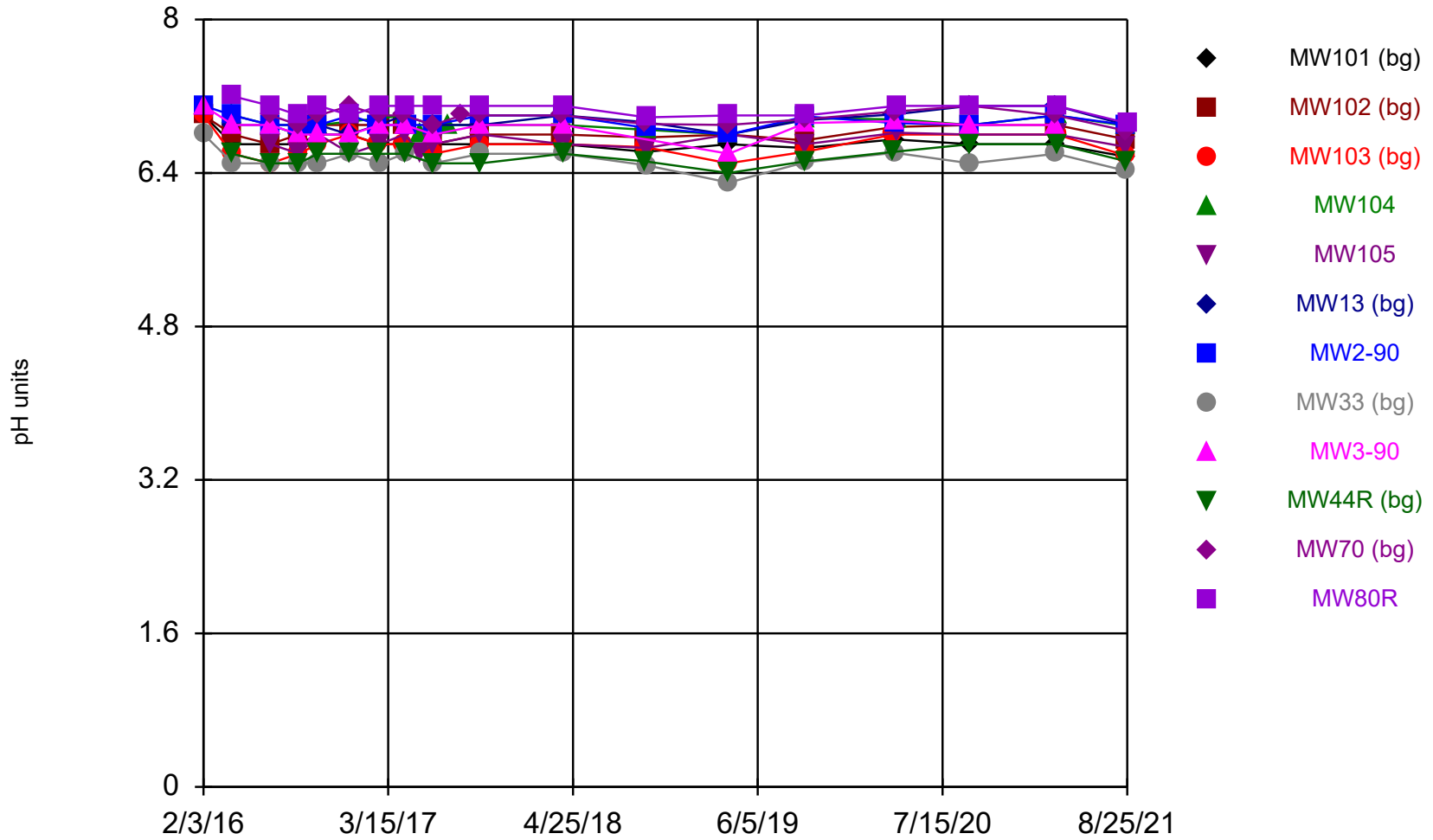
Fluoride



Time Series Analysis Run 12/15/2021 12:45 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

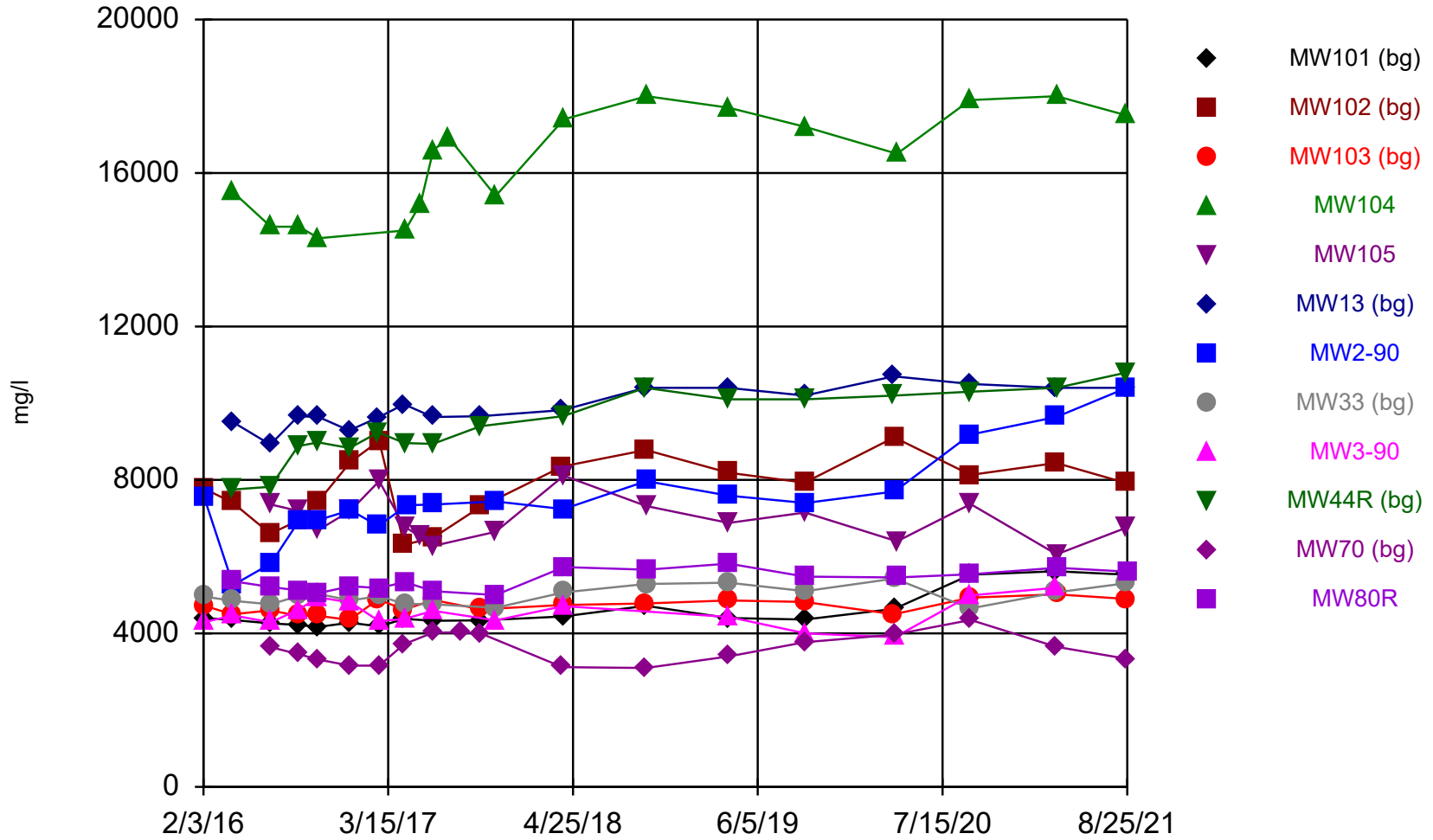
pH, Field



Time Series Analysis Run 12/15/2021 12:45 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

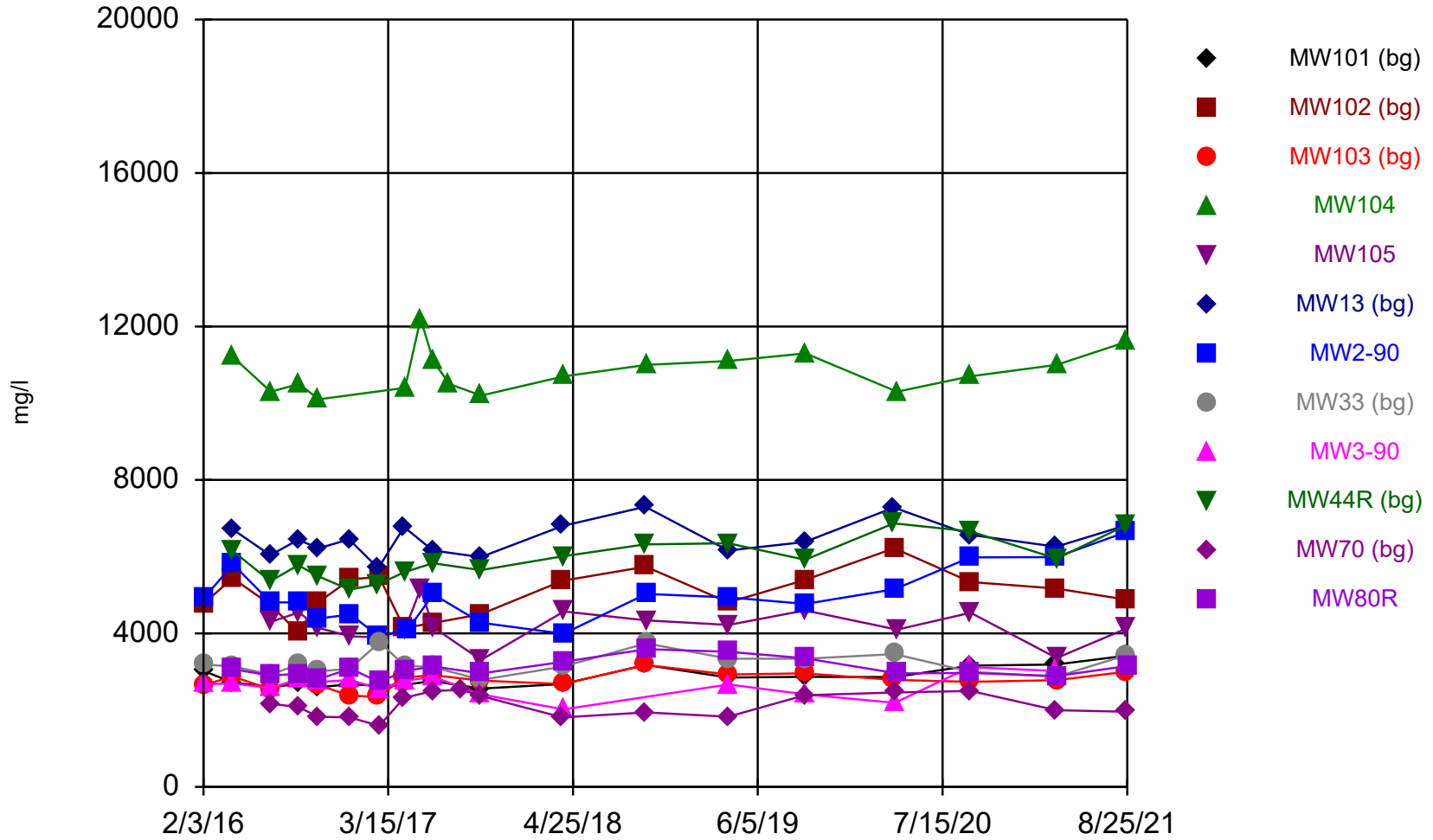
Solids, total dissolved



Time Series Analysis Run 12/15/2021 12:45 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Sulfate, as SO4



Time Series Analysis Run 12/15/2021 12:46 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

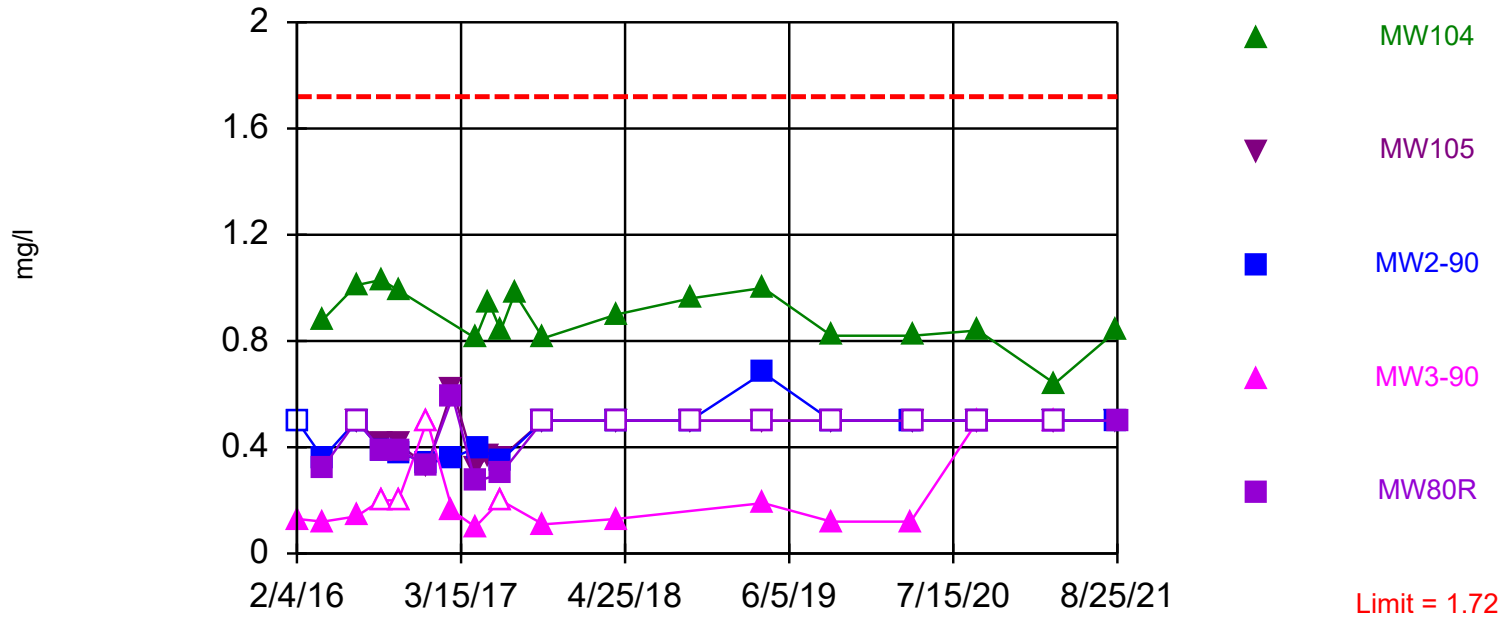
Appendix B

August 2021 Prediction Limit Plots

Within Limit

Boron, total

Interwell Non-parametric



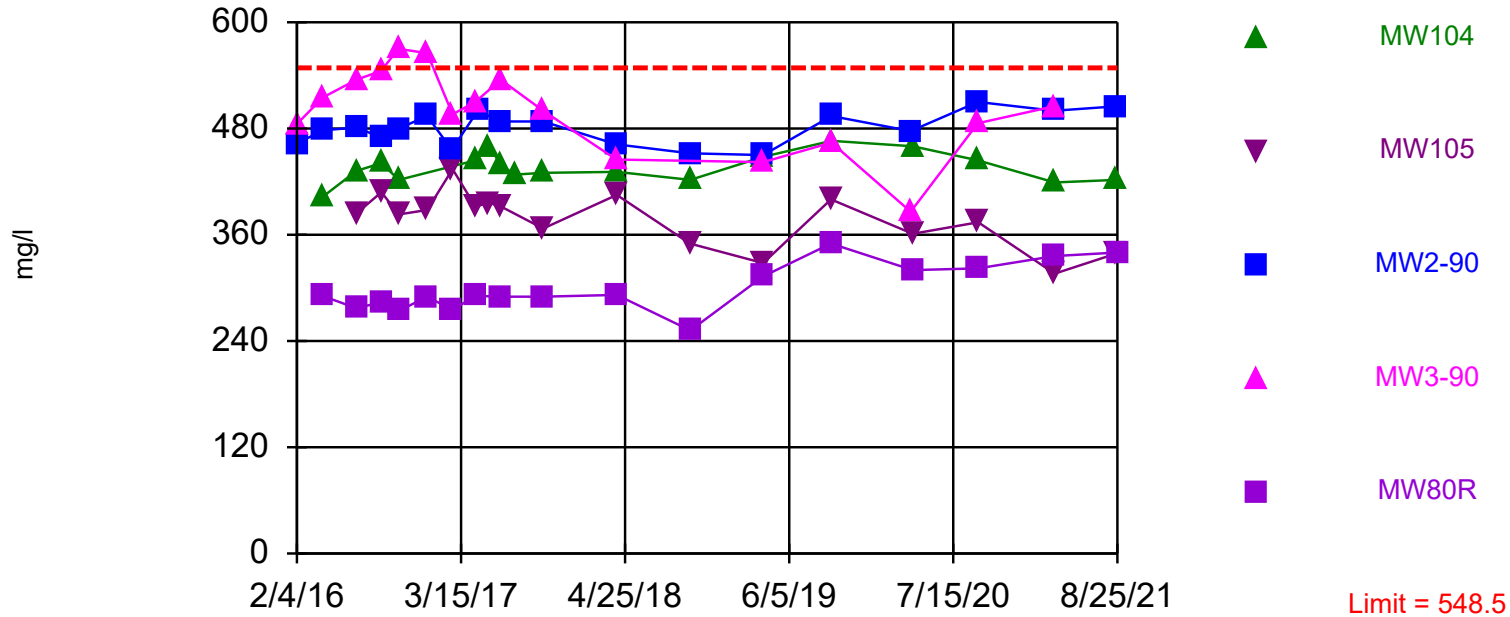
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 88 background values. 17.05% NDs. Annual per-constituent alpha = 0.002497. Individual comparison alpha = 0.00025 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

Prediction Limit Analysis Run 12/15/2021 10:55 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Within Limit

Calcium, Total Interwell Parametric



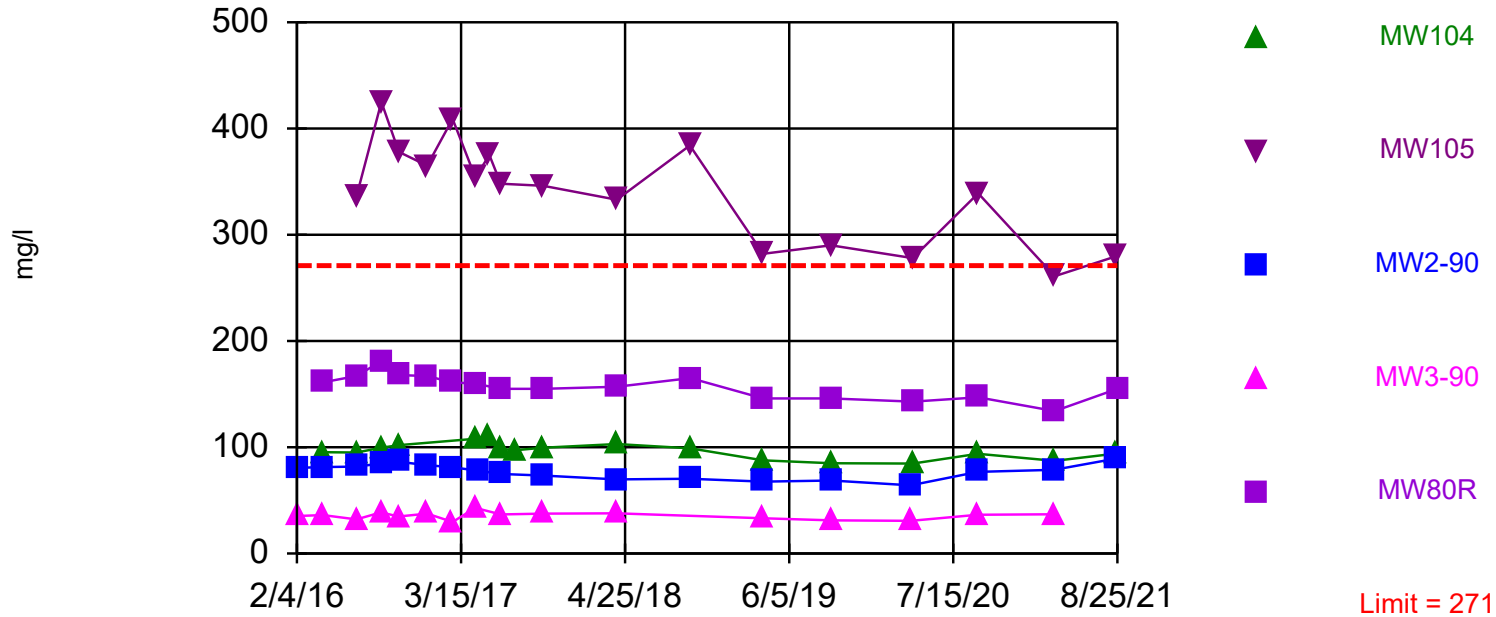
Background Data Summary: Mean=432.4, Std. Dev.=64.15, n=88. Seasonality was not detected with 95% confidence. Normality test: Shapiro Francia @alpha = 0.05, calculated = 0.9786, critical = 0.972. Kappa = 1.81 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.001504. Comparing 5 points to limit.

Prediction Limit Analysis Run 12/15/2021 10:55 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Exceeds Limit: MW105

Chloride Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 88 background values. Annual per-constituent alpha = 0.002497. Individual comparison alpha = 0.00025 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

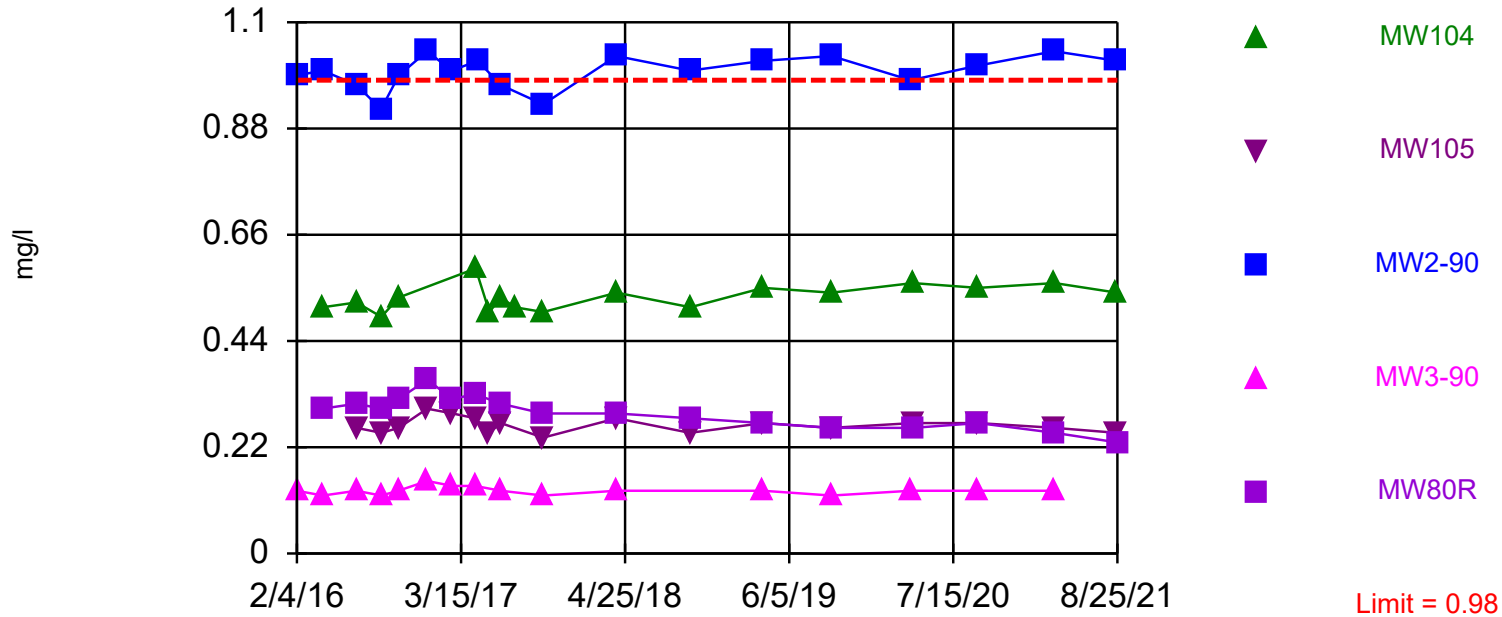
Prediction Limit Analysis Run 12/15/2021 10:55 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Exceeds Limit: MW2-90

Fluoride

Interwell Non-parametric



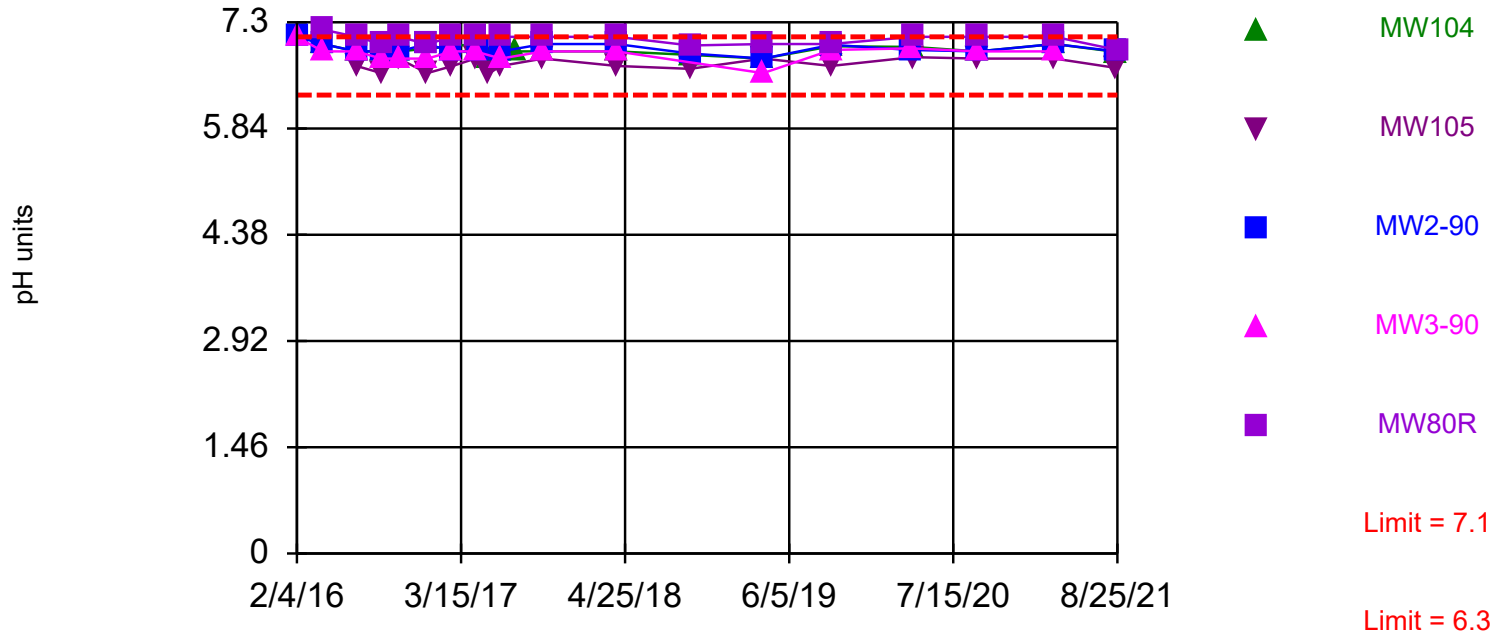
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 88 background values. 11.36% NDs. Annual per-constituent alpha = 0.002497. Individual comparison alpha = 0.00025 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

Prediction Limit Analysis Run 12/15/2021 10:56 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Within Limits

pH, Field Interwell Non-parametric



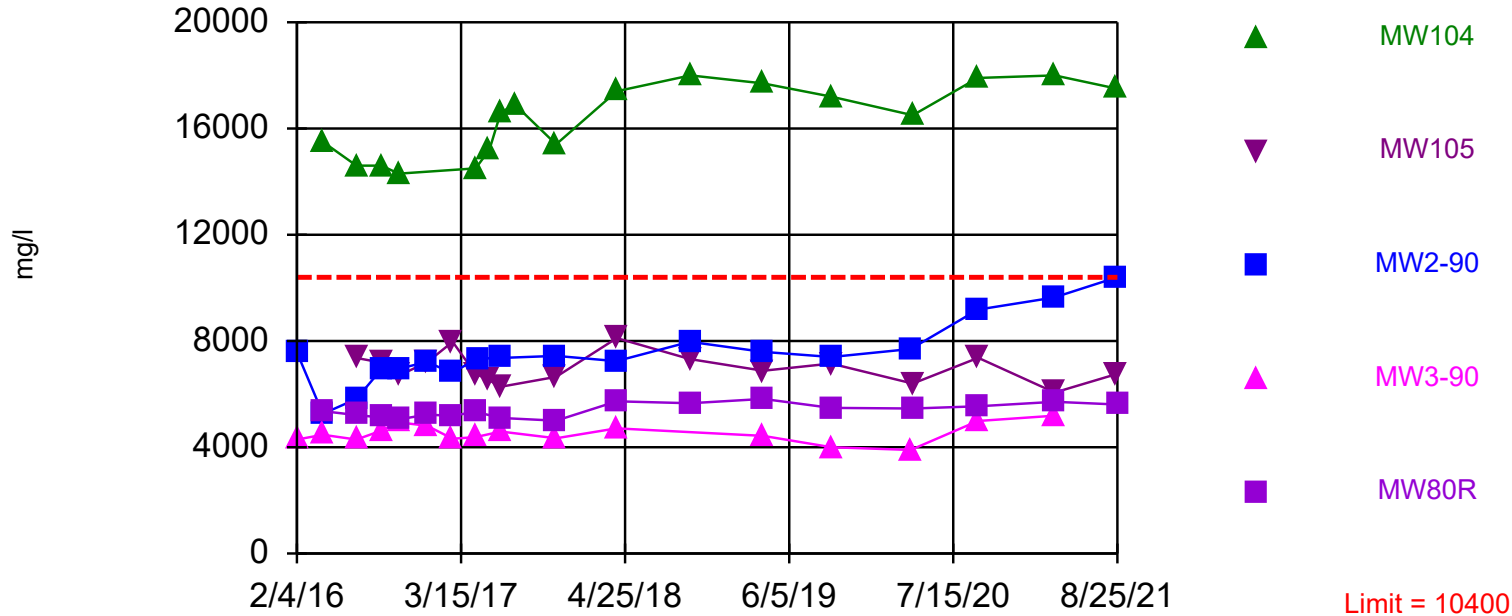
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 88 background values. Annual per-constituent alpha = 0.004994. Individual comparison alpha = 0.0004999 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

Prediction Limit Analysis Run 12/15/2021 10:56 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Exceeds Limit: MW104

Solids, total dissolved Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 84 background values. Annual per-constituent alpha = 0.002742. Individual comparison alpha = 0.0002746 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

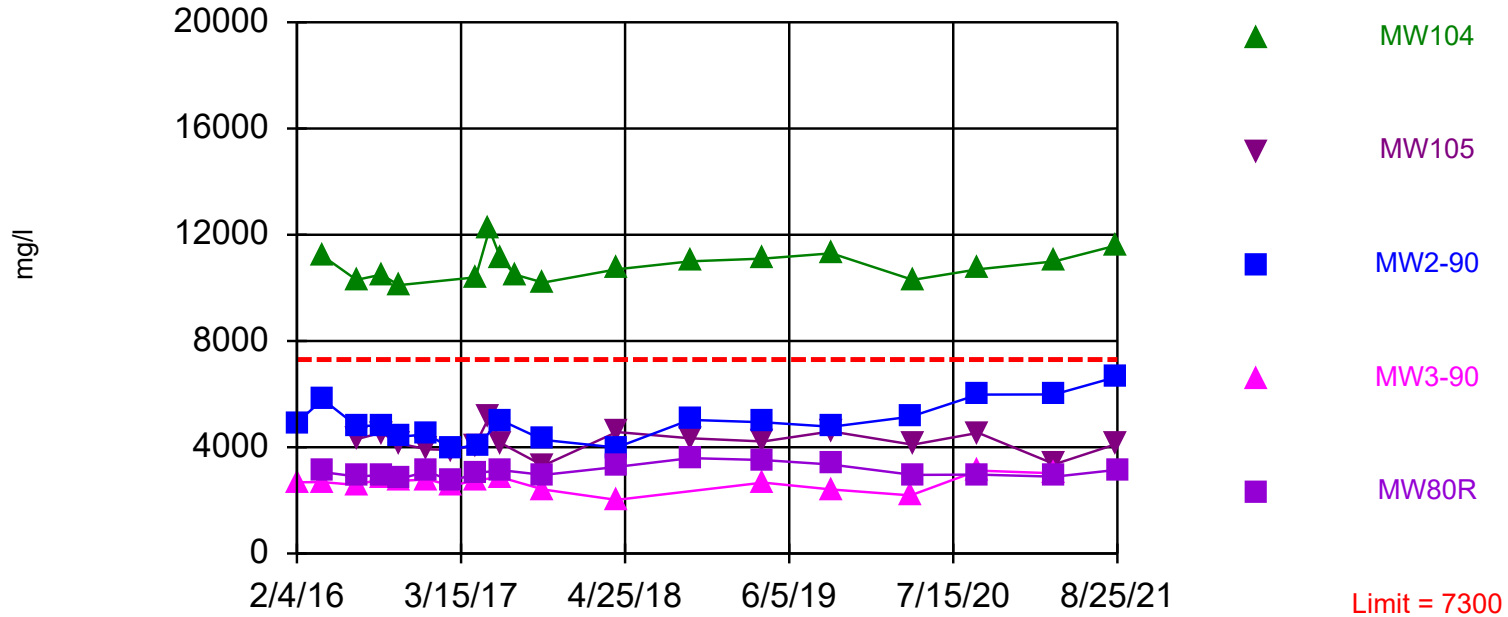
Prediction Limit Analysis Run 12/15/2021 10:56 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Exceeds Limit: MW104

Sulfate, as SO4

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 88 background values. Annual per-constituent alpha = 0.002497. Individual comparison alpha = 0.00025 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

Prediction Limit Analysis Run 12/15/2021 10:56 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII

Prediction Limit

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII Printed 12/15/2021, 11:02 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron, total (mg/l)	MW104	1.72	n/a	8/24/2021	0.84	No	88	17.05	n/a	0.00025	NP Inter (normality) ...
Boron, total (mg/l)	MW105	1.72	n/a	8/24/2021	0.5	No	88	17.05	n/a	0.00025	NP Inter (normality) ...
Boron, total (mg/l)	MW2-90	1.72	n/a	8/24/2021	0.5	No	88	17.05	n/a	0.00025	NP Inter (normality) ...
Boron, total (mg/l)	MW3-90	1.72	n/a	3/22/2021	0.5ND	No	88	17.05	n/a	0.00025	NP Inter (normality) ...
Boron, total (mg/l)	MW80R	1.72	n/a	8/25/2021	0.5	No	88	17.05	n/a	0.00025	NP Inter (normality) ...
Calcium, Total (mg/l)	MW104	548.5	n/a	8/24/2021	422	No	88	0	No	0.001504	Param Inter 1 of 2
Calcium, Total (mg/l)	MW105	548.5	n/a	8/24/2021	339	No	88	0	No	0.001504	Param Inter 1 of 2
Calcium, Total (mg/l)	MW2-90	548.5	n/a	8/24/2021	505	No	88	0	No	0.001504	Param Inter 1 of 2
Calcium, Total (mg/l)	MW3-90	548.5	n/a	3/22/2021	505	No	88	0	No	0.001504	Param Inter 1 of 2
Calcium, Total (mg/l)	MW80R	548.5	n/a	8/25/2021	340	No	88	0	No	0.001504	Param Inter 1 of 2
Chloride (mg/l)	MW104	271	n/a	8/24/2021	94.1	No	88	0	n/a	0.00025	NP Inter (normality) ...
Chloride (mg/l)	MW105	271	n/a	8/24/2021	280	Yes	88	0	n/a	0.00025	NP Inter (normality) ...
Chloride (mg/l)	MW2-90	271	n/a	8/24/2021	89.5	No	88	0	n/a	0.00025	NP Inter (normality) ...
Chloride (mg/l)	MW3-90	271	n/a	3/22/2021	36.9	No	88	0	n/a	0.00025	NP Inter (normality) ...
Chloride (mg/l)	MW80R	271	n/a	8/25/2021	155	No	88	0	n/a	0.00025	NP Inter (normality) ...
Fluoride (mg/l)	MW104	0.98	n/a	8/24/2021	0.54	No	88	11.36	n/a	0.00025	NP Inter (normality) ...
Fluoride (mg/l)	MW105	0.98	n/a	8/24/2021	0.25	No	88	11.36	n/a	0.00025	NP Inter (normality) ...
Fluoride (mg/l)	MW2-90	0.98	n/a	8/24/2021	1.02	Yes	88	11.36	n/a	0.00025	NP Inter (normality) ...
Fluoride (mg/l)	MW3-90	0.98	n/a	3/22/2021	0.13	No	88	11.36	n/a	0.00025	NP Inter (normality) ...
Fluoride (mg/l)	MW80R	0.98	n/a	8/25/2021	0.23	No	88	11.36	n/a	0.00025	NP Inter (normality) ...
pH, Field (pH units)	MW104	7.1	6.3	8/24/2021	6.89	No	88	0	n/a	0.000...	NP Inter (normality) ...
pH, Field (pH units)	MW105	7.1	6.3	8/24/2021	6.67	No	88	0	n/a	0.000...	NP Inter (normality) ...
pH, Field (pH units)	MW2-90	7.1	6.3	8/24/2021	6.9	No	88	0	n/a	0.000...	NP Inter (normality) ...
pH, Field (pH units)	MW3-90	7.1	6.3	3/22/2021	6.9	No	88	0	n/a	0.000...	NP Inter (normality) ...
pH, Field (pH units)	MW80R	7.1	6.3	8/25/2021	6.92	No	88	0	n/a	0.000...	NP Inter (normality) ...
Solids, total dissolved (mg/l)	MW104	10400	n/a	8/24/2021	17500	Yes	84	0	n/a	0.000...	NP Inter (normality) ...
Solids, total dissolved (mg/l)	MW105	10400	n/a	8/24/2021	6760	No	84	0	n/a	0.000...	NP Inter (normality) ...
Solids, total dissolved (mg/l)	MW2-90	10400	n/a	8/24/2021	10400	No	84	0	n/a	0.000...	NP Inter (normality) ...
Solids, total dissolved (mg/l)	MW3-90	10400	n/a	3/22/2021	5190	No	84	0	n/a	0.000...	NP Inter (normality) ...
Solids, total dissolved (mg/l)	MW80R	10400	n/a	8/25/2021	5610	No	84	0	n/a	0.000...	NP Inter (normality) ...
Sulfate, as SO4 (mg/l)	MW104	7300	n/a	8/24/2021	11600	Yes	88	0	n/a	0.00025	NP Inter (normality) ...
Sulfate, as SO4 (mg/l)	MW105	7300	n/a	8/24/2021	4130	No	88	0	n/a	0.00025	NP Inter (normality) ...
Sulfate, as SO4 (mg/l)	MW2-90	7300	n/a	8/24/2021	6650	No	88	0	n/a	0.00025	NP Inter (normality) ...
Sulfate, as SO4 (mg/l)	MW3-90	7300	n/a	3/22/2021	3020	No	88	0	n/a	0.00025	NP Inter (normality) ...
Sulfate, as SO4 (mg/l)	MW80R	7300	n/a	8/25/2021	3150	No	88	0	n/a	0.00025	NP Inter (normality) ...

Appendix C

Ash SPLP Laboratory Report (2011)



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
 51 West Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
 www.mvttl.com



Page: 1 of 2

Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2450
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit I Bottom Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	12.2	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	8778	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	3	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	1120	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Phenolphthalein Alk	1090	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Carbonate	60	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Hydroxide	1060	mg/l CaCO3	0	SM2320-B	22 Jul 11 17:00	Claudette
Tot Dis Solids (Summation)	4860	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	524	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	30.7	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	74.3	meq/L	NA	SM1030-F	3 Aug 11 8:40	Calculated
Anion Summation	74.6	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	-0.24	%	NA	SM1030-F	3 Aug 11 8:40	Calculated
Sodium Adsorption Ratio	27.1		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	0.7	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	< 0.1	mg/l	0.10	SM4500-F-C	4 Aug 11 17:00	CLB
Sulfate	2440	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	50.5	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	0.21	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	0.32	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	< 5	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	210	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 2.5	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	1440	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	44.8	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	< 0.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Iron - Total	< 0.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Strontium - Total	28.2	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Titanium - Total	< 0.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Boron - Total	< 0.5	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
 ! = Due to sample quantity

= Due to sample concentration
 + = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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www.mvttl.com



Page: 2 of 2

Duane Leingang
Montana Dakota Utilities
PO Box 40
Mandan ND 58554

Report Date: 8 Sep 11
Lab Number: 11-M2450
Work Order #: 81-818
Account #: 013479
Date Sampled:
Date Received: 28 Jun 11 9:00
PO #: 131460 OP

Sample Description: Unit I Bottom Ash
Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Antimony - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Arsenic - Total	0.0044	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Barium - Total	0.1135	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Beryllium - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Cadmium - Total	0.00164	mg/l	0.00100	6020	25 Jul 11 16:18	Claudette
Chromium - Total	0.0065	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Cobalt - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Copper - Total	0.0213	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Lead - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Manganese - Total	0.0027	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Molybdenum - Total	0.6860	mg/l	0.0020	6020	26 Jul 11 12:46	Claudette
Nickel - Total	0.0074	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Selenium - Total	0.0133	mg/l	0.0020	6020	26 Jul 11 9:46	Claudette
Silver - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Thallium - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Tin - Total	< 0.05	mg/l	0.0500	6020	25 Jul 11 16:18	Claudette
Vanadium - Total	0.0189	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Zinc - Total	0.0151	mg/l	0.0100	6020	25 Jul 11 16:18	Claudette
Uranium	< 0.002	mg/l	0.002	6020	25 Jul 11 16:18	Claudette

All analyses were performed on the extract from Method 1312 (SPLP) with a modified solution to solids ratio of 4:1.

Approved by: *D. Zarda*

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity

= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 1 of 2

Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2451
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit II Sand Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	11.1	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	20110	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	21	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	203	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Phenolphthalein Alk	171	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Carbonate	64	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Hydroxide	139	mg/l CaCO3	0	SM2320-B	22 Jul 11 17:00	Claudette
Tot Dis Solids(Summation)	22500	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	1200	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	70.2	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	318	meq/L	NA	SM1030-F	3 Aug 11 8:40	Calculated
Anion Summation	314	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	0.65	%	NA	SM1030-F	3 Aug 11 8:40	Calculated
Sodium Adsorption Ratio	80.9		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	See Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	< 0.5	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	< 0.1	mg/l	0.10	SM4500-F-C	4 Aug 11 17:00	CLB
Sulfate	14900	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	2.0	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	0.10	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	< 5	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	481	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 5	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	6500	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	459	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	1.09	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Iron - Total	< 1	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Strontium - Total	66.0	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Titanium - Total	< 1	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Boron - Total	5.96	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
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= Due to sample concentration
 + = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 2 of 2

Duane Leingang
Montana Dakota Utilities
PO Box 40
Mandan ND 58554

Report Date: 8 Sep 11
Lab Number: 11-M2451
Work Order #: 81-818
Account #: 013479
Date Sampled:
Date Received: 28 Jun 11 9:00
PO #: 131460 OP

Sample Description: Unit II Sand Ash
Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Antimony - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Arsenic - Total	0.0822	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Barium - Total	0.0930	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Beryllium - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Cadmium - Total	0.00182	mg/l	0.00100	6020	25 Jul 11 16:18	Claudette
Chromium - Total	0.0244	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Cobalt - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Copper - Total	0.1108	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Lead - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Manganese - Total	0.0052	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Molybdenum - Total	0.1000	mg/l	0.0020	6020	26 Jul 11 12:46	Claudette
Nickel - Total	0.0136	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Selenium - Total	0.0937	mg/l	0.0020	6020	26 Jul 11 9:46	Claudette
Silver - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Thallium - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Tin - Total	< 0.05	mg/l	0.0500	6020	25 Jul 11 16:18	Claudette
Vanadium - Total	0.3026	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Zinc - Total	0.0327	mg/l	0.0100	6020	25 Jul 11 16:18	Claudette
Uranium	< 0.002	mg/l	0.002	6020	25 Jul 11 16:18	Claudette

All analyses were performed on the extract from Method 1312 (SPLP) with a modified solution to solids ratio of 4:1.

Approved by:

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity

= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 1 of 2

Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2452
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit I Fly Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	12.9	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	50660	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	30	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	7020	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Phenolphthalein Alk	6900	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Carbonate	240	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Hydroxide	6780	mg/l CaCO3	0	SM2320-B	25 Jul 11 17:00	Claudette
Tot Dis Solids(Summation)	42200	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	1750	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	102	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	663	meq/L	NA	SM1030-F	3 Aug 11 8:40	Calculated
Anion Summation	613	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	3.99	%	NA	SM1030-F	3 Aug 11 8:40	Calculated
Sodium Adsorption Ratio	143		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	1.5	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	5.60	mg/l	0.10	SM4500-F-C	10 Aug 11 17:00	CLB
Sulfate	22600	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	53.8	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	0.68	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	7.22	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	22.4	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	700	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 25	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	14100	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	580	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	< 5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Iron - Total	< 5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Strontium - Total	59.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Titanium - Total	< 5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Boron - Total	1.89	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
 ! = Due to sample quantity

= Due to sample concentration
 + = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267

ND # ND-00016



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Page: 2 of 2

Duane Leingang
Montana Dakota Utilities
PO Box 40
Mandan ND 58554

Report Date: 8 Sep 11
Lab Number: 11-M2452
Work Order #: 81-818
Account #: 013479
Date Sampled:
Date Received: 28 Jun 11 9:00
PO #: 131460 OP

Sample Description: Unit I Fly Ash
Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Antimony - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Arsenic - Total	0.1128	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Barium - Total	0.0906	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Beryllium - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Cadmium - Total	0.00244	mg/l	0.00100	6020	25 Jul 11 16:18	Claudette
Chromium - Total	0.0270	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Cobalt - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Copper - Total	0.2934	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Lead - Total	0.0161	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Manganese - Total	0.0102	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Molybdenum - Total	0.9246	mg/l	0.0020	6020	26 Jul 11 12:46	Claudette
Nickel - Total	0.0175	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Selenium - Total	0.1959	mg/l	0.0020	6020	26 Jul 11 9:46	Claudette
Silver - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Thallium - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Tin - Total	< 0.05	mg/l	0.0500	6020	25 Jul 11 16:18	Claudette
Vanadium - Total	0.0158	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Zinc - Total	0.3984	mg/l	0.0100	6020	25 Jul 11 16:18	Claudette
Uranium	< 0.002	mg/l	0.002	6020	25 Jul 11 16:18	Claudette

All analyses were performed on the extract from Method 1312 (SPLP) with a modified solution to solids ratio of 4:1.

Approved by: 

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity

= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2453
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit II Fly Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	12.8	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	27240	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	13	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	4570	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Phenolphthalein Alk	4520	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Carbonate	100	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Hydroxide	4470	mg/l CaCO3	0	SM2320-B	22 Jul 11 17:00	Claudette
Tot Dis Solids(Summation)	16000	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	1960	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	115	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	252	meq/L	NA	SM1030-F	9 Aug 11 9:09	Calculated
Anion Summation	247	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	1.00	%	NA	SM1030-F	9 Aug 11 9:09	Calculated
Sodium Adsorption Ratio	46.1		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	1.6	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	3.60	mg/l	0.10	SM4500-F-C	4 Aug 11 17:00	CLB
Sulfate	7400	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	66.0	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	0.38	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	15.0	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	9.4	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	785	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 5	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	4720	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	275	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	< 1	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Iron - Total	< 1	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Strontium - Total	85.0	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Titanium - Total	< 1	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Boron - Total	< 1	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

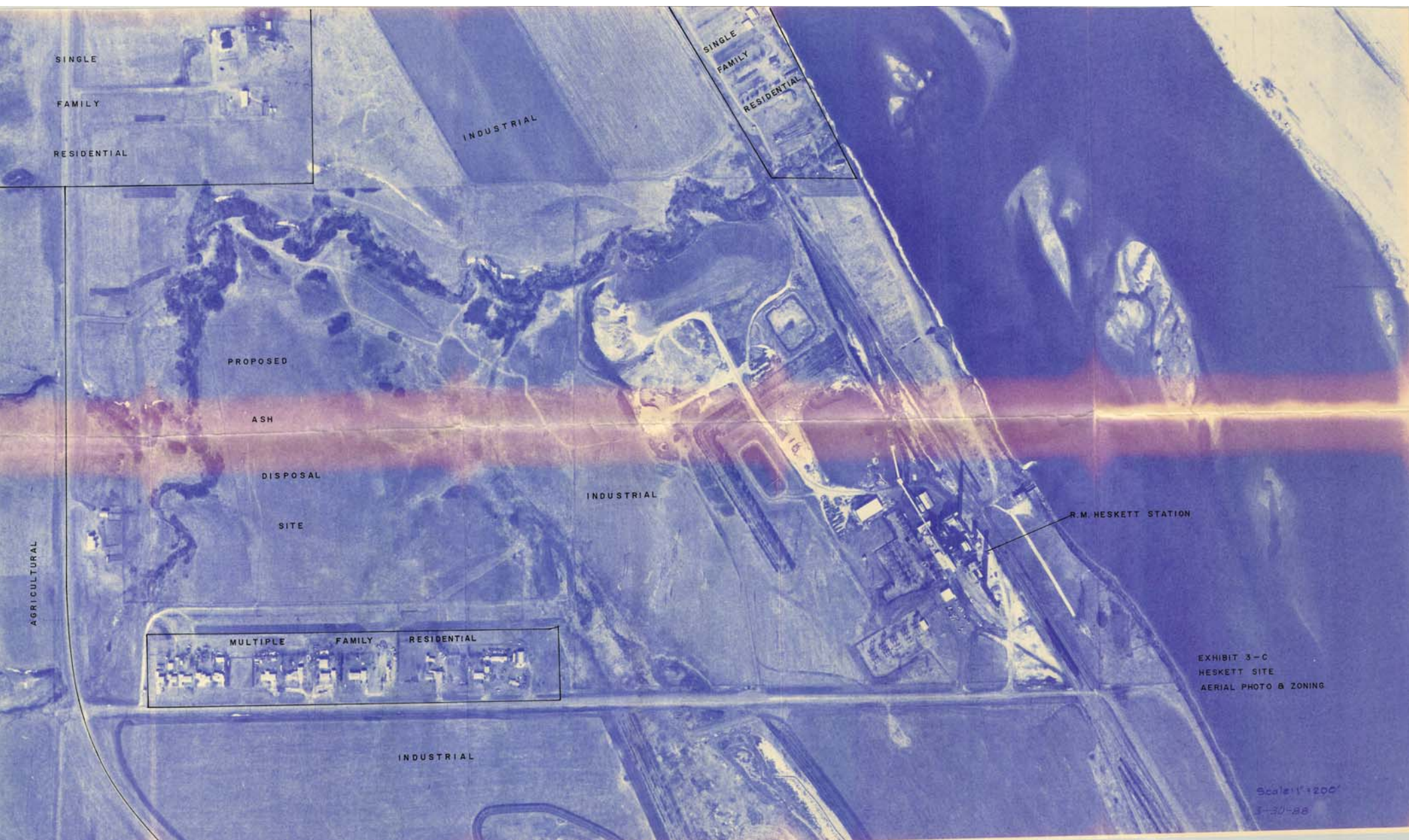
Elevated "Less Than Result" (<): @ = Due to sample matrix
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= Due to sample concentration
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CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

Appendix D

Aerial Photo (March 30, 1988)



SINGLE
FAMILY
RESIDENTIAL

SINGLE
FAMILY
RESIDENTIAL

INDUSTRIAL

PROPOSED

ASH

DISPOSAL

SITE

INDUSTRIAL

AGRICULTURAL

MULTIPLE FAMILY RESIDENTIAL

R.M. HESKETT STATION

INDUSTRIAL

EXHIBIT 3-C
HESKETT SITE
AERIAL PHOTO & ZONING

Scale: 1" = 200'
3-30-88

Appendix E

Boring Logs

EXHIBIT 5-E

LITHOLOGIC LOGS

Wells 10, 11, 12 and 13

- 0-1 Top soil, silty, clayey, sandy, brown, calcareous; with some limestone pebbles.
- 1-11 Silt, clayey, brownish-tan, slightly indurated, very dry, calcareous; with thin coarse-grained, clean silt lenses and a few small (less than .5 in.) iron oxide concretions. Abundant small gypsum crystals (less than .13 in. long). Some small, black flakes of organic plant material. Cannonball-Ludlow Formations.
- 11-14 Silt, as above, with some (less than 20%) very fine- to fine-grained sand interspersed.
- 14-30 Silt, as above, clayey, less sand than above interval, oxidized; with very fine-grained silty sand lenses and very few gypsum crystals.
- 30-41 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with fewer small gypsum crystals than above intervals.
- 41-59 Silt, as above, very clayey, with some (less than 20%) fine- to medium-grained sand interspersed in a silt and clay matrix.
- 59-65 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed.
- 65-81 Silt, clayey, steel-gray to bluish, moderately indurated; with thin coarse-grained silt to very fine-grained sand lenses in an otherwise fine silt to clay matrix.
- 81-84 Clay, silty, steel-gray to bluish, moderately indurated, dense.
- 84-91 Siltstone, sandy, clayey, steel-gray to bluish, slightly indurated; with small fine-grained sand lenses and abundant (more than 20%) sand interspersed in the matrix.
- 91-110 Silt, clayey, bluish-gray, moderately indurated; with thin (less than 1 foot) mudstone lenses.
- 110-120 Silt, very clayey, steel-gray to bluish, moderately indurated, very dense. Cannonball-Ludlow Formations.

Wells 20 and 21

- 0-1 Top soil, silty, sandy, clayey, dark-brown, calcareous; with some limestone and granite pebbles.
- 1-21 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, oxidized; with small iron oxide concretions and abundant small gypsum crystals.
Cannonball-Ludlow Formations.
- 21-26 Silt, as above, steel-gray (color change).
- 26-49 Silt, clayey, with some (less than 20%) very fine- to medium-grained sand interspersed, steel-gray to bluish, slightly indurated; with very few small gypsum crystals and some thin (less than 1 foot) siltstone lenses.
- 49-53 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed.
- 53-63 Silt, as above, clayey, less sand, with thin (less than 1 foot) siltstone to mudstone lenses.
- 63-80 Silt, very clayey, steel-gray to bluish, moderately indurated, very dense.
Cannonball-Ludlow Formations.

Wells 30, 31, 32 and 33

- 0-1 Top soil, silty, sandy, brownish, calcareous; with some granite and limestone pebbles.
- 1-2 Pebble-loam (glacial till), silty, sandy, clayey, yellowish-brown, dry, calcareous.
- 2-31 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, oxidized; with small iron oxide concretions. Some small, black flakes organic plant material.
Cannonball-Ludlow Formations.
- 31-44 Silt, clayey, steel-gray (color change), slightly indurated, calcareous; with small iron oxide concretions, thin coarse silt lenses, small gypsum crystals and gray to reddish-brown mottling.

- 44-61 Silt, as above, with some (less than 20%) fine- to medium-grained sand interspersed.
- 61-65 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed, dense.
- 65-76 Silt, as above, clayey, less sand, some thin (less than 1 foot) lenses of siltstone to mudstone.
- 76-80 Siltstone, sandy, clayey, steel-gray to bluish, slightly indurated; with small fine-grained sand lenses and abundant (more than 20%) fine-grained sand interspersed in the matrix.
- 80-92 Silt, clayey, steel-gray to bluish, moderately indurated, with some (less than 20%) very fine- to fine grained sand interspersed.
- 92-120 Silt, very clayey, steel-gray to bluish, moderately indurated, very dense.
Cannonball-Ludlow Formations.
- Well 40
- 0-1 Top soil, sandy, silty, brownish-tan, calcareous; with some granite and limestone pebbles.
- 1-5 Pebble-loam (glacial till), sandy, silty, with detrital lignite and organic matter, yellowish-brown, very dry, calcareous.
- 5-22 Sand, very fine- to medium-grained, unconsolidated, with thin lenses of clay and detrital lignite, brownish-yellow, calcareous.
- 22-40 Silt, clayey, with minor amounts (less than 10%) very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, oxidized; with small iron oxide concretions and small gypsum crystals; Cannonball-Ludlow Formations.
- 40-51 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with some reddish-brown mottling and some very thin (less than 6 inches) mudstone lenses.
- 51-58 Silt, as above, with abundant (more than 20%) fine-grained sand and thin silty-clay lenses.

- 58-62 Siltstone, sandy, clayey, steel-gray to bluish, moderately indurated; with small fine-grained sand lenses and abundant (more than 20%) sand interspersed in the matrix.
- 62-70 Silt, clayey, with some (less than 20%) fine- to medium-grained sand interspersed, steel-gray to bluish, moderately indurated; with thin (less than 2 feet) sandy lenses.
- 70-80 Silt, as above, very clayey, some (less than 10%) fine-grained sand interspersed; less sand than above interval.
- 80-120 Silt, as above, dark-steel-gray.
Cannonball-Ludlow Formations.

Wells 41, 42 and 43

- 0-1 Top soil, sandy, silty, dark-brown, calcareous; with some granite and limestone pebbles.
- 1-4 Pebble-loam (glacial till), sandy, silty, clayey, yellowish-brown, very dry, calcareous.
- 4-40 Silt, clayey, with some (less than 20%) very fine-grained sand interspersed, brownish-tan, unconsolidated, noncompacted, calcareous to 25 feet, oxidized; with small iron oxide concretions and abundant small gypsum crystals.
Cannonball-Ludlow Formations.
- 40-51 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with some reddish-brown mottling and some very thin (less than 6 inches) mudstone lenses.
- 51-58 Silt, as above, with abundant (more than 20%) fine-grained sand and thin silty-clay lenses.
- 58-62 Siltstone, sandy, clayey, steel-gray to bluish, moderately indurated; with small fine-grained sand lenses and abundant (more than 20%) sand interspersed in the matrix.
- 62-70 Silt, clayey, with some (less than 20%) fine- to medium-grained sand interspersed, steel-gray to bluish, moderately indurated; with thin (less than 2 feet) sandy lenses.

70-80 Silt, as above, very clayey, some (less than 10%) fine-grained sand interspersed; less sand than above interval.

Wells 43 and 44

- 0-2 Top soil, clayey, silty, some sand, brownish-tan to light-gray, calcareous.
- 2-20 Silt, clayey, with some (less than 20%) fine-grained sand interspersed, brownish-tan, slightly indurated, very dry, calcareous; with small iron oxide concretions, abundant small gypsum crystals and occasional thin silt lenses. Cannonball-Ludlow Formations.
- 20-25 Silt, as above, very clayey, oxidized, with minor amounts (less than 10%) of fine-grained sand.
- 25-35 Silt, as above, dark-brownish-tan to bluish-gray (color change), with thin very fine-grained sand lenses.
- 35-60 Silt, clayey, with some (less than 20%) fine- to medium-grained sand interspersed, steel-gray to bluish, moderately indurated; with some indurated silty sand lenses. Cannonball-Ludlow Formations.

Wells 50, 51 and 52

- 0-4 Top soil, clayey, silty, very dark-brown.
- 4-10 Clay, silty, with some (less than 20%) fine-grained sand, dark-brownish-tan, soft, cohesive, wet, sticky; with some pebbles.
- 10-22 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, dense; with abundant small gypsum crystals and very thin silt and sand lenses; Cannonball-Ludlow Formations.
- 22-23 Sandstone, fine-grained, silty, indurated, oxidized, dark-brown.
- 23-30 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with thin medium grained sand lenses.

30-40 Silt, as above, very clayey, less sand than above interval, dark-steel-gray.
Cannonball-Ludlow Formations.

Wells 53 and 54

- 0-4 Top soil, clayey, silty, very dark-brown, wet, sticky.
- 4-15 Clay, silty, with some (less than 20%) fine- to medium-grained sand interspersed, brownish-tan, slightly indurated, dry, calcareous; with small iron oxide concretions, small gypsum crystals and occasional reddish-brown mottling;
Cannonball-Ludlow Formations.
- 15-20 Sand, very fine-grained to medium-grained, silty, clayey, unconsolidated, yellowish-brown, oxidized.
- 20-30 Silt, clayey, with some (less than 20%) fine-grained sand interspersed, steel-gray (color change), slightly indurated; with clay and sand lenses, some small concretions and some small gypsum crystals.
- 30-45 Silt, as above, very clayey.
- 45-60 Silt, as above, clayey, brownish-gray, moderately indurated, some reddish-brown mottling.
Cannonball-Ludlow Formations.

Wells 55 and 56

- 0-5 Sandy-loam (glacial), with fine- to medium-grained sand, silty, calcareous; with small granite and limestone pebbles.
- 5-26 Clay, silty, with minor amounts (less than 10%) of very fine-grained sand, dark-brownish-tan, moderately indurated, brittle, very dry, calcareous; with small iron oxide concretions, small gypsum crystals and occasional thin sandstone laminae. Some small, black flakes of organic plant material.
Cannonball-Ludlow Formations.
- 26-35 Clay, as above, very silty, sandy, brownish-tan, oxidized.

- 35-40 Silt, clayey, with some (less than 20%) very fine- to fine-grained sand interspersed, steel-gray (color change) moderately indurated; with small gypsum crystals and occasional clay lenses.
- 40-60 Silt, as above, with minor amounts (less than 10%) of fine-grained sand interspersed.
- 60-85 Silt, as above, clayey, less sand than above interval.
- 85-100 Silt, as above, very clayey, with minor amounts (less than 10%) of sand interspersed, light-gray. Cannonball-Ludlow Formations.

Wells 60, 61 and 62

- 0-2 Top soil, silty, clayey, dark-brown to tanish-brown, calcareous.
- 2-25 Silt, very clayey, with some minor amounts (less than 10%) of very fine- to fine-grained sand interspersed, brownish-tan, slightly indurated, dry, calcareous; with abundant small gypsum crystals and thin silt and sand lenses; Cannonball-Ludlow Formations.
- 25-29 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed.
- 29-36 Silt, as above, clayey, less sand than above interval, dark-brownish-tan, oxidized.
- 36-60 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with thin (less than 1 foot) sandy-silt lenses. Cannonball-Ludlow Formations.

Well 70 0-2 Pebble-loam (glacial till), clayey, sandy, yellowish-brown, unconsolidated, damp, calcareous.

- 2-21 Silty, clayey, with some (less than 20%) fine-grained sand interspersed, brownish-tan, moderately indurated, very dry, calcareous, oxidized; with small iron oxide concretions and abundant small gypsum crystals. Cannonball-Ludlow Formations.

- 21-24 Shale, silty, steel- to dark-gray (color change), indurated, fissile, very dry; with occasional thin silt and sand lenses.
- 24-31 Silt, clayey, with abundant (more than 30%) sand, steel-gray, moderately indurated.
- 31-62 Silt, clayey, with some (less than 20%) very fine- to fine- grained sand interspersed, steel-gray, moderately indurated; with some small gypsum crystals and small iron oxide concretions.
- 62-76 Silt, as above, with some (less than 20%) fine-grained sand interspersed.
- 76-82 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand.
- 82-100 Silt, as above, clayey, with some (less than 20%) fine-grained sand interspersed, dark-gray.
Cannonball-Ludlow Formations.
-

The lithologic logs for wells 1-4 were described by personal from Water Supply Incorporated (WS), Bismarck, North Dakota. The wells were installed during a previous ground water investigation at Heskett Station.

Well WS 2

0-1 Top soil, silty, black.
1-4 Pebble-loam (glacial till), silty, clayey, some cobbles, yellowish-brown.
4-7 Gravel, sand and rocks.
7-21 Sand, fine- to coarse-grained, some pebbles.
21-39 Clay, silty, sandy, yellowish-brown to gray.
39-52 Clay, silty, sandy, gray.
52-67 Sand, fine-grained, bluish, with some clay layers.
67-89 Clay, silty, sandy, brown to gray.

Wells WS 1, 1A and 1B

0-1 Top soil, silty, black
1-4 Clay, (glacial), silty, with pebbles, yellowish-brown.
4-21 Sand, fine- to medium-grained, yellowish-brown; with clay and silt lenses.
21-25 Clay, silty, yellowish-brown.
25-30 Sand, fine-grained, yellowish-brown, some indurated layers.
30-35 Clay, silty, yellowish-brown.
35-45 Sand, fine-grained, yellowish-brown.
45-50 Clay, silty, sandy, gray, about 50 percent shale.
50-56 Sand, fine-grained, with clay layers.
56-73 Clay, silty, sandy, gray.

Wells WS 4, 4A and 4B

0-13 Pebble-loam (glacial till), silty, sandy, with some cobbles, yellowish-brown.
13-23 Sand, fine- to medium-grained, yellowish-brown.
23-25 Clay, silty, sandy, yellowish-brown.
25-27 Sandstone, indurated.
27-30 Clay, sandy, silty, gray.
30-36 Sand, fine-grained, gray.
36-52 Clay, silty, sandy, gray; with some sand layers.

Wells WS 3 and 3A

0-1 Top soil, silty, black.
1-12 Pebble-loam, clayey, silty, with some cobbles, yellowish-brown.
12-16 Clay, silty, gray; with some shale layers.
16-18 Limestone, indurated.
18-23 Clay, silty, yellowish-brown; with some sand layers.
23-44 Sand, fine- to medium-grained, gray; with some clay layers.
44-50 Clay, silty, medium-gray.

Project: Heskett Station
 Project No.: 34301012
 Location: Mandan, ND
 Coordinates: Lat: 46.86620° Long: -100.89313°
 Datum:

Surface Elevation:
 Drilling Method: HSA
 Sampling Method: Split Spoon
 Completion Depth: 46.0 ft

Unique Well No.: MW-44 R

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	OL/OH	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						0-1': TOPSOIL (OL/OH); Very Dark Brown (2.5/2 7.5YR); low to medium plasticity; roots, fine to medium grained sand.		
1		1	3-3-5-8.	OL/OH		1-46': SANDY CLAY (CL): Brown (5/4 7.5YR) to Dark Gray (4/1 7.5YR); medium to high plasticity; massive; fine to medium grained sand. Moist; 20% gravel, 30% sand, 50% fines. At 1-5': Gravel sized inclusions. Moist; 10% gravel, 20% sand, 70% fines.	PRO. CASING Diameter: 4" by 4" Type: Steel Interval: 3' up & 3' down	
2		2	9-9-7-7.					
5		3	7-5-5-7.			Moist; 0% gravel, 30% sand, 70% fines.	RISER CASING Diameter: 2" Type: Schd 40 PVC Interval: Stick up to screen (23')	
		4	7-9-11-13.			Moist; 0% gravel, 20% sand, 80% fines.		
		5	7-9-12-13.			At 8': Oxidized staining.	GROUT Type: Cement Interval: 0-0.5' BGS	
10		6	6-7-11-13.				SEAL Type: Bentonite Interval: Chips 0.5-21' BGS	
		7	7-10-12-14.	CL			SANDPACK Type: Granusil Interval: 21-46' BGS	
15		8	6-10-14-14.				SCREEN Diameter: 2" Type: No. 10 Slot Interval: 23-43' BGS	
20		9	10-10-13-16.			At 20': Interbedded layer of sand.		
25		10	10-10-12-16.	CL		(CL): At 24': Color change to dark brown (3/3 7.5YR). Moist; 0% gravel, 20% sand, 80% fines. At 25': Sand lens.		

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Date Boring Started: 10/20/14
 Date Boring Completed: 10/20/14
 Logged By: JEG3
 Drilling Contractor: Midwest Testing (Terracon)
 Drill Rig:

Remarks: Water encountered at 28.7' BGS in MW-44R while drilling on 10/2014

Additional data may have been collected in the field which is not included on this log.
 Weather:



Barr Engineering Company
 234 West Century Avenue
 Bismarck, ND 58503
 Telephone: 701-255-5460

LOG OF BORING MW-44 R

SHEET 2 OF 2

Project: Heskett Station
 Project No.: 34301012
 Location: Mandan, ND
 Coordinates: Lat: 46.86620° Long: -100.89313°
 Datum:

Surface Elevation:
 Drilling Method: HSA
 Sampling Method: Split Spoon
 Completion Depth: 46.0 ft
 Unique Well No.: MW-44 R

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SOUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet	
30		11	8-12-14-18	CL		(CL): At 24': Color change to dark brown (3/3 7.5YR). (continued) Wet; 0% gravel, 20% sand, 80% fines. At 30.5': Sand lens. (CL): At 32': Color change to dark gray (4/1 7.5YR).	<p>PRO. CASING Diameter: 4" by 4" Type: Steel Interval: 3' up & 3' down</p> <p>RISER CASING Diameter: 2" Type: Schd 40 PVC Interval: Stick up to screen (23')</p> <p>GROUT Type: Cement Interval: 0-0.5' BGS</p> <p>SEAL Type: Bentonite Interval: Chips 0.5-21' BGS</p> <p>SANDPACK Type: Granusil Interval: 21-46' BGS</p> <p>SCREEN Diameter: 2" Type: No. 10 Slot Interval: 23-43' BGS</p>		
35		12	8-13-16-27	CL					
40		13	11-19-25-27	CL					
45		14	14-18-27-34	SC		(SC): At 45.8': Clayey Sand (SC), fine to medium grained, low to medium plasticity, dark greenish gray (4/10G Gley 2).			
50									
55									

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Date Boring Started: 10/20/14
 Date Boring Completed: 10/20/14
 Logged By: JEG3
 Drilling Contractor: Midwest Testing (Terracon)
 Drill Rig:

Remarks: Water encountered at 28.7' BGS in MW-44R while drilling on 10/2014

Additional data may have been collected in the field which is not included on this log.
 Weather:



Barr Engineering Company
 234 West Century Avenue
 Bismarck, ND 58503
 Telephone: 701-255-5460

LOG OF BORING MW-80 R

SHEET 1 OF 1

Project: Heskett Station

Project No.: 34301012

Location: Mandan, ND

Coordinates: Lat: 46.86789° Long: -100.89320°

Datum:

Surface Elevation:

Drilling Method: HSA

Sampling Method: Split Spoon

Completion Depth: 27.0 ft

Unique Well No.: MW-80 R

Depth, feet	Sample Type & Recovery	Sample No.	Blows/ft.	SOFC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet	
0						0-0.5': TOPSOIL (OL/OH): Black; organic roots.			
1		1	4-4-4-5			0.5-27': SANDY CLAY (CL): Brown (4/4 7.5 YR) to Black (2.5/1 7.5YR); medium to high plasticity; fine to medium grained sand. Moist: 0% gravel, 30% sand, 70% fines. At 2': Gravel inclusions.	PRO. CASING Diameter: 4" by 4" Type: Steel Interval: 3' up & 3' down RISER CASING Diameter: 2" Type: Schd 40 PVC Interval: Stick up to screen (7') GROUT Type: Cement Interval: 0-0.5' BGS SEAL Type: Bentonite Interval: Chips 0.5-5' BGS SANDPACK Type: Granusil Interval: 5-27' BGS SCREEN Diameter: 2" Type: No 10 Slot Interval: 7-27' BGS		
2		2	4-5-7-9			Moist: 10% gravel, 30% sand, 60% fines.			
3		3	4-4-5-8	CL		Moist: 0% gravel, 20% sand, 80% fines.			
4		4	4-4-6-6			(CL): At 8': Color change to 2.5/1 7.5YR black, no odor.			
5		5	3-4-5-6	CL		(CL): At 9': Color change to 2.5/2 7.5YR very dark brown. Moist: 0% gravel, 20% sand, 80% fines.			
6		6	1-3-3-4	CL		(CL): At 11': Color change to 3/3 7.5YR dark brown, Moist: 0% gravel, 20% sand, 80% fines.			
7		7	1-1-2-1			(CL): At 13': Color change to 4/4 7.5YR brown. Wet: 0% gravel, 20% sand, 80% fines.			
8		8	1-2-2-1						
9		9	7-11-12-17	CL		At 21': Thin sand lens less than 0.1" thick. Wet: 0% gravel, 20% sand, 80% fines. At 21.5': Thin sand lens less than 0.1" thick.			
10		10	7-11-17-17			Wet: 0% gravel, 20% sand, 80% fines. At 26.5': Thin sand lens less than 0.1" thick.			

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Date Boring Started: 10/20/14
 Date Boring Completed: 10/20/14
 Logged By: JEG3
 Drilling Contractor: Midwest Testing (Terracon)
 Drill Rig:

Remarks: Water encountered at 11.8' BGS in MW-80R while drilling on 10/20/14

Additional data may have been collected in the field which is not included on this log.
 Weather:



Barr Engineering Company
 4300 MarketPointe Drive Suite 200
 Minneapolis, MN 55435
 Telephone: 952-832-2600

LOG OF BORING MW-101 DRAFT

SHEET 1 OF 3

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438844.919° Long: 1868647.777°
 Datum: NAD 83

Surface Elevation: 1716.6 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 58.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL: Brown (5/4 7.5YR).		
1		1	4-4-4-6.			SANDY LEAN CLAY WITH GRAVEL (CL): fine to medium grained; Brown (5/3 7.5YR); moist; thinly laminated; some mottling; low plasticity; [Cannonball Formation]. At 2': Start to see gravel inclusions.	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.98' ags - 34' bgs GROUT Type: Neat cement Interval: 0 - 29' bgs SEAL Type: Bentonite chips Interval: 29 - 32' bgs SANDPACK Type: Silica 40-70 Interval: 32 - 56' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 34 - 54' bgs	1715
2		2	4-6-6-7.			At 4': Oxidized staining. At 5': Oxidized staining.		1710
3		3	7-9-14-16.			At 7': Oxidized staining and white staining.		
4		4	8-9-12-15.					
5		5	10-15-21-26.					
6		6	7-18-24-27.	CL		At 11': Oxidized staining.		1705
7		7	8-12-19-23.					
8		8	8-14-18-23.			At 15': Gypsum. 16-20': No recovery.		1700
9		9	7-10-13-15.			At 20.5': Gypsum.		
10		10	7-9-13-15.	CL		LEAN CLAY (CL): Dark Brown (3/2 7.5YR); oxidized staining, some mottling; medium to high plasticity; [Cannonball Formation]. At 22': Color change to Brown (4/2 7.5YR). At 24': Interbedded sand, fine grained.		1695

25
 Date Boring Started: 8/18/15
 Date Boring Completed: 8/19/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Hole caved in from 56 - 58' bgs.
 DTW = 36.66' TOR on 9/23/2015 (elev. 1682.87)

Additional data may have been collected in the field which is not included on this log.
 Weather:

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Barr Engineering Company
 4300 MarketPointe Drive Suite 200
 Minneapolis, MN 55435
 Telephone: 952-832-2600

LOG OF BORING MW-101 DRAFT

SHEET 2 OF 3

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438844.919° Long: 1868647.777°
 Datum: NAD 83

Surface Elevation: 1716.6 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 58.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet	
25		11	7-11-13-15.	CL	LEAN CLAY (CL): Dark Brown (3/2 7.5YR); oxidized staining, some mottling; medium to high plasticity; [Cannonball Formation]. <i>(continued)</i> At 25' and 25.5': Gypsum.	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.98' ags - 34' bgs GROUT Type: Neat cement Interval: 0 - 29' bgs SEAL Type: Bentonite chips Interval: 29 - 32' bgs SANDPACK Type: Silica 40-70 Interval: 32 - 56' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 34 - 54' bgs	1690	
		12	8-11-15-19.		At 26.5': Gypsum.			
		13	8-11-13-15.		At 29.5': Gypsum.			
		14	6-11-14-17.					
		15	8-13-17-22.		At 33': Gypsum.			
		16	8-14-19-21.		At 34.5': Gypsum.			
		17	11-16-20-27.	CH	At 35.5-36': Color change to Black (2.5/1 7.5YR), turns back to brown. FAT CLAY (CH): Black (2.5/1 7.5YR); very stiff; high plasticity; wet at 43'; [Cannonball Formation].		1680	
		18	9-13-20-25.		At 38': Oxidized staining.			
		19	7-14-23-26.		At 41': Oxidized staining.			
		20	9-16-23-26.					

Date Boring Started: 8/18/15
 Date Boring Completed: 8/19/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Hole caved in from 56 - 58' bgs.
 DTW = 36.66' TOR on 9/23/2015 (elev. 1682.87)

Additional data may have been collected in the field which is not included on this log.
 Weather:

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Barr Engineering Company
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 Telephone: 952-832-2600

LOG OF BORING MW-101
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SHEET 3 OF 3

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438844.919° Long: 1868647.777°
 Datum: NAD 83

Surface Elevation: 1716.6 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 58.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
50						FAT CLAY (CH): Black (2.5/1 7.5YR); very stiff; high plasticity; wet at 43'; [Cannonball Formation]. (continued)	<p>PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs</p> <p>RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.98' ags - 34' bgs</p> <p>GROUT Type: Neat cement Interval: 0 - 29' bgs</p> <p>SEAL Type: Bentonite chips Interval: 29 - 32' bgs</p> <p>SANDPACK Type: Silica 40-70 Interval: 32 - 56' bgs</p> <p>SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 34 - 54' bgs</p>	1665
55					CH			1660
60						End of boring 58.0 feet		
65								
70								
75								

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Date Boring Started: 8/18/15
 Date Boring Completed: 8/19/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Hole caved in from 56 - 58' bgs.
 DTW = 36.66' TOR on 9/23/2015 (elev. 1682.87)

Additional data may have been collected in the field which is not included on this log.
 Weather:



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LOG OF BORING MW-102 DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438161.145° Long: 1868782.871°
 Datum: NAD 83

Surface Elevation: 1703.8 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 46.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL: Brown (5/4 7.5YR).		
1		1	3-3-3-2.			LEAN CLAY (CL): medium grained; Brown (4/3 7.5YR); moist; low to medium plasticity; with gravel to 4"; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.85' ags - 10' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 8' bgs SANDPACK Type: Silica 40-70 Interval: 8 - 31' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 20 - 30' bgs	1700
2		2	3-2-2-3.					
3		3	3-3-4-5.	CL				
4		4	3-4-5-7.					
5		5	4-8-7-4.	ML				
10		6	4-3-5-9.	CL		1695		
		7	3-5-7-9.			LEAN CLAY (CL): Dark Brown (3/2 7.5YR); medium to high plasticity; [Cannonball Formation].		1690
15		8	6-8-12-14.					1685
		9	6-10-12-16.					
		10	5-9-14-16.	CL				
20		11	5-12-15-18.					
		12	9-15-18-22.			At 21': Color changes to Black (2.5/1).		1680

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Date Boring Started: 8/18/15
 Date Boring Completed: 8/18/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Lithological descriptions for a hole that was abandoned. Monitoring well blind drilled and installed next to abandoned hole.
 DTW = 17.09' TOR on 8/21/2015 (elev. 1689.51)

Additional data may have been collected in the field which is not included on this log.
 Weather:



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LOG OF BORING MW-102
DRAFT

SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438161.145° Long: 1868782.871°
 Datum: NAD 83

Surface Elevation: 1703.8 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 46.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SPT	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet	
25		13	9-14-19-22.			LEAN CLAY (CL): Dark Brown (3/2 7.5YR); medium to high plasticity; [Cannonball Formation]. (continued)	<p>PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs</p> <p>RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.85' ags - 10' bgs</p> <p>GROUT Type: None Interval: None</p> <p>SEAL Type: Bentonite chips Interval: 0 - 8' bgs</p> <p>SANDPACK Type: Silica 40-70 Interval: 8 - 31' bgs</p> <p>SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 20 - 30' bgs</p>	1675	
		14	10-17-18-24.			At 29': Gypsum.			
30		15	6-15-18-26.			At 29': Gypsum.			
		16	7-14-18-22.			At 33.5' and 34': Gypsum.			
		17	11-16-20-27.			At 33.5' and 34': Gypsum.			
35		18	10-14-15-24.			At 33.5' and 34': Gypsum.			
		19	13-19-25-35.			At 33.5' and 34': Gypsum.			
		20	8-17-26-31.			At 33.5' and 34': Gypsum.			
40		21	10-20-27-38.			At 33.5' and 34': Gypsum.			
		22	13-20-27-37.			At 33.5' and 34': Gypsum.			
		23	15-27-27-32.			SILTY SAND (SM): fine to medium grained; Dark Gray (4/1 7.5YR); wet; [Cannonball Formation].			
45						End of boring 46.0 feet			

Date Boring Started: 8/18/15
 Date Boring Completed: 8/18/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Lithological descriptions for a hole that was abandoned. Monitoring well blind drilled and installed next to abandoned hole.
 DTW = 17.09' TOR on 8/21/2015 (elev. 1689.51)

Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-103
DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 437578.205° Long: 1869355.992°
 Datum: NAD 83

Surface Elevation: 1714.7 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 44.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S U	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL (OL/OH): Brown (5/4 7.5YR).		
1		1	3-4-5-5.		OL/OH	LEAN CLAY (CL): Very Dark Gray (3/1 7.5YR); moist; stiff; medium to high plasticity; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.79' ags - 24' bgs GROUT Type: Neat cement Interval: 0 - 19' bgs SEAL Type: Bentonite chips Interval: 19 - 22' bgs SANDPACK Type: Silica 40-70 Interval: 22 - 44' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 24 - 44' bgs	1710
2		2	5-5-8-8.		CL			
3		3	5-8-10-11.		CL	POORLY GRADED SAND WITH GRAVEL (SP): fine to coarse grained; Brown (5/4 7.5YR); some oxidized staining, some mottling; [Cannonball Formation].		
4		4	6-9-15-15.		SP			
5		5	5-6-5-4.		SP	POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; Brown (5/4 7.5YR); [Cannonball Formation].		
6		6	4-5-5-7.		SP-SM			
7		7	2-2-2-3.		SP-SM	NO RECOVERY (16 - 20').		
8		8	3-3-3-3.		SP-SM			
9		9	3-3-5-5.		CL	SANDY LEAN CLAY (CL): fine to medium grained; Light Brown (6/4 7.5YR); wet; some mottling and oxidized staining, cohesive; low to medium plasticity; [Cannonball Formation].		1695
10								1705
15								1700
20								1695
25								1690

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Date Boring Started: 8/19/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 33.24' TOR on 8/20/2015 (elev. 1684.29)

 Additional data may have been collected in the field which is not included on this log.
 Weather:



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LOG OF BORING MW-103 DRAFT

SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 437578.205° Long: 1869355.992°
 Datum: NAD 83

Surface Elevation: 1714.7 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 44.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
25		10	2-2-4-4.	CL		SANDY LEAN CLAY (CL): fine to medium grained; Light Brown (6/4 7.5YR); wet; some mottling and oxidized staining, cohesive; low to medium plasticity; [Cannonball Formation]. <i>(continued)</i>	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.79' ags - 24' bgs GROUT Type: Neat cement Interval: 0 - 19' bgs SEAL Type: Bentonite chips Interval: 19 - 22' bgs SANDPACK Type: Silica 40-70 Interval: 22 - 44' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 24 - 44' bgs	1685
30		11	10-10-7-9.	SM		SILTY SAND WITH GRAVEL (SM): wet; [Cannonball Formation].		
		12	8-15-17-22.			LEAN CLAY (CL): Brown (4/4 7.5YR); moist; oxidized staining; medium to high plasticity; [Cannonball Formation]. At 32.5': Sand lens, color changes to Black (2.5/1 7.5YR). At 33.5': Sand lens. At 34': Interbedded sand with oxidized staining.		
35		13	7-19-15-25.					1680
		14	11-16-21-50 for 5".	CL		At 36.5': Sand lens. At 37': Sand lens. At 37.5': Color change to Gray (5/1 7.5YR). At 38-38.5': 6" thick layer of hard material.		
40		15	50 for 2"-.					
		16	12-17-22-30.					
		17	9-18-24-50.			At 42-42.5': Silt layer. At 43.5-44': Silt layer.		1675
45						End of boring 44.0 feet		

Date Boring Started: 8/19/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 33.24' TOR on 8/20/2015 (elev. 1684.29)

Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-104 DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438853.542° Long: 1869832.72°
 Datum: NAD 83

Surface Elevation: 1681.5 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 32.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL: Brown (5/4 7.5YR).		
1		1	4-5-5-5.			LEAN CLAY WITH SAND (CL): fine to medium grained; Brown (5/4 7.5YR); moist; gravel; medium plasticity; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs	1680
2		2	3-5-6-8.	CL				
3		3	3-7-9-10.			LEAN CLAY (CL): Brown (4/4 7.5YR); oxidized staining and mottling; medium to high plasticity; with gypsum throughout; [Cannonball Formation].	RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.06' ags - 9' bgs	1675
4		4	5-7-9-10.					
5		5	5-9-9-10.					
6		6	5-7-9-10.	CL		At 12': Heavily oxidized.	GROUT Type: None Interval: None	1670
7		7	5-8-8-12.					
8		8	5-9-11-15.			At 15': Start seeing black staining.	SEAL Type: Bentonite chips Interval: 0 - 7' bgs	1665
9		9	6-9-11-13.			At 17': Heavily oxidized.		
10		10	4-7-16-19.			SILTY SAND (SM): Strong Brown (5/6 7.5YR); wet; [Cannonball Formation].	SANDPACK Type: Silica 40-70 Interval: 7 - 32' bgs	1660
11		11	5-16-22-26.	SM		At 19.5': Color change to Brown (5/4 7.5YR). At 21': Oxidized layer.		
12		12	7-11-14-16.	CH		FAT CLAY (CH): Dark Gray (4/1 7.5YR); moist; stiff; high plasticity; with interbedded sand layers below 27'; [Cannonball Formation].		

25
 Date Boring Started: 8/20/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 13.25' TOR on 8/21/2015 (elev. 1671.26)
 Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-104
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SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438853.542° Long: 1869832.72°
 Datum: NAD 83

Surface Elevation: 1681.5 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 32.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet	
25		13	6-12-16-17.			FAT CLAY (CH): Dark Gray (4/1 7.5YR); moist; stiff; high plasticity; with interbedded sand layers below 27'; [Cannonball Formation]. (continued)	 PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.06' ags - 9' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 7' bgs SANDPACK Type: Silica 40-70 Interval: 7 - 32' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 9 - 29' bgs	1655	
		14	8-12-16-21.	CH					
		15	8-12-16-20.						
30		16				Driller notes: sluff.		1650	
						End of boring 32.0 feet			

Date Boring Started: 8/20/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 13.25' TOR on 8/21/2015 (elev. 1671.26)

 Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-105 DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438042.079° Long: 1870325.657°
 Datum: NAD 83

Surface Elevation: 1686.0 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 30.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCSU	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL: Brown (5/4 7.5YR).		1686
1		1	6-7-6-5.			SANDY LEAN CLAY (CL): fine to medium grained; Brown (4/2 7.5YR); moist; gravel; medium plasticity; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.16' ags - 10' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 7' bgs SANDPACK Type: Silica 40-70 Interval: 7 - 30' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 10 - 30' bgs	1685
2		2	5-5-5-6.					1680
3		3	3-2-4-5.	CL				1675
4		4	2-2-2-3.					1670
5		5	2-1-2-2.			LEAN CLAY (CL): Brown (4/2 7.5YR); soft; high plasticity; wet at 16"; [Cannonball Formation].		
6		6	2-1-2-1.			At 10.5': Color change to Reddish-Yellow (6/6 7.5YR).		
7		7	2-1-1-3.					
8		8	4-3-5-5.	CL		At 14.5-15.5': Gravel inclusions. At 15.5': Color change to Brown (4/3 7.5YR).		
9		9	7-9-11-13.					
10		10	7-9-11-13.			At 18': Color change to Brown (5/3 7.5YR).		
11		11	7-9-13-15.					
12		12	19-26-28-30.	SP-SM		POORLY GRADED SAND WITH SILT (SP-SM): medium to coarse grained; Brown (5/4 7.5YR); [Cannonball Formation].		1665

25
 Date Boring Started: 8/17/15
 Date Boring Completed: 8/17/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 13.22' TOR on 8/21/2015 (elev. 1675.92)

 Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-105
DRAFT

SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438042.079° Long: 1870325.657°
 Datum: NAD 83

Surface Elevation: 1686.0 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 30.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
25		13	15-25-31-40.			FAT CLAY (CL): Dark Brown (3/4 7.5YR); high plasticity; sand lens at 26.5'; [Cannonball Formation]. At 26': Color change to Gray (5/1 7.5YR).		1660
		14	10-15-18-30.	CL				
		15	11-16-22-32.					
30						End of boring 30.0 feet	RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.16' ags - 10' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 7' bgs SANDPACK Type: Silica 40-70 Interval: 7 - 30' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 10 - 30' bgs	

Date Boring Started: 8/17/15
 Date Boring Completed: 8/17/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 13.22' TOR on 8/21/2015 (elev. 1675.92)

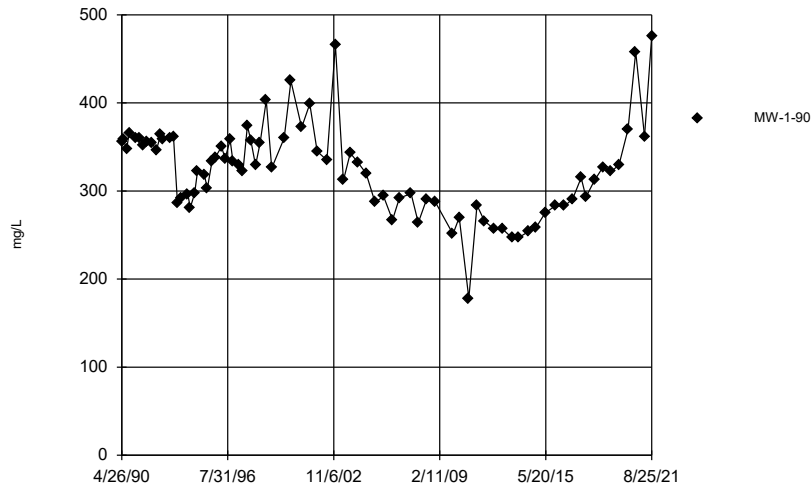
 Additional data may have been collected in the field which is not included on this log.
 Weather:

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Appendix F

MW1-90 Time Series Plots

Alkalinity, bicarbonate

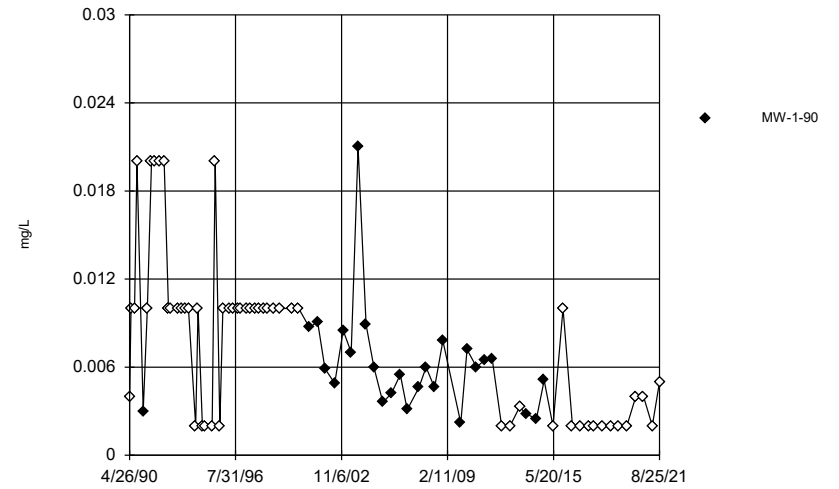


Time Series Analysis Run 3/8/2022 9:43 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Hollow symbols indicate censored values.

Arsenic

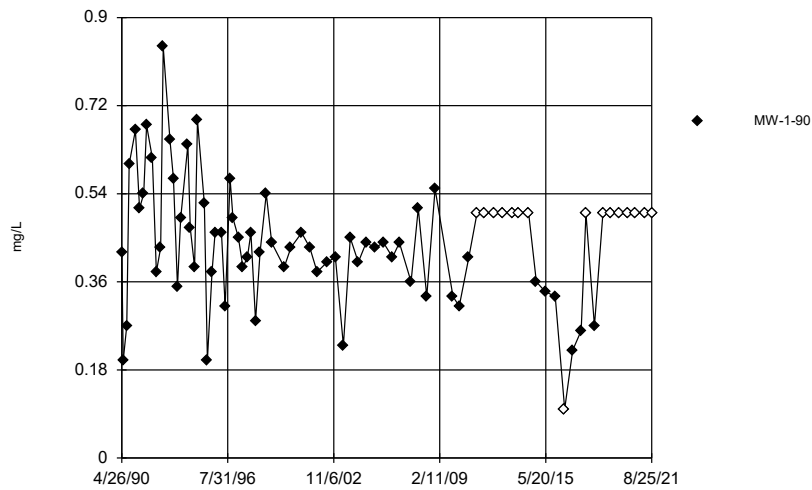


Time Series Analysis Run 3/8/2022 9:43 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Hollow symbols indicate censored values.

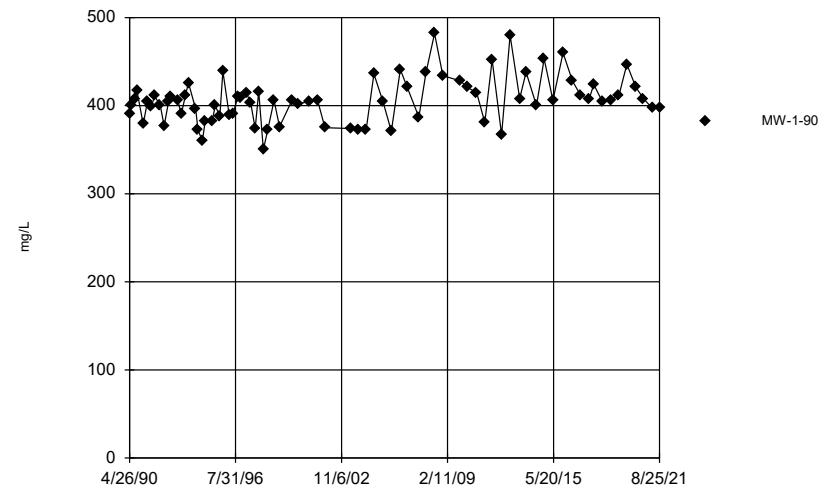
Boron



Time Series Analysis Run 3/8/2022 9:43 AM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

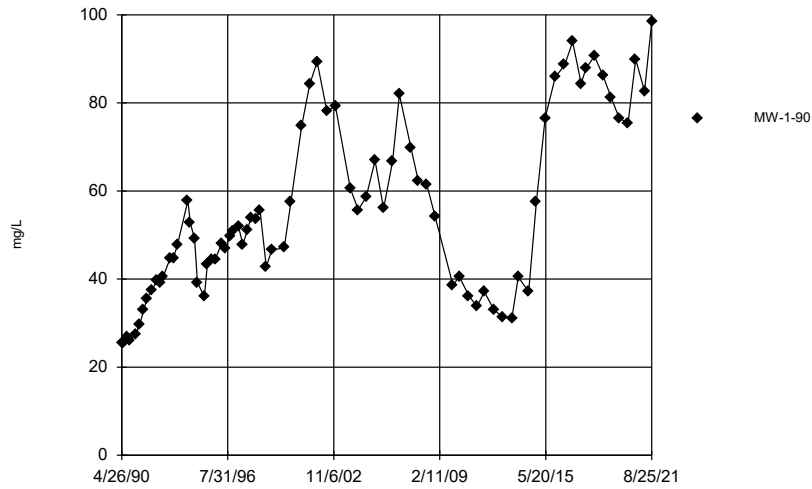
Calcium



Time Series Analysis Run 3/8/2022 9:43 AM

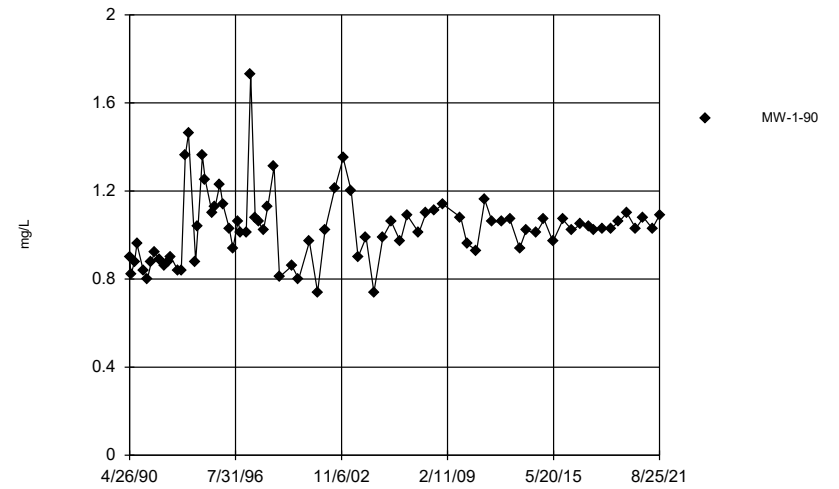
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Chloride



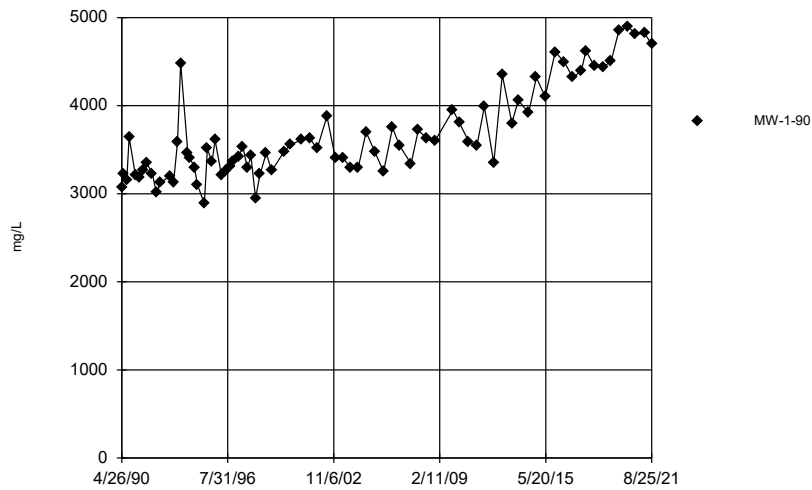
Time Series Analysis Run 3/8/2022 9:43 AM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Fluoride



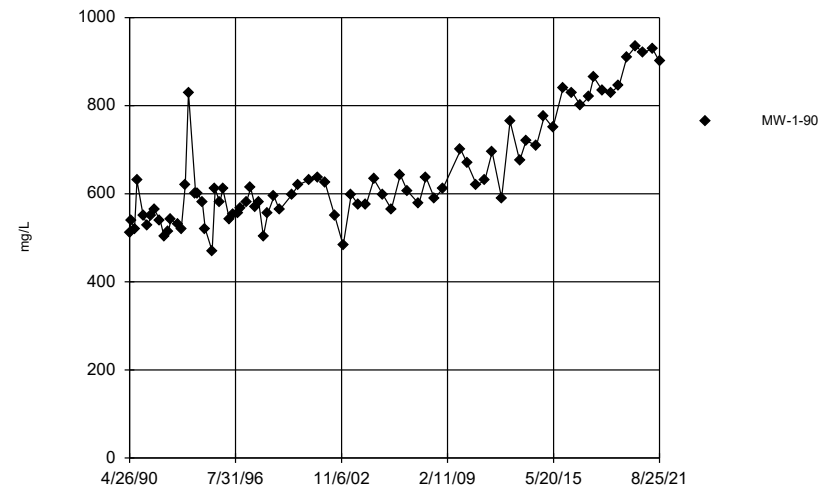
Time Series Analysis Run 3/8/2022 9:43 AM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Hardness



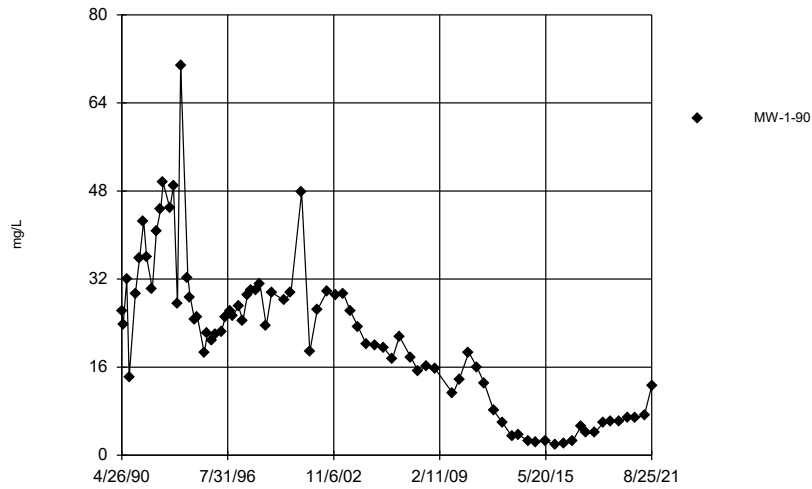
Time Series Analysis Run 3/8/2022 9:43 AM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Magnesium

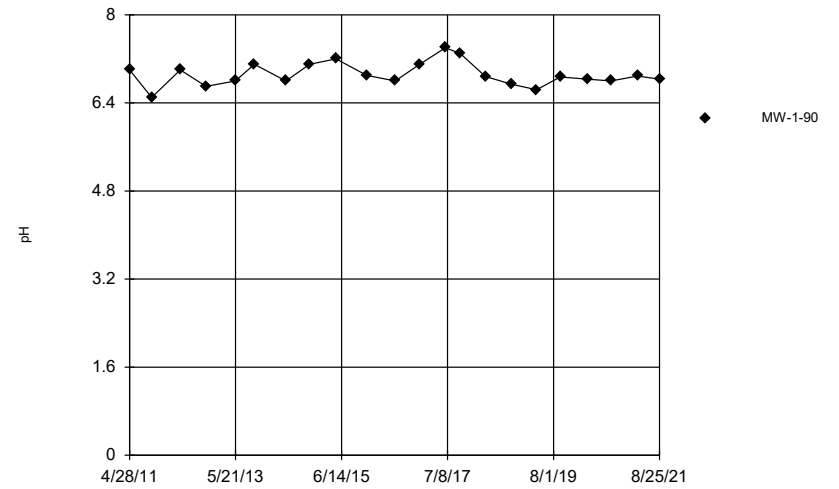


Time Series Analysis Run 3/8/2022 9:43 AM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

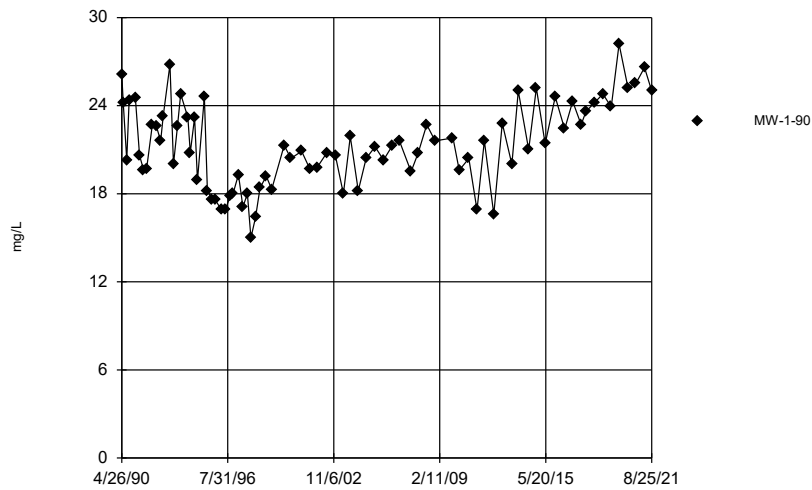
Nitrogen



pH

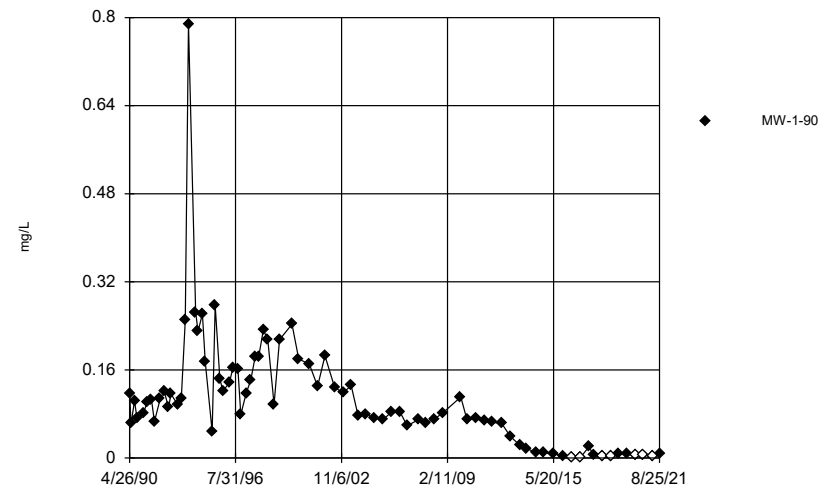


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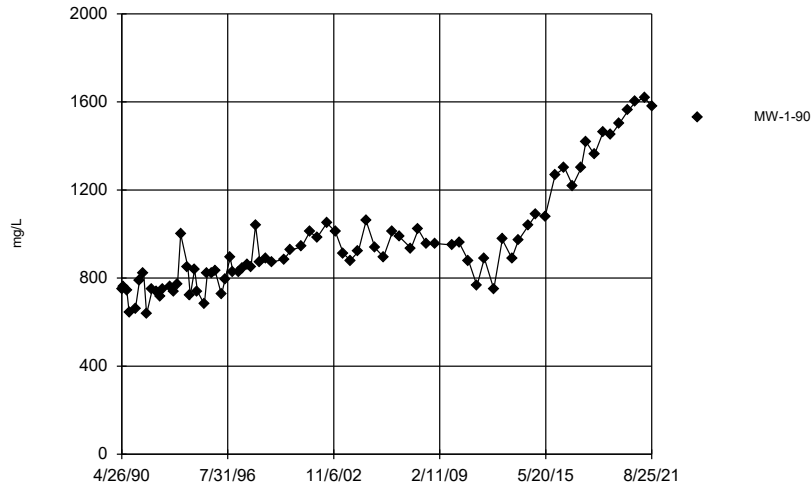


Hollow symbols indicate censored values.

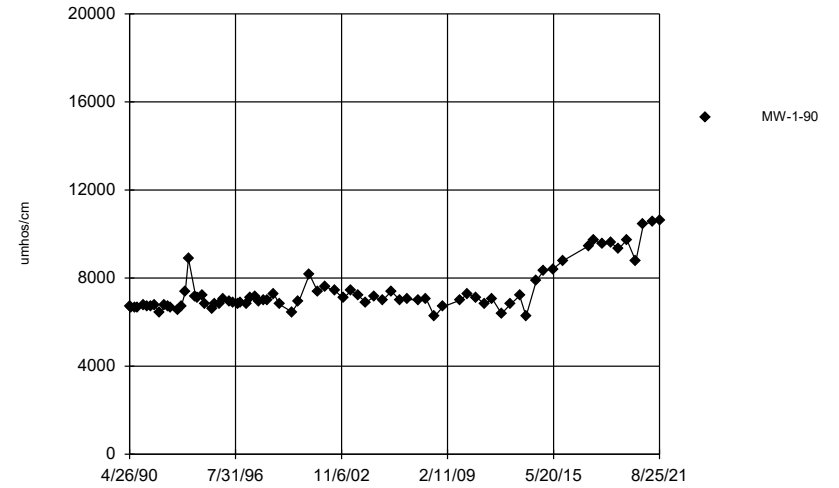
Selenium



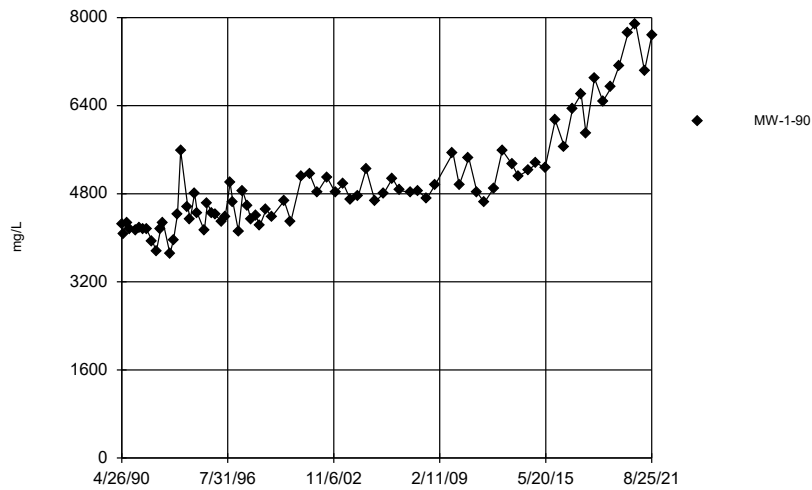
Sodium



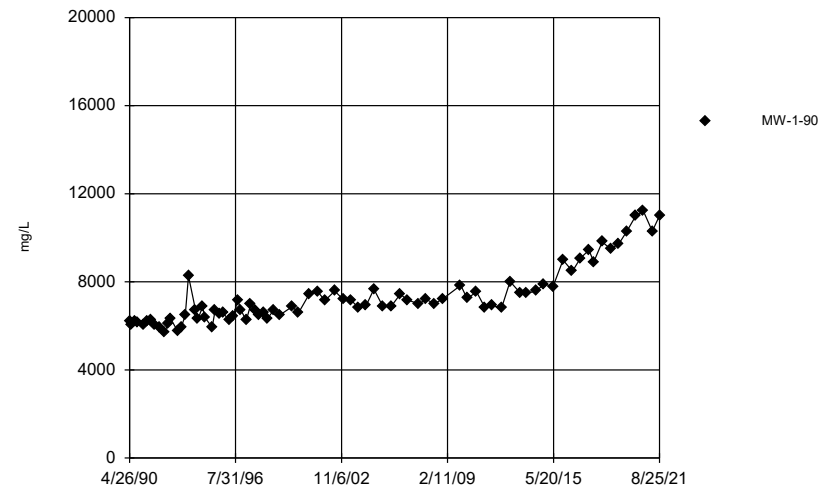
Specific conductance



Sulfate

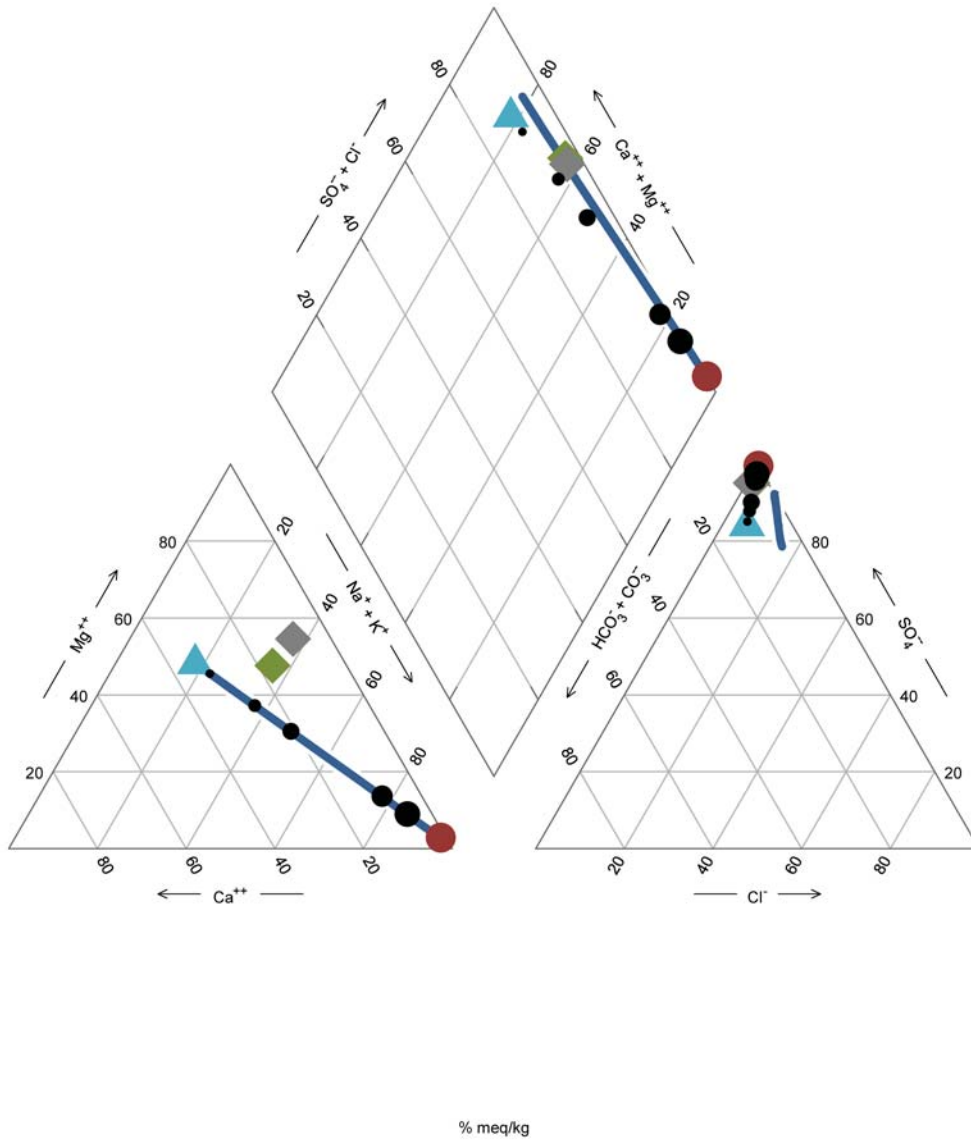


TDS



Appendix G

Geochemist's Workbench Results



- ▲ MW103
- Evaporation Pond
- 1 part MW-103 : 1 part Evap Pond
- 1 part MW-103 : 0.50 part Evap Pond
- 1 part MW-103 : 0.10 part Evap Pond
- 1 part MW-103 : 0.05 part Evap Pond
- 1 part MW-103 : 0.01 part Evap Pond
- ◆ MW1-90
- ◆ MW104

Figure G.1
 Piper Plot for Mixing
 Evaporation Pond into MW-103
 R.M. Heskett Station
 Alternative Source Demonstration
 August 2021 Event
 Montana Dakota Utilities
 Mandan, North Dakota

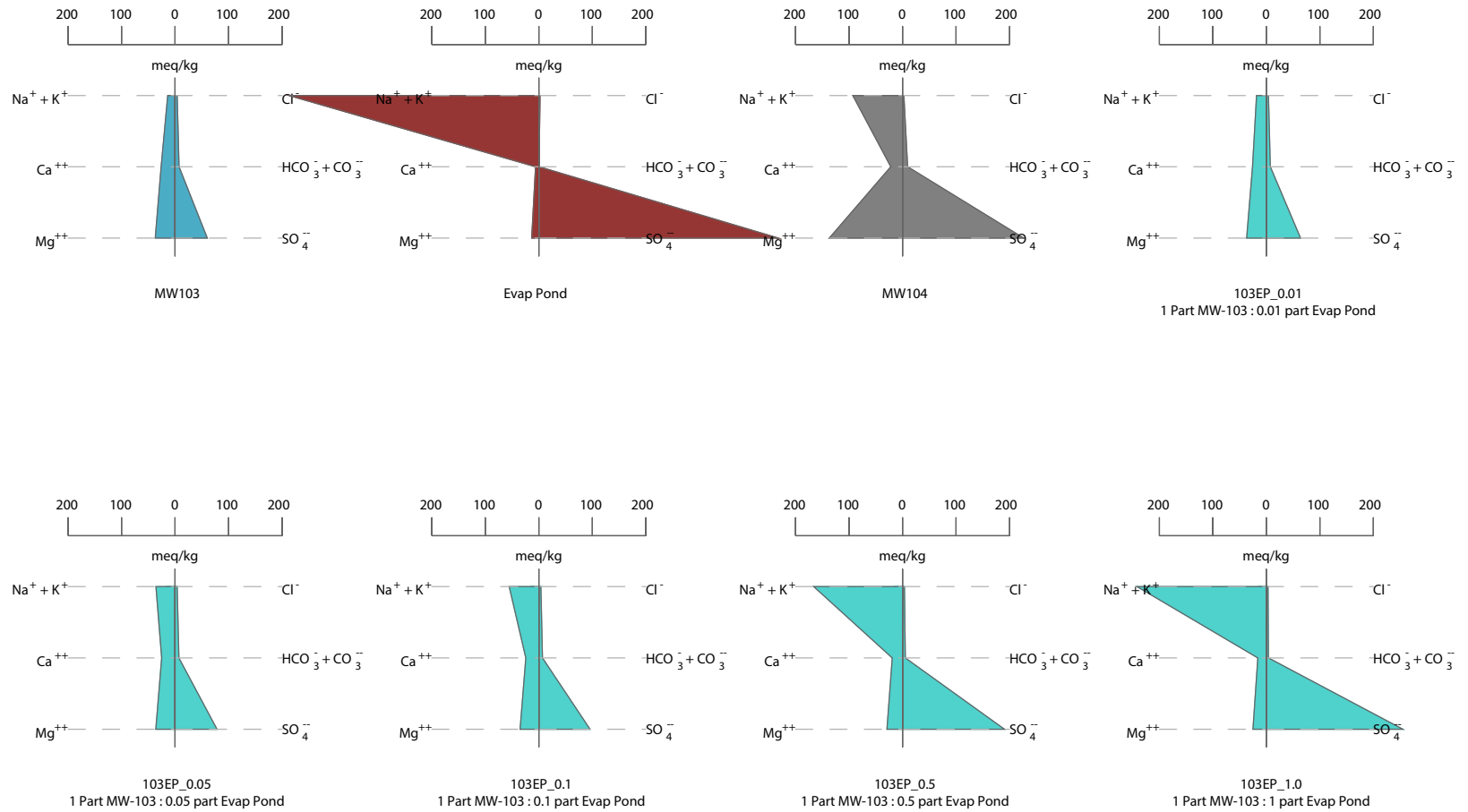


Figure G.2
Stiff Plot for Mixing
Evaporation Pond into MW-103
R.M. Heskett Station
Alternative Source Demonstration
August 2021 Event
Montana Dakota Utilities
Mandan, North Dakota

**Table G.1
Geochemist's Workbench Mixing Model Results**

Description		Upgradient	Evap Pond	Mixing Evap Pond into MW 103					Downgradient	
Sample ID		MW-103	Evap Pond	1 : 0.01	1 : 0.05	1 : 0.1	1 : 0.5	1 : 1	MW1 90	MW 104
HCO3	mg/l	457	20	453	436	417	311	239	259	591
Ca++	mg/l	530	125	526	511	493	395	328	453	448
Cl	mg/l	142	79.8	141	139	136	121	111	57.4	87.6
F	mg/l	0.15	0.1	0.15	0.15	0.15	0.13	0.13	1.07	0.55
Mg++	mg/l	458	165	455	444	431	360	312	775	1,700
pH	SU	6.5	10.7	6.5	6.5	6.5	6.6	6.9	7.1	6.8
K+	mg/l	18.8	734	25.9	52.9	83.9	257	377	25.2	37
Na+	mg/l	311	10,600	413	801	1,250	3,740	5,460	1,090	2,160
SO4	mg/l	2,930	22,100	3,120	3,840	4,670	9,320	12,500	5,350	11,100
TDS	mg/kg	4,860	34,000	5,150	6,270	7,540	14,700	19,500	7,910	17,700



Alternative Source Demonstration: May 2022 Event

R.M. Heskett Station

Prepared for
Montana-Dakota Utilities Co.

December 2022

Alternative Source Demonstration
May 2022 Event

December 2022

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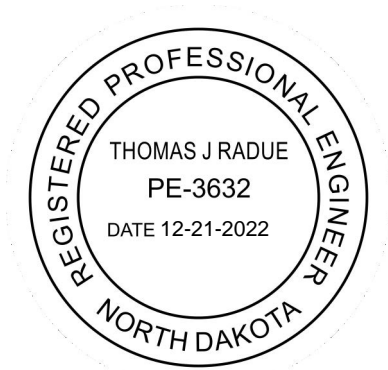
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Certifications

I hereby certify that I, or my agent, have examined this written demonstration and attest that this Coal Combustion Residuals Facility Alternative Source Demonstration (ASD) is accurate and has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR §257.94. I further certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of North Dakota.

Revision	Date	Summary of Revisions
0	December 21, 2022	May 2022 Event Alternative Source Demonstration



Thomas J. Radue

1 Introduction

Montana-Dakota Utilities Co. (MDU) owns and operated R.M. Heskett Station (Site), a coal-fired generating station and a gas-fired turbine located in Mandan, Morton County, North Dakota (Figure 1). Coal unit operations at the Site ended in March 2022, and the generating station is now undergoing demolition. One CCR (coal combustion residual) unit, as defined by 40 CFR 257.53, is located on the property. The CCR unit contains coal combustion by-products, asbestos wastes generated from construction activity associated with MDU-owned facilities, and ash derived from burning tire-derived fuel (TDF) at the facility.

The CCR Rule (US EPA, 2015) §257.94(e)(2) allows for an alternative source demonstration (ASD) in the event of an identified statistically significant increase (SSI) in a water quality parameter in a downgradient monitoring well over background levels:

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.

The purpose of this work is to evaluate the data collected as part of the May 2022 monitoring event, along with historical data, to demonstrate if the SSIs are the results of a “source other than the CCR unit” or due to natural variation in groundwater quality or an error in sampling, analysis, or statistical evaluation.

2 May 2022 SSIs

Sampling for the first detection monitoring event in 2022 was conducted May 2-3, 2022. Five potential SSIs over background were identified and verified as SSIs by resampling: calcium at MW2-90 and MW3-90, chloride at MW-80R, and fluoride and total dissolved solids (TDS) at MW1-90 (see time series plots in Appendix A and prediction limit plots in Appendix B).

Evaluations were undertaken to review potential alternative sources for the SSIs. These evaluations included comparing leaching tests of on-site CCR materials, leachate collected in the Evaporation Pond (non-CCR unit), regional (background) groundwater quality data, groundwater quality data from additional site wells, and groundwater quality data collected at the Site prior to construction of the CCR unit.

Several characteristics of the CCR unit, Site geology, groundwater monitoring well locations, and historic groundwater quality data prompted consideration of potential alternative sources for the SSIs, including elevated water quality parameters in pre-landfill and upgradient groundwater monitoring data, site-specific geologic conditions, and/or leakage from the Evaporation Pond (non-CCR unit).

A successful demonstration of alternative source(s) for the SSIs are discussed in Section 3.

2.1 May 2022 Sampling Event

Concentrations for potential SSIs observed in May 2022 are presented in Table 1 and are consistent with those observed during the prior seven detection monitoring events.

Table 1 Detection Monitoring Results for Potential SSI Well-Parameter Pairs

Well	Parameter	PL (mg/L)	Detection Monitoring Results (mg/L)								
			April 2018	Oct. 2018	April 2019	Sept. 2019	April 2020	Sept. 2020	March 2021	Aug. 2021	May 2022
MW2-90	Calcium	442	462	452	450	494	477	510	500	505	451
MW3-90	Calcium	442	445	dry	442	464	386	486	505	dry	506
MW-80R	Chloride	95.9	157	165	146	146	143	147	134	155	162
MW1-90	Fluoride	1.04	1.03	1.03	1.06	1.1	1.03	1.08	1.03	1.09	1.12
MW1-90	TDS	11,100	9,810	9,490	9,740	10,300	11,000	11,200	12,200	11,000	11,600

Bolded values indicate concentrations exceed the associated interwell prediction limits (PL).

Dry: sample was not collected due to insufficient volume of water in well.

Trend analysis results indicate:

- Calcium at MW2-90, though above the prediction limit, does not have a statistically significant trend
- Calcium at MW3-90, though above the prediction limit, has a statistically significant decreasing trend

- Chloride at MW-80R, though above the prediction limit, has a statistically significant decreasing trend
- Fluoride at MW1-90 has a statistically significant increasing trend
- TDS at MW1-90 has a statistically significant increasing trend

Methods used to evaluate potential alternative sources as the basis for water quality parameter concentrations over background from the May 2022 detection monitoring event are discussed in Section 3.

2.2 Verification Sampling

Verification resampling was conducted in August 2022 for the well-parameter pairs with potential SSIs. The five potential SSIs were verified.

Table 2 Verification Resampling Results for Potential SSI Well-Parameter Pairs

Well	Parameter	Interwell Prediction Limit (mg/L)	May 2022 (mg/L)	August 2022 (mg/L)
MW2-90	Calcium	442	451	508
MW3-90	Calcium	442	506	501
MW-80R	Chloride	95.9	162	154
MW1-90	Fluoride	1.04	1.12	1.14
MW1-90	TDS	11,100	11,600	12,700

Bolded values indicate concentrations exceed the associated interwell prediction limits (PL).

3 Alternative Source Demonstration

The purpose of this ASD Report is to evaluate whether the May 2022 SSIs were due to a CCR unit release or due to another source or to error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. For each SSI, three hypotheses regarding the potential source of the SSI are assessed: (1) a release of leachate from the CCR unit is the source of one or more of the SSIs, (2) natural variations of non-landfill or regional groundwater quality are the source of one or more of the SSIs, or (3) a release of leachate from the Evaporation Pond (non-CCR unit) is the source of one or more of the SSIs.

Successful demonstrations of alternative sources have previously been documented for three of the four parameters with SSIs at locations within the previous monitoring network. The associated ASD Reports (included as appendices to Barr, 2019; Barr, 2020; Barr, 2021; and Barr, 2022) documented that each of the SSIs could be explained by natural groundwater quality variability based on concentrations that were either present at the Site before the landfill was constructed, consistent with regional groundwater quality data, and/or associated with a release from the Evaporation Pond (non-CCR unit).

3.1 Source Hypothesis #1: CCR Unit Release

To accept the hypothesis that a release of leachate from the CCR unit is the source of one or more of the SSIs, it would be assumed that groundwater chemistry at one or more potentially impacted wells (MW2-90, MW3-90, MW-80R, and/or MW1-90) would be geochemically similar to impacted water from the CCR unit represented by leach testing results. However, if they are geochemically dissimilar, this indicates that a source "other than the CCR unit" may be responsible for the SSI. Therefore, major ion chemistry from the CCR groundwater monitoring locations (upgradient and downgradient) was compared to CCR Synthetic Precipitation Leaching Procedure (SPLP; EPA Method 1312) data collected July 2011 (Appendix C).

To test this hypothesis, a Piper diagram (Figure 2) was used to visually compare the CCR SPLP results (Appendix C) and the measured groundwater quality at the Site. Piper diagrams are plots of major ion chemistry of water samples (calcium, magnesium, potassium, sodium, chloride, sulfate, and [bi]carbonate) that are used to differentiate between water types and to identify potential mixing of water types. This method is a means to identify or "fingerprint" water samples by their common characteristics (major ions) to assess which types of water are similar or dissimilar to potential source water types (Helsel et al., 2020). On the Piper diagram depicted in Figure 2, downgradient well compositions are shown as circular points, CCR SPLP compositions as orange triangles, and the range of upgradient compositions as a yellow polygon.

Downgradient water quality (including the SSI parameter-well pairs) is characterized as an intermediate-SO₄ type water, whereas the ash SPLP results are Na-SO₄ type water. The major difference observed between the downgradient water quality and the SPLP results is the dominant cation composition (no cation strongly dominant vs. heavily dominant sodium). Because water quality data from SSI well-parameter pairs are clustered with data from that of the upgradient wells, which are intermediate-SO₄,

rather than near the ash SPLP results, the results indicate that the water chemistry at those locations is more like upgradient groundwater than a potential release from the CCR unit. **Therefore, we reject the hypothesis that the CCR unit is the source of the calcium observed at MW2-90 and MW3-90 and the chloride at MW-80R.**

3.2 Source Hypothesis #2: Natural Variations of Pre-Landfill, Upgradient, or Regional Groundwater Quality

As Source Hypothesis #1 (CCR Unit Release) was rejected as a potential source of the SSIs, the second hypothesis evaluated is that concentrations of SSI parameters are consistent with historical (pre-landfill), upgradient, or regional (background) groundwater data. To test this hypothesis, results of the May 2022 detection monitoring event were compared to groundwater data collected at the Site before the landfill was constructed (pre-landfill data), additional upgradient well data, and/or regional groundwater quality data from the Cannonball Formation and associated units to determine if natural variation is a potential alternative source for the SSIs.

3.2.1 Calcium at MW2-90 and MW3-90

Results from groundwater samples collected in 1986 were included in the 1989 Special Use Disposal Site Permit Application (Permit Application; MDU, 1989). The 1986 samples were collected prior to construction of the CCR unit; an aerial photograph from March 30, 1988, shows the area of the CCR unit, which appears undisturbed (Appendix D).

Discussion of pre-landfill groundwater samples in the Permit Application notes that high calcium, chloride, fluoride, TDS, and other parameters were observed at the Site. Pre-landfill calcium concentrations collected from groundwater at the Site were measured as high as 648 mg/L (Well 44, 1986), indicating that high calcium concentrations pre-date construction of the CCR unit.

The mineralogy of the underlying Fort Union Group may yield an explanation for the elevated calcium concentrations. The dominant lithology observed at the Site is unconsolidated silt in a clay matrix with interspersed fine- to medium-grained sand (10% to 30%). Calcareous (calcium-carbonate-bearing) materials and small gypsum (hydrated calcium sulfate) crystals are documented discontinuously throughout the upper 30 feet of the surface materials, which have been presumed to be the result of diagenetic processes which occur above the water table during alternating wetting and drying cycles (Groenewold et al., 1983). The presence of these minerals can be a source of high calcium concentrations in groundwater.

The boring logs for CCR wells and pre-landfill wells note calcareous material and gypsum occurrences across the Site (Appendix E). As groundwater fluctuates and surface water infiltration occurs, periodic dissolution of these calcium-bearing minerals into the water column may occur, resulting in elevated calcium concentrations.

In 2022, the Site received a new permit from the North Dakota Department of Environmental Quality (NDDEQ). Under the previous permit, the monitoring network included seven upgradient wells to define

background rather than the one upgradient well (MW-13) included in the current network. The high degree of heterogeneity in historical background concentrations, including for calcium, means that the long-term monitoring record includes background data that may exceed statistically determined thresholds. The maximum and median concentrations measured in the seven background wells while the previous groundwater monitoring system was operating are shown below in Table 3.

Table 3 Previously Measured Upgradient Concentration Results for SSI Parameters

Parameter	Interwell Prediction Limit (mg/L)	May 2022 SSI (mg/L)	Maximum upgradient concentration, 2016-2021 (mg/L)	Median upgradient concentration, 2016-2021 (mg/L)
Calcium	442	451 (MW2-90) 506 (MW3-90)	600 (MW-103)	438
Chloride	95.9	162	271 (MW-44R)	35.8
Fluoride	1.04	1.12	1.01 (MW-13)	0.25
TDS	11,100	11,600	10,800 (MW-44R)	5,070

Based on 123 samples collected from seven upgradient/background wells (Barr, 2017) between 2016 and 2021 (Barr, 2018-2022).

The data in Table 3 indicate that higher calcium concentrations than those leading to the May 2022 SSIs have been measured in upgradient/background wells at the Site. Therefore, the degree of natural variability in groundwater calcium concentrations at the Site encompasses the SSIs at MW2-90 and MW3-90.

The presence of soluble calcium-bearing minerals in native subsurface deposits and documentation of elevated calcium in pre-landfill and upgradient groundwater provide multiple lines of evidence substantiating the hypothesis that the SSIs for calcium at MW2-90 and MW3-90 are due to natural variation in groundwater quality. **Therefore, we accept the hypothesis that calcium concentrations at MW2-90 and MW3-90 are due to variability in natural conditions and are consistent with regional and Site background groundwater data.**

3.2.2 Chloride at MW-80R

As with calcium, heterogeneity in chloride concentrations have been observed at the Site prior to landfill construction and within additional upgradient measurements. Pre-landfill chloride concentrations collected from groundwater at the Site and reported in the 1989 Permit Application were measured as high as 558 mg/L (Well 44, 1986), indicating that high chloride concentrations pre-date construction of the CCR unit. This conclusion is substantiated by concentrations measured in samples from the additional upgradient/background wells at the Site, which have been as high as 271 mg/L (MW-44R, Table 3), exceeding the 162 mg/L measured at MW-80R in May 2022. These results support the hypothesis that the SSI for chloride at MW-80R is due to natural variation in groundwater quality. **Therefore, we accept the hypothesis that chloride concentrations observed at MW-80R are due to variability in natural conditions and are consistent with regional and Site background groundwater data.**

3.2.3 Fluoride at MW1-90

Source Hypothesis #2 was tested by comparing fluoride concentrations collected as part of several regional groundwater quality studies on the Cannonball Formation and associated units. A summary of the range of fluoride concentrations in the Cannonball Formation and associated units is included in Table 4 below.

Table 4 Fluoride Concentrations in Morton County, North Dakota

Reference	Fluoride Conc. Range	Formation/Units	Data Source Location
Ackerman, D.J., 1980. Ground-Water Resources of Morton County, North Dakota. North Dakota Geological Survey Bulletin 72, Part III. 51 p.	0.0 to 4.0 mg/L	Cannonball and Ludlow formations, undifferentiated	Morton County
Crosby, O.A. and Klausning, R.L., 1984. Hydrology of Area 47, Northern Great Plains and Rocky Mountain Coal Provinces, North Dakota, South Dakota, and Montana. USGS Water-Resources Investigations Open-File Report 83-221, 93 p.	0.1 to 6.3 mg/L	Entire Fort Union Formation (includes Cannonball Formation)	Morton County

The Ackerman study provides summary statistics for the fluoride concentrations observed in Morton County. Forty-six samples were analyzed for fluoride; of those, 20 (or 43%) had concentrations greater than 1.3 mg/L (Ackerman, 1980). The fluoride concentration observed at MW1-90 in May 2022 (1.12 mg/L) is within the range of values consistent with naturally occurring concentrations of fluoride associated with the Cannonball Formation in Morton County. However, a statistically significant increasing trend for fluoride at MW1-90 was observed. **Therefore, we accept the hypothesis that fluoride concentrations observed at MW1-90 are consistent with regional (background) groundwater data; however, additional source considerations were evaluated, as described in Section 3.3.**

3.2.4 TDS at MW1-90

As noted in previous sections, high variability and concentrations of various parameters have been noted in groundwater at the Site and in the region. This observation extends to TDS. The maximum TDS concentration reported in the 1989 Permit Application from 1986 (pre-landfill) was 14,917 mg/L (Well 60), with similar concentrations observed two years later, indicating that high TDS pre-dates landfill construction.

In groundwater at the Site, sulfate accounts for approximately 50-70% of TDS. Therefore, sulfate and TDS concentrations are strongly related. The well-documented presence of gypsum, a source of groundwater sulfate, is discussed in Section 3.2.1. As noted, the boring logs for CCR wells and pre-landfill wells note gypsum occurrences across the Site (Appendix E). As groundwater fluctuates and surface water infiltration occurs, periodic dissolution of gypsum into the water column may occur, resulting in elevated sulfate, and therefore sulfate-dominated TDS, concentrations.

Based on presence of gypsum in native subsurface deposits and documentation of elevated TDS in pre-landfill groundwater, the hypothesis that the SSI for TDS at MW1-90 may be due to natural conditions is possible. However, a statistically significant increasing trend for TDS at MW1-90 was observed. Natural/background groundwater can be affected by site-wide aquifer changes, resulting in trending data, and significantly increasing TDS concentrations were observed in other monitoring system wells, including upgradient well MW-13. **TDS concentrations at MW1-90 may be due to natural conditions; however, additional source considerations were evaluated, as described in Section 3.3.**

3.3 Source Hypothesis #3: Evaporation Pond Release

Two conditions are necessary to accept the hypothesis that a release of Evaporation Pond water is the source of one or more of the SSIs: (1) mechanism of release (such as an issue with the Evaporation Pond liner integrity) and (2) geochemically similar groundwater chemistry at one or more of the potentially impacted wells with water from the Evaporation Pond. Based on proximity, only the SSIs observed at MW1-90 (TDS and fluoride) are being evaluated for this potential source.

3.3.1 TDS and Fluoride at MW1-90

A statistically significant increasing trend in TDS was observed at MW1-90 following the May 2022 detection monitoring event. The only statistically significant trend observed for other Appendix III parameters at this location was for fluoride. Past ASD Reports (Barr, 2020; Barr, 2021; Barr, 2022) attributed elevated TDS concentrations at MW-104 to either natural conditions or a release from the Evaporation Pond. MW-104 is located between the CCR unit and the Evaporation Pond (a non-CCR unit), approximately 225 feet southwest of MW1-90, which is located north of the Evaporation Pond. The Evaporation Pond was designed and constructed to collect surface water run-off from the Site as well as leachate from the CCR Unit. It is not a CCR unit as defined in §257.53. Due to the relative proximity of MW1-90 to the Evaporation Pond and MW-104, an evaluation was conducted to assess the Evaporation Pond liner integrity and potential impacts to downgradient wells and determine the geochemical feasibility of Evaporation Pond water contributing to the conditions observed at MW1-90.

Liner Integrity Evaluation

In the 2010 Annual Report for the Special Waste Disposal Permit (SP-087), it was noted that erosion was encountered at the Evaporation Pond. More specifically, “cuts in the banks of the pond ranged from 8 to 24-inches. Erosion was caused from storm water running into the evaporation pond from closed Slots and the haul road” (MDU, 2011). No repairs were made at that time due to standing water in the pond. Similar erosional features were noted in the 2011 and 2012 Annual Reports, citing erosion cuts of 8 to 48 inches (MDU, 2012; MDU, 2013). These erosion cuts were repaired in 2013 during the construction of Slot 10. Additionally, the 2013 Annual Report stated that “the west wall of the evaporation pond was raised and graded to reroute storm water that accumulates outside of the ash disposal area from the cover of Phase I ash disposal site away from the pond during rain events” (MDU, 2014).

These reports did not specify if the erosional cuts were 8 to 48 inches wide or 8 to 48 inches deep. Based on the Phase I Development “as-constructed” Plan Sheets (January and November 1990), the Evaporation Pond was built with a 3-foot-thick compacted clay liner (MDU, 1989, Exhibit 6-B). If the erosional cuts

were up to 48 inches deep, then the cuts would extend through the entirety of the liner thickness, creating a conduit for Evaporation Pond water to enter the groundwater. Additionally, no details were provided on the materials used for repairing the Evaporation Pond (i.e., if the liner was impacted, whether the erosion cuts were filled in with a comparable clay liner material).

Additionally, the integrity of the Evaporation Pond liner may have been compromised due to cation exchange. Time series plots of groundwater quality at well MW1-90 (Appendix F) show an increase in sodium; this increase is most apparent at MW1-90 between 2012 and 2021. The Evaporation Pond liner may be composed of a clay with sodium as its main interlayer cation (e.g., sodium-montmorillonite and/or sodium-bentonite, which are common in the area (Groenewold et al., 1983)), and cation exchange processes can occur between the sodium in the clay and positively charged cations concentrated in the Evaporation Pond water (calcium, magnesium, potassium, and aluminum), increasing the concentration of dissolved sodium as it is released from the clay structure. Over time this exchange may decrease swelling potential and increase hydraulic conductivity of the clay constituting the pond liner, resulting in increased leakage of Evaporation Pond water.

Potential Downgradient Effects

The base of the Evaporation Pond sits at approximately 1675 feet above MSL, whereas historical groundwater elevations in MW-104 and MW1-90 remain below 1675 feet MSL. Therefore, any water leaking from the Evaporation Pond would move radially outward from the pond through the unsaturated zone downward into the groundwater, toward both MW-104 and MW1-90, reaching both wells downgradient of the Pond.

Groundwater monitoring data have consistently been collected from MW1-90 since 1990. As seen in the time series plots (Appendix F; 1990–2022), in approximately 2010 the concentrations of chloride, sulfate, TDS, magnesium, sodium, and specific conductance at MW1-90 began increasing more rapidly. To a lesser extent, changes in concentrations were observed around this same time for potassium, nitrogen, and total alkalinity. This timing corresponds to when the erosional cuts at the Evaporation Pond were first observed in the Annual Monitoring Reports. The increasing trends have continued, despite reports of the erosional cuts being repaired in 2013, except for chloride, which has since leveled off.

Geochemical Feasibility

A simple mixing model was developed in April 2019 (Barr, 2020) to determine the potential of producing a similar water quality to that observed at MW-104 and MW1-90 when mixing Evaporation Pond water with unimpacted upgradient water. This mixing model was conducted in Geochemist's Workbench® v.12.0, using data from water samples collected from the Evaporation Pond and upgradient monitoring well MW-103. The mixing model assumes a starting concentration equal to the upgradient groundwater concentrations and then iteratively mixes it with incremental amounts of Evaporation Pond water. The upgradient groundwater concentrations used in the model were from a sample from upgradient monitoring well MW-103 collected in April 2019, which is assumed to represent the long-term composition of groundwater in that vicinity due to the fairly stable concentrations of major ions exhibited in samples from MW-103 (Barr, 2020). The Evaporation Pond concentrations used in the model were from

a sample collected from the pond in September 2014, which is assumed for the purposes of the model to represent a typical Evaporation Pond water composition during the period when the pond liner was compromised.

The results of the model are provided in Appendix G. Figure G.1 shows the results of the mixing model on a Piper diagram. Downgradient wells MW-104 and MW1-90 are shown as gray and green diamonds, respectively. The blue line represents the various possible outcomes when mixing the upgradient water (represented by a blue triangle) with the Evaporation Pond (represented by a red circle). The black circles represent specific proportions (1-part upgradient water to 0.01-, 0.05-, 0.1-, 0.5-, and 1-part Evaporation Pond water). Figure G.2 shows the results as Stiff plots. Table G.1 provides the numerical inputs and results of the various mixing proportions.

As shown on Figure G.1, the downgradient well compositions are similar to the chemistry anticipated if the Evaporation Pond is mixing with upgradient groundwater emanating from the proximity of monitoring well MW-103. The path of the mixing reaction from MW-103 to the Evaporation Pond transects MW1-90 when 1-part upgradient (MW-103) water is mixed with as little as 0.05-part Evaporation Pond water. Therefore, it appears plausible that a relatively small portion of Evaporation Pond water would be needed to “impact” groundwater from upgradient to get a similar chemistry as observed downgradient in MW1-90. The geometry of the Stiff plots in Figure G.2 shows the similarity in ionic composition in the mixing models.

Recorded measurements of fluoride concentrations in the Evaporation Pond have generally been low (<0.3 mg/L), and therefore a release from the Evaporation Pond is unlikely to be a direct source of fluoride to groundwater. However, the Evaporation Pond water has several characteristics that can lead to the release of fluoride from clays and other minerals in aquifer sediments. The pH of the Evaporation Pond is high (≥ 10), meaning that the water has a high concentration of hydroxide ions. Hydroxide and fluoride have similar ionic radii and charge. Mineralogically, this means that fluoride can easily substitute for hydroxide within mineral structures. In addition, fluoride can sorb to clay, particularly in slightly acidic conditions. A release of high-pH water provides ample hydroxide that can replace fluoride in mineral structures and cause the desorption of fluoride from clay minerals, leading to an increase in fluoride concentrations in groundwater (Edmunds and Smedley, 2013; McMahon et al., 2020).

Based on the description of erosional features extending upwards of 48 inches into the liner of the Evaporation Pond in 2010–2013, corresponding with the increased concentrations of several parameters observed in downgradient monitoring well MW1-90, it is possible that a release from the Evaporation Pond occurred starting in approximately 2011. Furthermore, the results of the geochemical model along with the general proximity and hydraulic position of MW1-90 relative to the Evaporation Pond support the hypothesis that the SSIs for fluoride and TDS at MW1-90 are due to a “source other than the CCR unit.” **Therefore, we accept the hypothesis that the fluoride and TDS concentrations observed at MW1-90 are consistent with a potential release from the Evaporation Pond, a non-CCR unit.**

4 Conclusions

Five SSIs were identified from the May 2022 detection monitoring event. This report demonstrates that a “source other than the CCR unit” caused the SSIs (natural variation in regional and/or pre-landfill groundwater quality and the Evaporation Pond), as allowed by §257.94(e)(2). The results of this alternative source demonstration are summarized in Table 5 below.

Table 5 Summary of SSIs and Alternative Sources

Well	Parameter	Report Section	Evidence for Alternative Source
MW2-90	Calcium	3.2.1	Natural variation (pre-landfill values, upgradient groundwater, and geologic background)
MW3-90	Calcium	3.2.1	Natural variation (pre-landfill values, upgradient groundwater, and geologic background)
MW-80R	Chloride	3.2.2	Natural variation (pre-landfill values, upgradient groundwater, and geologic background)
MW1-90	Fluoride	3.2.3, 3.3.1	Natural variation and/or Other (Evaporation Pond, a non-CCR unit)
MW1-90	TDS	3.2.4, 3.3.1	Natural variation and/or Other (Evaporation Pond, a non-CCR unit)

Based on the foregoing, the alternative source demonstration presented herein meets the requirements of CCR Rule §257.94(e)(2). As coal unit operations ended in early March 2022, MDU will work with the NDDEQ on closure options for the Evaporation Pond as it is regulated under a permit through the NDDEQ.

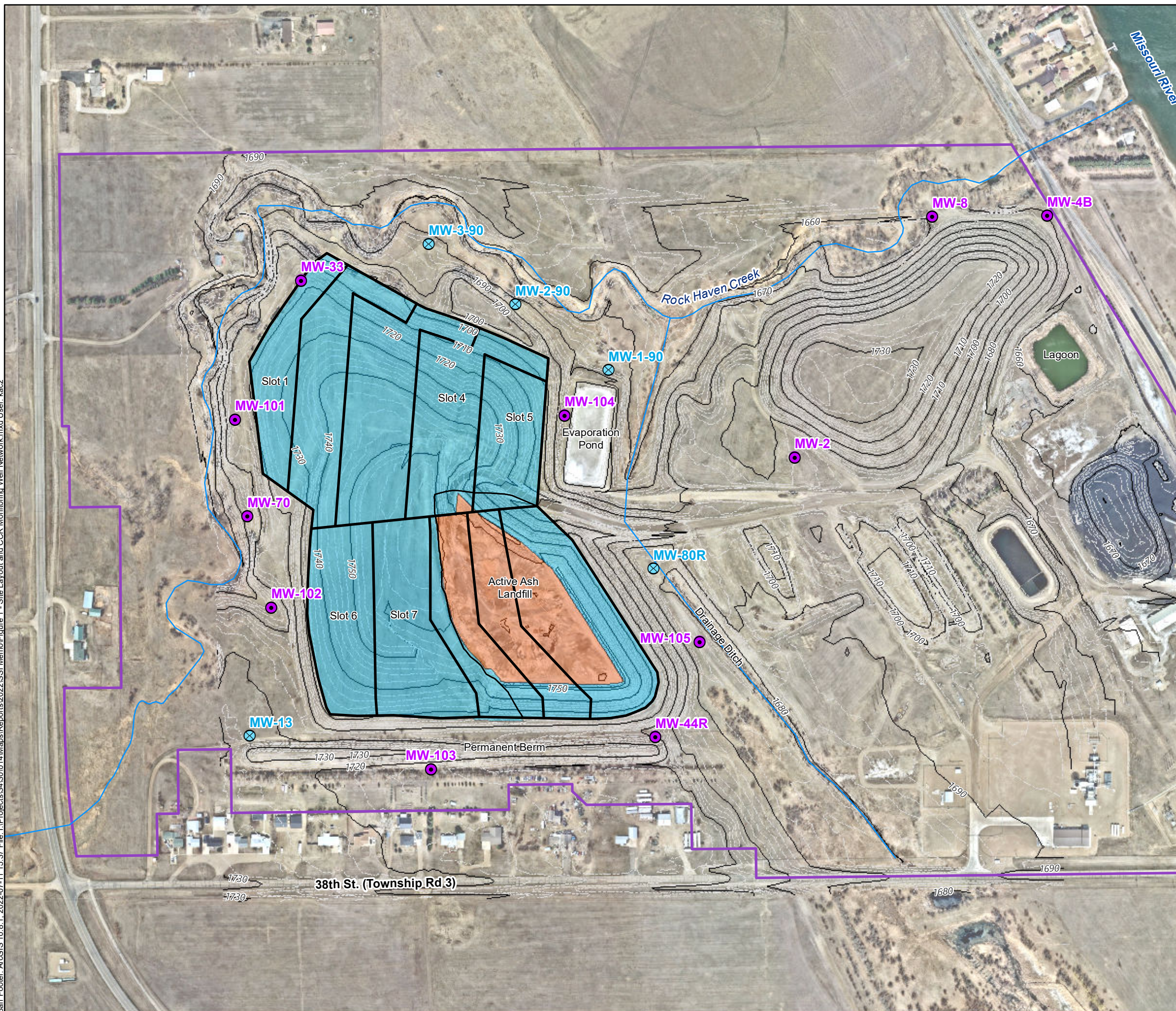
5 References

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Figures

Barr Footer: ArcGIS 10.8.1, 2022-07-11 15:37 File: I:\Projects\3430014\Maps\Reports\2022\SS1 Memo\Figure 1 - Site Layout and CCR Monitoring Well Network.mxd User: kac2



- Monitoring Well Location
- Monitoring Well Location - Water Level Only;
Monitoring Well - Water Level Only
- Existing Slot Boundaries
- Streams
- Property Line
- 10' Contour
- 2' Contour
- Active CCR Landfill Limits
- Closed CCR Landfill Limits

Image Source: NearMap May 2021
CAD Data Source: Slot Linework.dwg

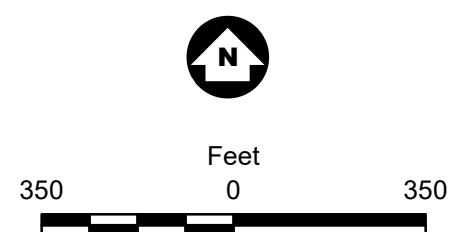


Figure 1
SITE LAYOUT AND CCR
MONITORING WELL NETWORK
R. M. Heskett Station

Montana Dakota Utilities
Mandan, North Dakota

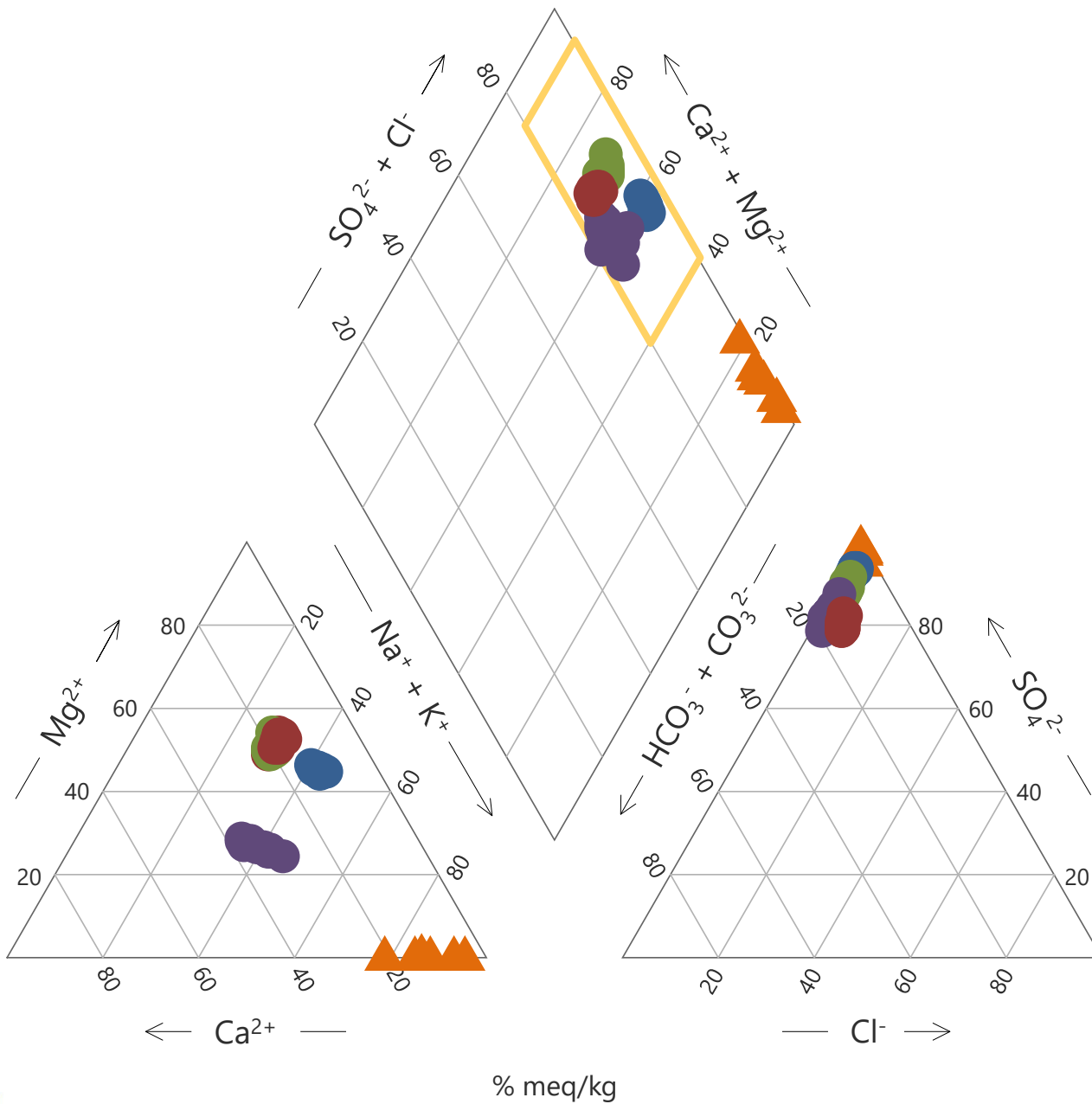


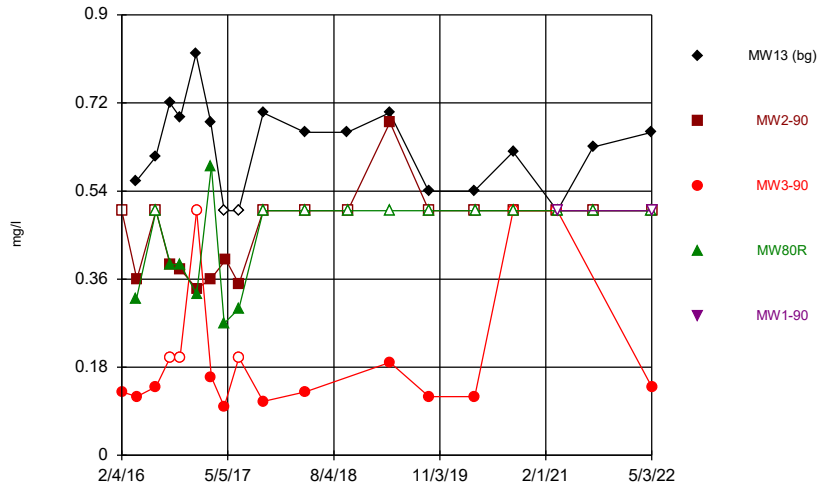
Figure 2
 PIPER PLOT: ALTERNATIVE
 SOURCE DEMONSTRATION
 R.M. Heskett Station
 Mandan, North Dakota

Appendices

Appendix A

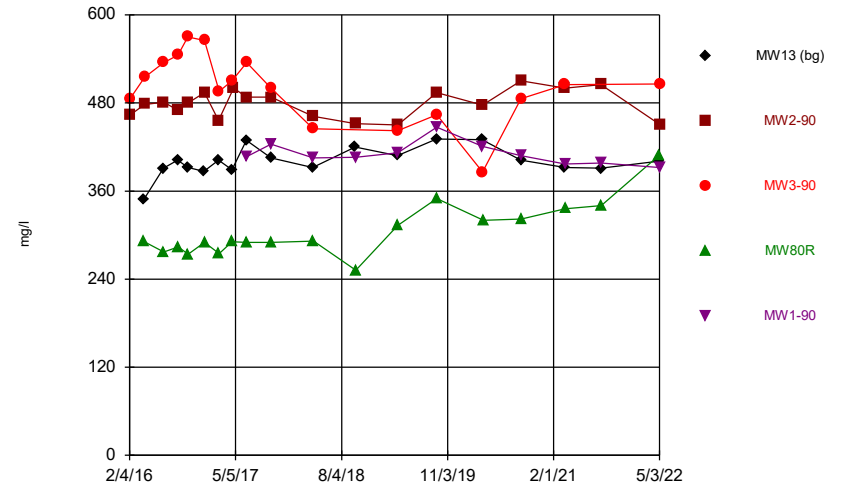
Appendix III Time Series Plots

Boron



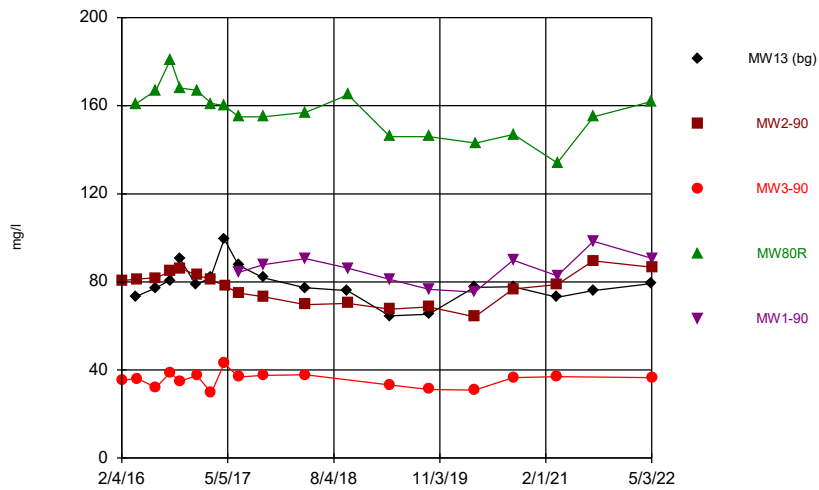
Time Series Analysis Run 7/28/2022 7:21 PM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Calcium, Total



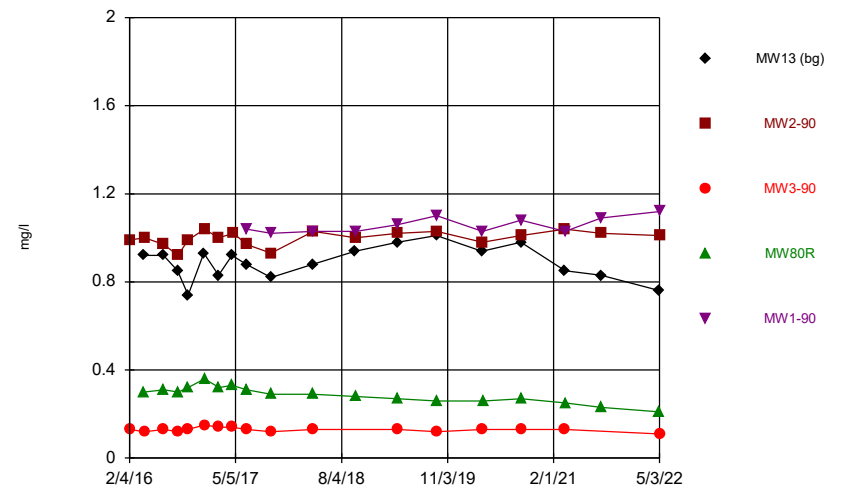
Time Series Analysis Run 7/28/2022 7:21 PM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Chloride



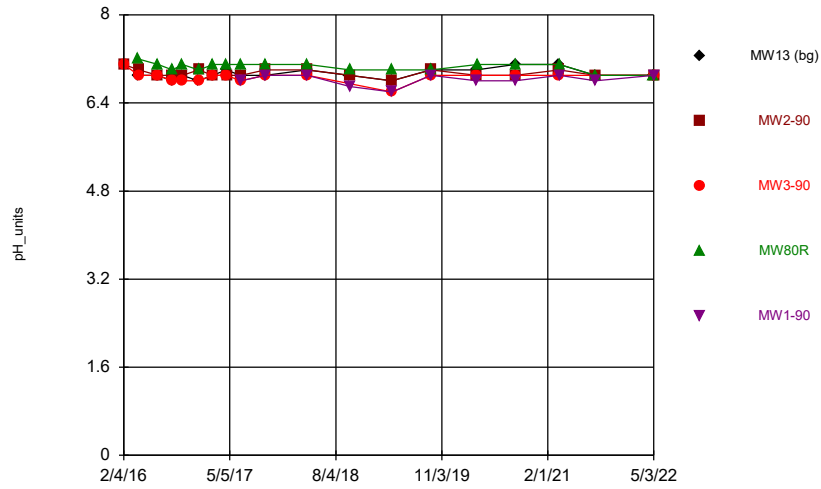
Time Series Analysis Run 7/28/2022 7:21 PM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Fluoride



Time Series Analysis Run 7/28/2022 7:21 PM
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

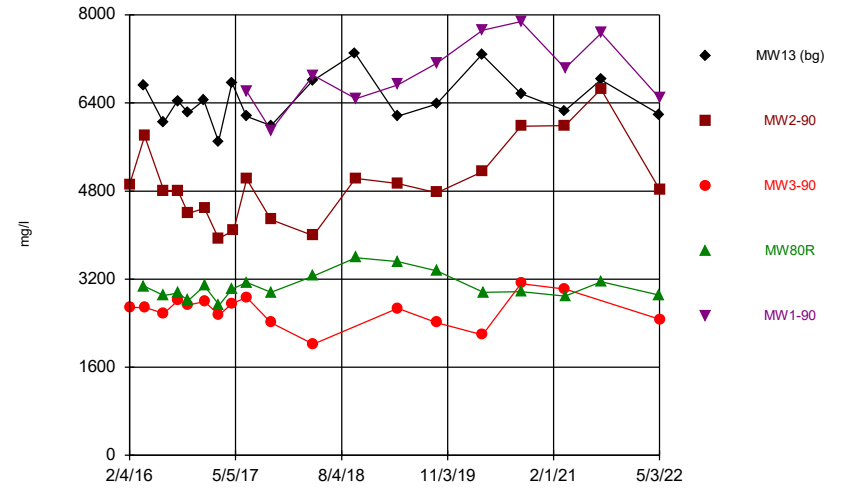
pH, Field



Time Series Analysis Run 7/28/2022 7:21 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

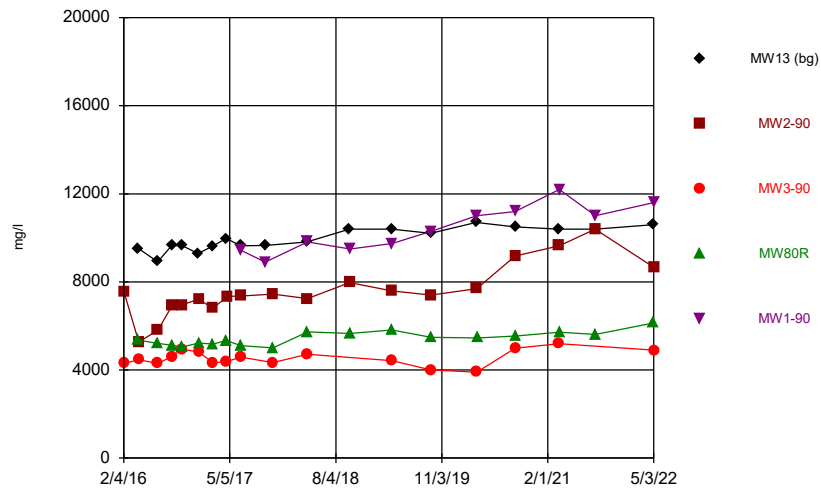
Sulfate



Time Series Analysis Run 7/28/2022 7:21 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Total Dissolved Solids



Time Series Analysis Run 7/28/2022 7:21 PM

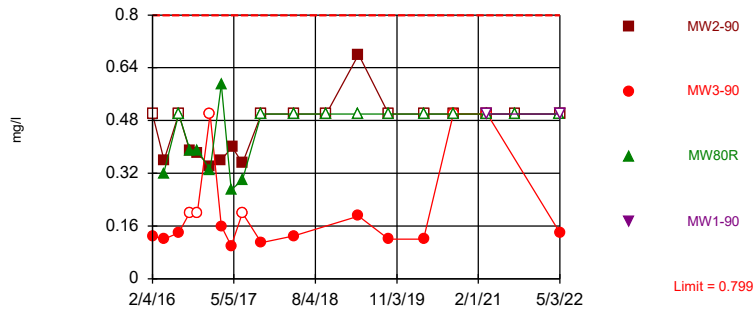
R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Appendix B

Prediction Limit Plots

Within Limit

Boron
Interwell Parametric



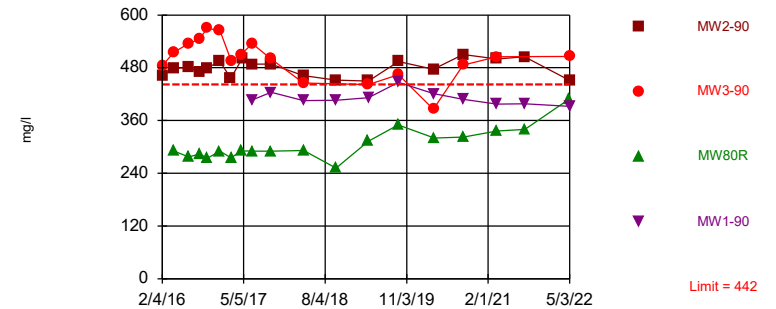
Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.6095, Std. Dev.=0.09284, n=17, 17.65% NDs. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9408, critical = 0.892. Kappa = 2.04 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Comparing 4 points to limit.

Prediction Limit Analysis Run 7/28/2022 4:53 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Exceeds Limit: MW2-90, MW3-90

Calcium, Total
Interwell Parametric



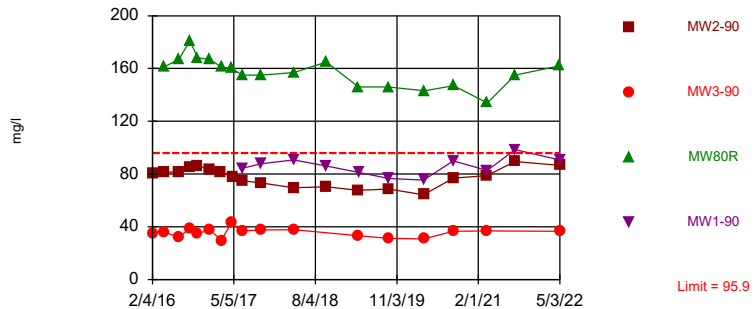
Background Data Summary: Mean=400.7, Std. Dev.=20.06, n=17. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8935, critical = 0.892. Kappa = 2.04 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Comparing 4 points to limit.

Prediction Limit Analysis Run 7/28/2022 4:53 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Exceeds Limit: MW80R

Chloride
Interwell Parametric



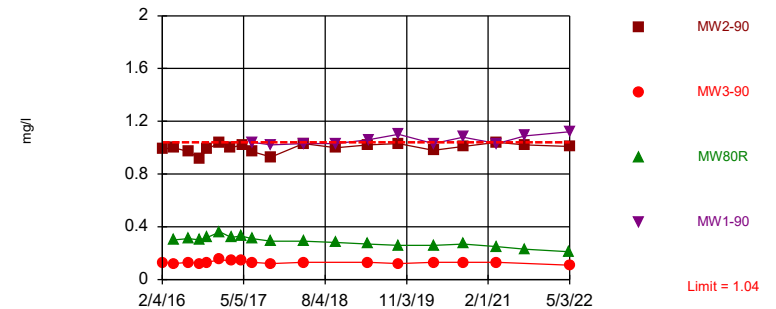
Background Data Summary: Mean=78.76, Std. Dev.=8.397, n=17. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9338, critical = 0.892. Kappa = 2.04 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Comparing 4 points to limit.

Prediction Limit Analysis Run 7/28/2022 4:53 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Exceeds Limit: MW1-90

Fluoride
Interwell Parametric



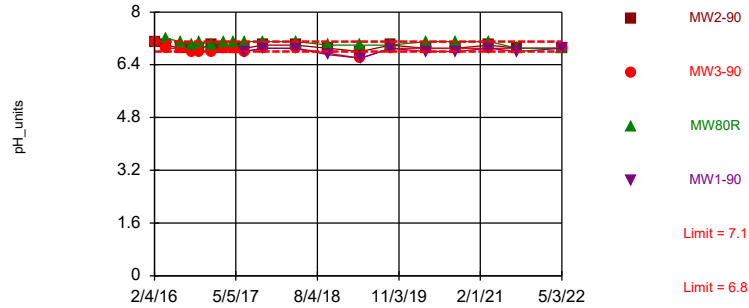
Background Data Summary: Mean=0.8953, Std. Dev.=0.06956, n=17. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9654, critical = 0.892. Kappa = 2.04 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Comparing 4 points to limit.

Prediction Limit Analysis Run 7/28/2022 4:53 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Within Limits

pH, Field
Interwell Non-parametric



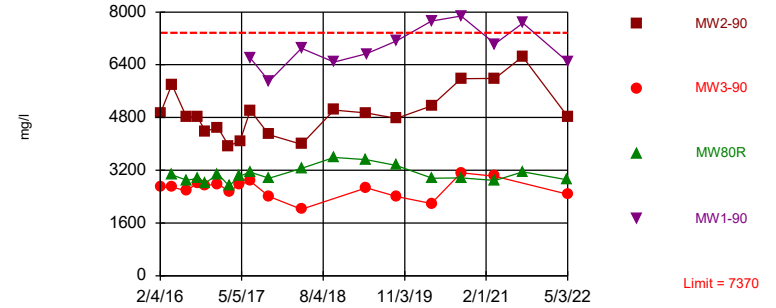
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 17 background values. Annual per-constituent alpha = 0.08687. Individual comparison alpha = 0.01107 (1 of 2). Comparing 4 points to limit. Seasonality was not detected with 95% confidence.

Prediction Limit Analysis Run 7/28/2022 4:53 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Within Limit

Sulfate
Interwell Parametric



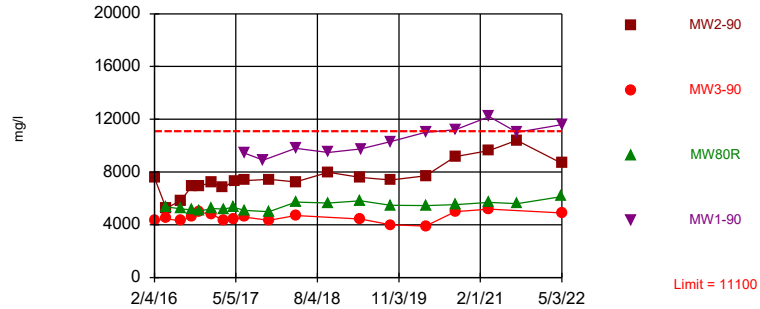
Background Data Summary: Mean=6474, Std. Dev.=437, n=17. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9637, critical = 0.892. Kappa = 2.04 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Comparing 4 points to limit.

Prediction Limit Analysis Run 7/28/2022 4:53 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Exceeds Limit: MW1-90

Total Dissolved Solids
Interwell Parametric



Background Data Summary: Mean=10276, Std. Dev.=332.5, n=9. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8605, critical = 0.829. Kappa = 2.447 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Comparing 4 points to limit.

Prediction Limit Analysis Run 7/28/2022 4:53 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasAppIII_new

Prediction Limit

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: Heskett_SanitasApplIII_new Printed 7/28/2022, 4:54 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/l)	MW2-90	0.799	n/a	5/3/2022	0.5ND	No	17	17.65	No	0.00188	Param Inter 1 of 2
Boron (mg/l)	MW3-90	0.799	n/a	5/3/2022	0.14	No	17	17.65	No	0.00188	Param Inter 1 of 2
Boron (mg/l)	MW80R	0.799	n/a	5/2/2022	0.5ND	No	17	17.65	No	0.00188	Param Inter 1 of 2
Boron (mg/l)	MW1-90	0.799	n/a	5/3/2022	0.5ND	No	17	17.65	No	0.00188	Param Inter 1 of 2
Calcium, Total (mg/l)	MW2-90	442	n/a	5/3/2022	451	Yes	17	0	No	0.00188	Param Inter 1 of 2
Calcium, Total (mg/l)	MW3-90	442	n/a	5/3/2022	506	Yes	17	0	No	0.00188	Param Inter 1 of 2
Calcium, Total (mg/l)	MW80R	442	n/a	5/2/2022	409	No	17	0	No	0.00188	Param Inter 1 of 2
Calcium, Total (mg/l)	MW1-90	442	n/a	5/3/2022	392	No	17	0	No	0.00188	Param Inter 1 of 2
Chloride (mg/l)	MW2-90	95.9	n/a	5/3/2022	86.6	No	17	0	No	0.00188	Param Inter 1 of 2
Chloride (mg/l)	MW3-90	95.9	n/a	5/3/2022	36.5	No	17	0	No	0.00188	Param Inter 1 of 2
Chloride (mg/l)	MW80R	95.9	n/a	5/2/2022	162	Yes	17	0	No	0.00188	Param Inter 1 of 2
Chloride (mg/l)	MW1-90	95.9	n/a	5/3/2022	90.7	No	17	0	No	0.00188	Param Inter 1 of 2
Fluoride (mg/l)	MW2-90	1.04	n/a	5/3/2022	1.01	No	17	0	No	0.00188	Param Inter 1 of 2
Fluoride (mg/l)	MW3-90	1.04	n/a	5/3/2022	0.11	No	17	0	No	0.00188	Param Inter 1 of 2
Fluoride (mg/l)	MW80R	1.04	n/a	5/2/2022	0.21	No	17	0	No	0.00188	Param Inter 1 of 2
Fluoride (mg/l)	MW1-90	1.04	n/a	5/3/2022	1.12	Yes	17	0	No	0.00188	Param Inter 1 of 2
pH, Field (pH_units)	MW2-90	7.1	6.8	5/3/2022	6.9	No	17	0	n/a	0.01107	NP Inter (normality) 1 of 2
pH, Field (pH_units)	MW3-90	7.1	6.8	5/3/2022	6.9	No	17	0	n/a	0.01107	NP Inter (normality) 1 of 2
pH, Field (pH_units)	MW80R	7.1	6.8	5/2/2022	6.9	No	17	0	n/a	0.01107	NP Inter (normality) 1 of 2
pH, Field (pH_units)	MW1-90	7.1	6.8	5/3/2022	6.9	No	17	0	n/a	0.01107	NP Inter (normality) 1 of 2
Sulfate (mg/l)	MW2-90	7370	n/a	5/3/2022	4830	No	17	0	No	0.00188	Param Inter 1 of 2
Sulfate (mg/l)	MW3-90	7370	n/a	5/3/2022	2470	No	17	0	No	0.00188	Param Inter 1 of 2
Sulfate (mg/l)	MW80R	7370	n/a	5/2/2022	2910	No	17	0	No	0.00188	Param Inter 1 of 2
Sulfate (mg/l)	MW1-90	7370	n/a	5/3/2022	6490	No	17	0	No	0.00188	Param Inter 1 of 2
Total Dissolved Solids (mg/l)	MW2-90	11100	n/a	5/3/2022	8670	No	9	0	No	0.00188	Param Inter 1 of 2
Total Dissolved Solids (mg/l)	MW3-90	11100	n/a	5/3/2022	4900	No	9	0	No	0.00188	Param Inter 1 of 2
Total Dissolved Solids (mg/l)	MW80R	11100	n/a	5/2/2022	6140	No	9	0	No	0.00188	Param Inter 1 of 2
Total Dissolved Solids (mg/l)	MW1-90	11100	n/a	5/3/2022	11600	Yes	9	0	No	0.00188	Param Inter 1 of 2

Appendix C

Ash SPLP Laboratory Report (2011)



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
 51 West Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
 www.mvttl.com



Page: 1 of 2

Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2450
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit I Bottom Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	12.2	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	8778	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	3	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	1120	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Phenolphthalein Alk	1090	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Carbonate	60	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Hydroxide	1060	mg/l CaCO3	0	SM2320-B	22 Jul 11 17:00	Claudette
Tot Dis Solids (Summation)	4860	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	524	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	30.7	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	74.3	meq/L	NA	SM1030-F	3 Aug 11 8:40	Calculated
Anion Summation	74.6	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	-0.24	%	NA	SM1030-F	3 Aug 11 8:40	Calculated
Sodium Adsorption Ratio	27.1		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	0.7	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	< 0.1	mg/l	0.10	SM4500-F-C	4 Aug 11 17:00	CLB
Sulfate	2440	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	50.5	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	0.21	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	0.32	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	< 5	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	210	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 2.5	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	1440	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	44.8	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	< 0.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Iron - Total	< 0.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Strontium - Total	28.2	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Titanium - Total	< 0.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Boron - Total	< 0.5	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
 ! = Due to sample quantity

= Due to sample concentration
 + = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 2 of 2

Duane Leingang
Montana Dakota Utilities
PO Box 40
Mandan ND 58554

Report Date: 8 Sep 11
Lab Number: 11-M2450
Work Order #: 81-818
Account #: 013479
Date Sampled:
Date Received: 28 Jun 11 9:00
PO #: 131460 OP

Sample Description: Unit I Bottom Ash
Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Antimony - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Arsenic - Total	0.0044	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Barium - Total	0.1135	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Beryllium - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Cadmium - Total	0.00164	mg/l	0.00100	6020	25 Jul 11 16:18	Claudette
Chromium - Total	0.0065	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Cobalt - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Copper - Total	0.0213	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Lead - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Manganese - Total	0.0027	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Molybdenum - Total	0.6860	mg/l	0.0020	6020	26 Jul 11 12:46	Claudette
Nickel - Total	0.0074	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Selenium - Total	0.0133	mg/l	0.0020	6020	26 Jul 11 9:46	Claudette
Silver - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Thallium - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Tin - Total	< 0.05	mg/l	0.0500	6020	25 Jul 11 16:18	Claudette
Vanadium - Total	0.0189	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Zinc - Total	0.0151	mg/l	0.0100	6020	25 Jul 11 16:18	Claudette
Uranium	< 0.002	mg/l	0.002	6020	25 Jul 11 16:18	Claudette

All analyses were performed on the extract from Method 1312 (SPLP) with a modified solution to solids ratio of 4:1.

Approved by: *D. Zarda*

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity

= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 1 of 2

Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2451
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit II Sand Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	11.1	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	20110	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	21	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	203	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Phenolphthalein Alk	171	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Carbonate	64	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Hydroxide	139	mg/l CaCO3	0	SM2320-B	22 Jul 11 17:00	Claudette
Tot Dis Solids(Summation)	22500	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	1200	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	70.2	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	318	meq/L	NA	SM1030-F	3 Aug 11 8:40	Calculated
Anion Summation	314	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	0.65	%	NA	SM1030-F	3 Aug 11 8:40	Calculated
Sodium Adsorption Ratio	80.9		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	See Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	< 0.5	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	< 0.1	mg/l	0.10	SM4500-F-C	4 Aug 11 17:00	CLB
Sulfate	14900	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	2.0	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	0.10	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	< 5	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	481	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 5	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	6500	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	459	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	1.09	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Iron - Total	< 1	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Strontium - Total	66.0	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Titanium - Total	< 1	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Boron - Total	5.96	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
 ! = Due to sample quantity

= Due to sample concentration
 + = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 2 of 2

Duane Leingang
Montana Dakota Utilities
PO Box 40
Mandan ND 58554

Report Date: 8 Sep 11
Lab Number: 11-M2451
Work Order #: 81-818
Account #: 013479
Date Sampled:
Date Received: 28 Jun 11 9:00
PO #: 131460 OP

Sample Description: Unit II Sand Ash
Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Antimony - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Arsenic - Total	0.0822	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Barium - Total	0.0930	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Beryllium - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Cadmium - Total	0.00182	mg/l	0.00100	6020	25 Jul 11 16:18	Claudette
Chromium - Total	0.0244	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Cobalt - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Copper - Total	0.1108	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Lead - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Manganese - Total	0.0052	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Molybdenum - Total	0.1000	mg/l	0.0020	6020	26 Jul 11 12:46	Claudette
Nickel - Total	0.0136	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Selenium - Total	0.0937	mg/l	0.0020	6020	26 Jul 11 9:46	Claudette
Silver - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Thallium - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Tin - Total	< 0.05	mg/l	0.0500	6020	25 Jul 11 16:18	Claudette
Vanadium - Total	0.3026	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Zinc - Total	0.0327	mg/l	0.0100	6020	25 Jul 11 16:18	Claudette
Uranium	< 0.002	mg/l	0.002	6020	25 Jul 11 16:18	Claudette

All analyses were performed on the extract from Method 1312 (SPLP) with a modified solution to solids ratio of 4:1.

Approved by:

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity

= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 1 of 2

Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2452
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit I Fly Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	12.9	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	50660	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	30	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	7020	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Phenolphthalein Alk	6900	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Carbonate	240	mg/l CaCO3	4	SM2320-B	25 Jul 11 17:00	Claudette
Hydroxide	6780	mg/l CaCO3	0	SM2320-B	25 Jul 11 17:00	Claudette
Tot Dis Solids (Summation)	42200	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	1750	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	102	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	663	meq/L	NA	SM1030-F	3 Aug 11 8:40	Calculated
Anion Summation	613	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	3.99	%	NA	SM1030-F	3 Aug 11 8:40	Calculated
Sodium Adsorption Ratio	143		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	1.5	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	5.60	mg/l	0.10	SM4500-F-C	10 Aug 11 17:00	CLB
Sulfate	22600	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	53.8	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	0.68	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	7.22	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	22.4	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	700	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 25	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	14100	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	580	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	< 5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Iron - Total	< 5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Strontium - Total	59.5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Titanium - Total	< 5	mg/l	0.10	6010	2 Aug 11 9:30	Stacy
Boron - Total	1.89	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
 ! = Due to sample quantity

= Due to sample concentration
 + = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267

ND # ND-00016



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Page: 2 of 2

Duane Leingang
Montana Dakota Utilities
PO Box 40
Mandan ND 58554

Report Date: 8 Sep 11
Lab Number: 11-M2452
Work Order #: 81-818
Account #: 013479
Date Sampled:
Date Received: 28 Jun 11 9:00
PO #: 131460 OP

Sample Description: Unit I Fly Ash
Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Antimony - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Arsenic - Total	0.1128	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Barium - Total	0.0906	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Beryllium - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Cadmium - Total	0.00244	mg/l	0.00100	6020	25 Jul 11 16:18	Claudette
Chromium - Total	0.0270	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Cobalt - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Copper - Total	0.2934	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Lead - Total	0.0161	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Manganese - Total	0.0102	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Molybdenum - Total	0.9246	mg/l	0.0020	6020	26 Jul 11 12:46	Claudette
Nickel - Total	0.0175	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Selenium - Total	0.1959	mg/l	0.0020	6020	26 Jul 11 9:46	Claudette
Silver - Total	< 0.001	mg/l	0.0010	6020	25 Jul 11 16:18	Claudette
Thallium - Total	< 0.002	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Tin - Total	< 0.05	mg/l	0.0500	6020	25 Jul 11 16:18	Claudette
Vanadium - Total	0.0158	mg/l	0.0020	6020	25 Jul 11 16:18	Claudette
Zinc - Total	0.3984	mg/l	0.0100	6020	25 Jul 11 16:18	Claudette
Uranium	< 0.002	mg/l	0.002	6020	25 Jul 11 16:18	Claudette

All analyses were performed on the extract from Method 1312 (SPLP) with a modified solution to solids ratio of 4:1.

Approved by: *D. Jordan*

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity

= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016



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Page: 1 of 2

Duane Leingang
 Montana Dakota Utilities
 PO Box 40
 Mandan ND 58554

Report Date: 8 Sep 11
 Lab Number: 11-M2453
 Work Order #: 81-818
 Account #: 013479
 Date Sampled:
 Date Received: 28 Jun 11 9:00
 PO #: 131460 OP

Sample Description: Unit II Fly Ash
 Sample Site: MDU Heskett

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
SPLP Extraction				1312	22 Jul 11	SS
pH	12.8	units	N/A	SM4500 H+ B	22 Jul 11 17:00	Claudette
Specific Conductance	27240	umhos/cm	N/A	SM2510-B	22 Jul 11 17:00	Claudette
Total Suspended Solids	13	mg/l	1	SM2540-D	22 Jul 11 14:00	CLB
Total Alkalinity	4570	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Phenolphthalein Alk	4520	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Bicarbonate	< 4	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Carbonate	100	mg/l CaCO3	4	SM2320-B	22 Jul 11 17:00	Claudette
Hydroxide	4470	mg/l CaCO3	0	SM2320-B	22 Jul 11 17:00	Claudette
Tot Dis Solids(Summation)	16000	mg/l	NA	SM1030-F	3 Aug 11 8:40	Calculated
Total Hardness as CaCO3	1960	mg/l	NA	SM2340-B	3 Aug 11 8:40	Calculated
Hardness in grains/gallon	115	gr/gal	NA	SM2340-B	3 Aug 11 8:40	Calculated
Cation Summation	252	meq/L	NA	SM1030-F	9 Aug 11 9:09	Calculated
Anion Summation	247	meq/L	NA	SM1030-F	28 Jul 11 14:30	Calculated
Percent Error	1.00	%	NA	SM1030-F	9 Aug 11 9:09	Calculated
Sodium Adsorption Ratio	46.1		NA	USDA 20b	3 Aug 11 8:40	Calculated
Gross Alpha Radiation	Attached	pCi/l			22 Aug 11 2:03	
Radon 222	Attached				28 Jul 11 4:37	
Radium 226	Attached	pCi/l			22 Aug 11 22:20	
Radium 228	Attached	pCi/l			16 Aug 11 16:50	
Total Organic Carbon	1.6	mg/l	0.5	SM5310-C	1 Aug 11 8:00	Eric
Fluoride	3.60	mg/l	0.10	SM4500-F-C	4 Aug 11 17:00	CLB
Sulfate	7400	mg/l	5.00	ASTM D516-02	27 Jul 11 9:00	KMP
Chloride	66.0	mg/l	1.0	SM4500-Cl-E	27 Jul 11 14:00	KMP
Nitrate-Nitrite as N	0.38	mg/l	0.10	EPA 353.2	28 Jul 11 14:30	KMP
Ammonia-Nitrogen as N	15.0	mg/l	0.10	EPA 350.1	28 Jul 11 10:45	KMP
Phosphorus as P - Total	< 0.1	mg/l	0.10	EPA 365.1	28 Jul 11 13:00	KMP
Mercury - Total	< 0.0002	mg/l	0.0002	EPA 245.1	28 Jul 11 8:00	Eric
Chemical Oxygen Demand	9.4	mg/l	5.0	HACH 8000	1 Aug 11 8:30	Wayne
Calcium - Total	785	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Magnesium - Total	< 5	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Sodium - Total	4720	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Potassium - Total	275	mg/l	1.0	6010	3 Aug 11 8:40	Stacy
Aluminum - Total	< 1	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Iron - Total	< 1	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Strontium - Total	85.0	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Titanium - Total	< 1	mg/l	0.10	6010	9 Aug 11 9:09	Stacy
Boron - Total	< 1	mg/l	0.10	6010	11 Aug 11 8:40	Stacy

RL = Method Reporting Limit

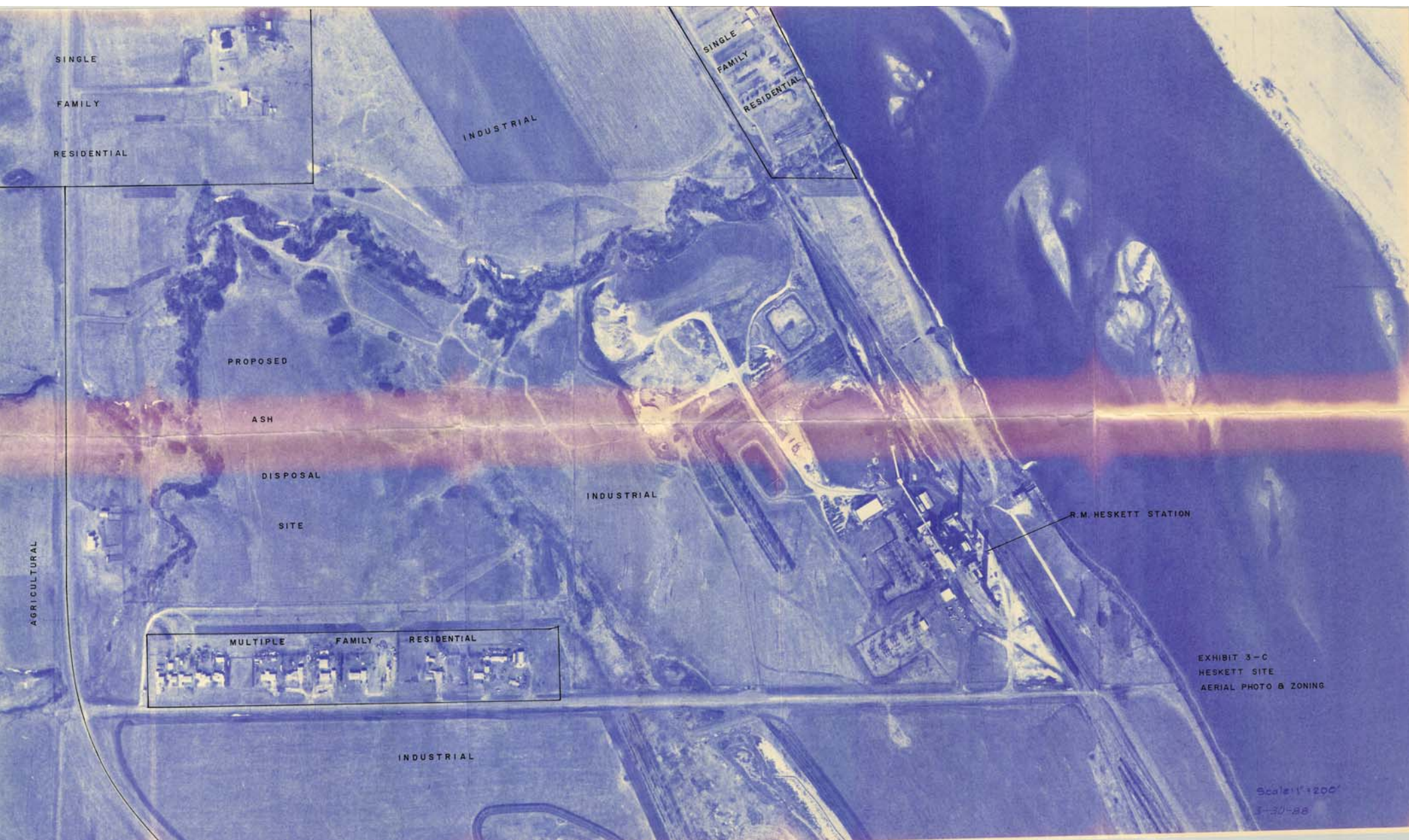
Elevated "Less Than Result" (<): @ = Due to sample matrix
 ! = Due to sample quantity

= Due to sample concentration
 + = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

Appendix D

Aerial Photo (March 30, 1998)



SINGLE
FAMILY
RESIDENTIAL

SINGLE
FAMILY
RESIDENTIAL

INDUSTRIAL

PROPOSED

ASH

DISPOSAL

SITE

INDUSTRIAL

R.M. HESKETT STATION

AGRICULTURAL

MULTIPLE FAMILY RESIDENTIAL

INDUSTRIAL

EXHIBIT 3-C
HESKETT SITE
AERIAL PHOTO & ZONING

Scale: 1" = 200'
3-30-88

Appendix E

Boring Logs

EXHIBIT 5-E

LITHOLOGIC LOGS

Wells 10, 11, 12 and 13

- 0-1 Top soil, silty, clayey, sandy, brown, calcareous; with some limestone pebbles.
- 1-11 Silt, clayey, brownish-tan, slightly indurated, very dry, calcareous; with thin coarse-grained, clean silt lenses and a few small (less than .5 in.) iron oxide concretions. Abundant small gypsum crystals (less than .13 in. long). Some small, black flakes of organic plant material. Cannonball-Ludlow Formations.
- 11-14 Silt, as above, with some (less than 20%) very fine- to fine-grained sand interspersed.
- 14-30 Silt, as above, clayey, less sand than above interval, oxidized; with very fine-grained silty sand lenses and very few gypsum crystals.
- 30-41 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with fewer small gypsum crystals than above intervals.
- 41-59 Silt, as above, very clayey, with some (less than 20%) fine- to medium-grained sand interspersed in a silt and clay matrix.
- 59-65 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed.
- 65-81 Silt, clayey, steel-gray to bluish, moderately indurated; with thin coarse-grained silt to very fine-grained sand lenses in an otherwise fine silt to clay matrix.
- 81-84 Clay, silty, steel-gray to bluish, moderately indurated, dense.
- 84-91 Siltstone, sandy, clayey, steel-gray to bluish, slightly indurated; with small fine-grained sand lenses and abundant (more than 20%) sand interspersed in the matrix.
- 91-110 Silt, clayey, bluish-gray, moderately indurated; with thin (less than 1 foot) mudstone lenses.
- 110-120 Silt, very clayey, steel-gray to bluish, moderately indurated, very dense. Cannonball-Ludlow Formations.

Wells 20 and 21

- 0-1 Top soil, silty, sandy, clayey, dark-brown, calcareous; with some limestone and granite pebbles.
- 1-21 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, oxidized; with small iron oxide concretions and abundant small gypsum crystals.
Cannonball-Ludlow Formations.
- 21-26 Silt, as above, steel-gray (color change).
- 26-49 Silt, clayey, with some (less than 20%) very fine- to medium-grained sand interspersed, steel-gray to bluish, slightly indurated; with very few small gypsum crystals and some thin (less than 1 foot) siltstone lenses.
- 49-53 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed.
- 53-63 Silt, as above, clayey, less sand, with thin (less than 1 foot) siltstone to mudstone lenses.
- 63-80 Silt, very clayey, steel-gray to bluish, moderately indurated, very dense.
Cannonball-Ludlow Formations.

Wells 30, 31, 32 and 33

- 0-1 Top soil, silty, sandy, brownish, calcareous; with some granite and limestone pebbles.
- 1-2 Pebble-loam (glacial till), silty, sandy, clayey, yellowish-brown, dry, calcareous.
- 2-31 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, oxidized; with small iron oxide concretions. Some small, black flakes organic plant material.
Cannonball-Ludlow Formations.
- 31-44 Silt, clayey, steel-gray (color change), slightly indurated, calcareous; with small iron oxide concretions, thin coarse silt lenses, small gypsum crystals and gray to reddish-brown mottling.

- 44-61 Silt, as above, with some (less than 20%) fine- to medium-grained sand interspersed.
- 61-65 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed, dense.
- 65-76 Silt, as above, clayey, less sand, some thin (less than 1 foot) lenses of siltstone to mudstone.
- 76-80 Siltstone, sandy, clayey, steel-gray to bluish, slightly indurated; with small fine-grained sand lenses and abundant (more than 20%) fine-grained sand interspersed in the matrix.
- 80-92 Silt, clayey, steel-gray to bluish, moderately indurated, with some (less than 20%) very fine- to fine grained sand interspersed.
- 92-120 Silt, very clayey, steel-gray to bluish, moderately indurated, very dense.
Cannonball-Ludlow Formations.
- Well 40
- 0-1 Top soil, sandy, silty, brownish-tan, calcareous; with some granite and limestone pebbles.
- 1-5 Pebble-loam (glacial till), sandy, silty, with detrital lignite and organic matter, yellowish-brown, very dry, calcareous.
- 5-22 Sand, very fine- to medium-grained, unconsolidated, with thin lenses of clay and detrital lignite, brownish-yellow, calcareous.
- 22-40 Silt, clayey, with minor amounts (less than 10%) very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, oxidized; with small iron oxide concretions and small gypsum crystals; Cannonball-Ludlow Formations.
- 40-51 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with some reddish-brown mottling and some very thin (less than 6 inches) mudstone lenses.
- 51-58 Silt, as above, with abundant (more than 20%) fine-grained sand and thin silty-clay lenses.

- 58-62 Siltstone, sandy, clayey, steel-gray to bluish, moderately indurated; with small fine-grained sand lenses and abundant (more than 20%) sand interspersed in the matrix.
- 62-70 Silt, clayey, with some (less than 20%) fine- to medium-grained sand interspersed, steel-gray to bluish, moderately indurated; with thin (less than 2 feet) sandy lenses.
- 70-80 Silt, as above, very clayey, some (less than 10%) fine-grained sand interspersed; less sand than above interval.
- 80-120 Silt, as above, dark-steel-gray.
Cannonball-Ludlow Formations.

Wells 41, 42 and 43

- 0-1 Top soil, sandy, silty, dark-brown, calcareous; with some granite and limestone pebbles.
- 1-4 Pebble-loam (glacial till), sandy, silty, clayey, yellowish-brown, very dry, calcareous.
- 4-40 Silt, clayey, with some (less than 20%) very fine-grained sand interspersed, brownish-tan, unconsolidated, noncompacted, calcareous to 25 feet, oxidized; with small iron oxide concretions and abundant small gypsum crystals.
Cannonball-Ludlow Formations.
- 40-51 Silt, clayey, with minor amounts (less than 10%) of very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with some reddish-brown mottling and some very thin (less than 6 inches) mudstone lenses.
- 51-58 Silt, as above, with abundant (more than 20%) fine-grained sand and thin silty-clay lenses.
- 58-62 Siltstone, sandy, clayey, steel-gray to bluish, moderately indurated; with small fine-grained sand lenses and abundant (more than 20%) sand interspersed in the matrix.
- 62-70 Silt, clayey, with some (less than 20%) fine- to medium-grained sand interspersed, steel-gray to bluish, moderately indurated; with thin (less than 2 feet) sandy lenses.

70-80 Silt, as above, very clayey, some (less than 10%) fine-grained sand interspersed; less sand than above interval.

Wells 43 and 44

- 0-2 Top soil, clayey, silty, some sand, brownish-tan to light-gray, calcareous.
- 2-20 Silt, clayey, with some (less than 20%) fine-grained sand interspersed, brownish-tan, slightly indurated, very dry, calcareous; with small iron oxide concretions, abundant small gypsum crystals and occasional thin silt lenses. Cannonball-Ludlow Formations.
- 20-25 Silt, as above, very clayey, oxidized, with minor amounts (less than 10%) of fine-grained sand.
- 25-35 Silt, as above, dark-brownish-tan to bluish-gray (color change), with thin very fine-grained sand lenses.
- 35-60 Silt, clayey, with some (less than 20%) fine- to medium-grained sand interspersed, steel-gray to bluish, moderately indurated; with some indurated silty sand lenses. Cannonball-Ludlow Formations.

Wells 50, 51 and 52

- 0-4 Top soil, clayey, silty, very dark-brown.
- 4-10 Clay, silty, with some (less than 20%) fine-grained sand, dark-brownish-tan, soft, cohesive, wet, sticky; with some pebbles.
- 10-22 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, brownish-tan, slightly indurated, calcareous, dense; with abundant small gypsum crystals and very thin silt and sand lenses; Cannonball-Ludlow Formations.
- 22-23 Sandstone, fine-grained, silty, indurated, oxidized, dark-brown.
- 23-30 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with thin medium grained sand lenses.

30-40 Silt, as above, very clayey, less sand than above interval, dark-steel-gray.
Cannonball-Ludlow Formations.

Wells 53 and 54

- 0-4 Top soil, clayey, silty, very dark-brown, wet, sticky.
- 4-15 Clay, silty, with some (less than 20%) fine- to medium-grained sand interspersed, brownish-tan, slightly indurated, dry, calcareous; with small iron oxide concretions, small gypsum crystals and occasional reddish-brown mottling;
Cannonball-Ludlow Formations.
- 15-20 Sand, very fine-grained to medium-grained, silty, clayey, unconsolidated, yellowish-brown, oxidized.
- 20-30 Silt, clayey, with some (less than 20%) fine-grained sand interspersed, steel-gray (color change), slightly indurated; with clay and sand lenses, some small concretions and some small gypsum crystals.
- 30-45 Silt, as above, very clayey.
- 45-60 Silt, as above, clayey, brownish-gray, moderately indurated, some reddish-brown mottling.
Cannonball-Ludlow Formations.

Wells 55 and 56

- 0-5 Sandy-loam (glacial), with fine- to medium-grained sand, silty, calcareous; with small granite and limestone pebbles.
- 5-26 Clay, silty, with minor amounts (less than 10%) of very fine-grained sand, dark-brownish-tan, moderately indurated, brittle, very dry, calcareous; with small iron oxide concretions, small gypsum crystals and occasional thin sandstone laminae. Some small, black flakes of organic plant material.
Cannonball-Ludlow Formations.
- 26-35 Clay, as above, very silty, sandy, brownish-tan, oxidized.

- 35-40 Silt, clayey, with some (less than 20%) very fine- to fine-grained sand interspersed, steel-gray (color change) moderately indurated; with small gypsum crystals and occasional clay lenses.
- 40-60 Silt, as above, with minor amounts (less than 10%) of fine-grained sand interspersed.
- 60-85 Silt, as above, clayey, less sand than above interval.
- 85-100 Silt, as above, very clayey, with minor amounts (less than 10%) of sand interspersed, light-gray. Cannonball-Ludlow Formations.

Wells 60, 61 and 62

- 0-2 Top soil, silty, clayey, dark-brown to tanish-brown, calcareous.
- 2-25 Silt, very clayey, with some minor amounts (less than 10%) of very fine- to fine-grained sand interspersed, brownish-tan, slightly indurated, dry, calcareous; with abundant small gypsum crystals and thin silt and sand lenses; Cannonball-Ludlow Formations.
- 25-29 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand interspersed.
- 29-36 Silt, as above, clayey, less sand than above interval, dark-brownish-tan, oxidized.
- 36-60 Silt, very clayey, with some (less than 20%) very fine-grained sand interspersed, steel-gray (color change), moderately indurated; with thin (less than 1 foot) sandy-silt lenses. Cannonball-Ludlow Formations.

Well 70 0-2 Pebble-loam (glacial till), clayey, sandy, yellowish-brown, unconsolidated, damp, calcareous.

- 2-21 Silty, clayey, with some (less than 20%) fine-grained sand interspersed, brownish-tan, moderately indurated, very dry, calcareous, oxidized; with small iron oxide concretions and abundant small gypsum crystals. Cannonball-Ludlow Formations.

- 21-24 Shale, silty, steel- to dark-gray (color change), indurated, fissile, very dry; with occasional thin silt and sand lenses.
- 24-31 Silt, clayey, with abundant (more than 30%) sand, steel-gray, moderately indurated.
- 31-62 Silt, clayey, with some (less than 20%) very fine- to fine- grained sand interspersed, steel-gray, moderately indurated; with some small gypsum crystals and small iron oxide concretions.
- 62-76 Silt, as above, with some (less than 20%) fine-grained sand interspersed.
- 76-82 Silt, as above, with abundant (more than 20%) fine- to medium-grained sand.
- 82-100 Silt, as above, clayey, with some (less than 20%) fine-grained sand interspersed, dark-gray.
Cannonball-Ludlow Formations.
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The lithologic logs for wells 1-4 were described by personal from Water Supply Incorporated (WS), Bismarck, North Dakota. The wells were installed during a previous ground water investigation at Heskett Station.

Well WS 2

0-1 Top soil, silty, black.
1-4 Pebble-loam (glacial till), silty, clayey, some cobbles, yellowish-brown.
4-7 Gravel, sand and rocks.
7-21 Sand, fine- to coarse-grained, some pebbles.
21-39 Clay, silty, sandy, yellowish-brown to gray.
39-52 Clay, silty, sandy, gray.
52-67 Sand, fine-grained, bluish, with some clay layers.
67-89 Clay, silty, sandy, brown to gray.

Wells WS 1, 1A and 1B

0-1 Top soil, silty, black
1-4 Clay, (glacial), silty, with pebbles, yellowish-brown.
4-21 Sand, fine- to medium-grained, yellowish-brown; with clay and silt lenses.
21-25 Clay, silty, yellowish-brown.
25-30 Sand, fine-grained, yellowish-brown, some indurated layers.
30-35 Clay, silty, yellowish-brown.
35-45 Sand, fine-grained, yellowish-brown.
45-50 Clay, silty, sandy, gray, about 50 percent shale.
50-56 Sand, fine-grained, with clay layers.
56-73 Clay, silty, sandy, gray.

Wells WS 4, 4A and 4B

0-13 Pebble-loam (glacial till), silty, sandy, with some cobbles, yellowish-brown.
13-23 Sand, fine- to medium-grained, yellowish-brown.
23-25 Slay, silty, sandy, yellowish-brown.
25-27 Sandstone, indurated.
27-30 Clay, sandy, silty, gray.
30-36 Sand, fine-grained, gray.
36-52 Clay, silty, sandy, gray; with some sand layers.

Wells WS 3 and 3A

0-1 Top soil, silty, black.
1-12 Pebble-loam, clayey, silty, with some cobbles, yellowish-brown.
12-16 Clay, silty, gray; with some shale layers.
16-18 Limestone, indurated.
18-23 Clay, silty, yellowish-brown; with some sand layers.
23-44 Sand, fine- to medium-grained, gray; with some clay layers.
44-50 Clay, silty, medium-gray.

Project: Heskett Station
 Project No.: 34301012
 Location: Mandan, ND
 Coordinates: Lat: 46.86620° Long: -100.89313°
 Datum:
 Surface Elevation:
 Drilling Method: HSA
 Sampling Method: Split Spoon
 Unique Well No.: MW-44 R
 Completion Depth: 46.0 ft

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	OL/OH	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						0-1': TOPSOIL (OL/OH); Very Dark Brown (2.5/2 7.5YR); low to medium plasticity; roots, fine to medium grained sand.		
1		1	3-3-5-8.	OL/OH		1-46': SANDY CLAY (CL); Brown (5/4 7.5YR) to Dark Gray (4/1 7.5YR); medium to high plasticity; massive; fine to medium grained sand. Moist; 20% gravel, 30% sand, 50% fines. At 1-5': Gravel sized inclusions. Moist; 10% gravel, 20% sand, 70% fines.	PRO. CASING Diameter: 4" by 4" Type: Steel Interval: 3' up & 3' down	
2		2	9-9-7-7.					
5		3	7-5-5-7.			Moist; 0% gravel, 30% sand, 70% fines.	RISER CASING Diameter: 2" Type: Schd 40 PVC Interval: Stick up to screen (23')	
		4	7-9-11-13.			Moist; 0% gravel, 20% sand, 80% fines.		
		5	7-9-12-13.			At 8': Oxidized staining.	GROUT Type: Cement Interval: 0-0.5' BGS	
10		6	6-7-11-13.				SEAL Type: Bentonite Interval: Chips 0.5-21' BGS	
		7	7-10-12-14.	CL			SANDPACK Type: Granusil Interval: 21-46' BGS	
15		8	6-10-14-14.				SCREEN Diameter: 2" Type: No. 10 Slot Interval: 23-43' BGS	
20		9	10-10-13-16.			At 20': Interbedded layer of sand.		
25		10	10-10-12-16.	CL		(CL): At 24': Color change to dark brown (3/3 7.5YR). Moist; 0% gravel, 20% sand, 80% fines. At 25': Sand lens.		

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Date Boring Started: 10/20/14
 Date Boring Completed: 10/20/14
 Logged By: JEG3
 Drilling Contractor: Midwest Testing (Terracon)
 Drill Rig:

Remarks: Water encountered at 28.7' BGS in MW-44R while drilling on 10/2014

Additional data may have been collected in the field which is not included on this log.
 Weather:



Barr Engineering Company
 234 West Century Avenue
 Bismarck, ND 58503
 Telephone: 701-255-5460

LOG OF BORING MW-44 R

SHEET 2 OF 2

Project: Heskett Station
 Project No.: 34301012
 Location: Mandan, ND
 Coordinates: Lat: 46.86620° Long: -100.89313°
 Datum:

Surface Elevation:
 Drilling Method: HSA
 Sampling Method: Split Spoon
 Completion Depth: 46.0 ft
 Unique Well No.: MW-44 R

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SOUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet	
30		11	8-12-14-18	CL		(CL): At 24': Color change to dark brown (3/3 7.5YR). (continued) Wet; 0% gravel, 20% sand, 80% fines. At 30.5': Sand lens. (CL): At 32': Color change to dark gray (4/1 7.5YR).	<p>PRO. CASING Diameter: 4" by 4" Type: Steel Interval: 3' up & 3' down</p> <p>RISER CASING Diameter: 2" Type: Schd 40 PVC Interval: Stick up to screen (23')</p> <p>GROUT Type: Cement Interval: 0-0.5' BGS</p> <p>SEAL Type: Bentonite Interval: Chips 0.5-21' BGS</p> <p>SANDPACK Type: Granusil Interval: 21-46' BGS</p> <p>SCREEN Diameter: 2" Type: No. 10 Slot Interval: 23-43' BGS</p>		
35		12	8-13-16-27						
40		13	11-19-25-27	CL					
45		14	14-18-27-34	SC		(SC): At 45.8': Clayey Sand (SC), fine to medium grained, low to medium plasticity, dark greenish gray (4/10G Gley 2).			

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Date Boring Started: 10/20/14
 Date Boring Completed: 10/20/14
 Logged By: JEG3
 Drilling Contractor: Midwest Testing (Terracon)
 Drill Rig:

Remarks: Water encountered at 28.7' BGS in MW-44R while drilling on 10/2014

Additional data may have been collected in the field which is not included on this log.
 Weather:



Barr Engineering Company
 234 West Century Avenue
 Bismarck, ND 58503
 Telephone: 701-255-5460

LOG OF BORING MW-80 R

SHEET 1 OF 1

Project: Heskett Station

Project No.: 34301012

Location: Mandan, ND

Coordinates: Lat: 46.86789° Long: -100.89320°

Datum:

Surface Elevation:

Drilling Method: HSA

Sampling Method: Split Spoon

Completion Depth: 27.0 ft

Unique Well No.: MW-80 R

Depth, feet	Sample Type & Recovery	Sample No.	Blows/fin.	SOFC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						0-0.5': TOPSOIL (OL/OH): Black; organic roots.		
1		1	4-4-4-5			0.5-27': SANDY CLAY (CL): Brown (4/4 7.5 YR) to Black (2.5/1 7.5YR); medium to high plasticity; fine to medium grained sand. Moist: 0% gravel, 30% sand, 70% fines. At 2': Gravel inclusions.	<p>PRO. CASING Diameter: 4" by 4" Type: Steel Interval: 3' up & 3' down</p> <p>RISER CASING Diameter: 2" Type: Schd 40 PVC Interval: Stick up to screen (7')</p> <p>GROUT Type: Cement Interval: 0-0.5' BGS</p> <p>SEAL Type: Bentonite Interval: Chips 0.5-5' BGS</p> <p>SANDPACK Type: Granusil Interval: 5-27' BGS</p> <p>SCREEN Diameter: 2" Type: No 10 Slot Interval: 7-27' BGS</p>	
2		2	4-5-7-9			Moist: 10% gravel, 30% sand, 60% fines.		
3		3	4-4-5-8	CL		Moist: 0% gravel, 20% sand, 80% fines.		
4		4	4-4-6-6			(CL): At 8': Color change to 2.5/1 7.5YR black, no odor.		
5		5	3-4-5-6	CL		(CL): At 9': Color change to 2.5/2 7.5YR very dark brown. Moist: 0% gravel, 20% sand, 80% fines.		
6		6	1-3-3-4	CL		(CL): At 11': Color change to 3/3 7.5YR dark brown, Moist: 0% gravel, 20% sand, 80% fines.		
7		7	1-1-2-1			(CL): At 13': Color change to 4/4 7.5YR brown. Wet: 0% gravel, 20% sand, 80% fines.		
8		8	1-2-2-1					
9		9	7-11-12-17	CL		At 21': Thin sand lens less than 0.1" thick. Wet: 0% gravel, 20% sand, 80% fines. At 21.5': Thin sand lens less than 0.1" thick.		
10		10	7-11-17-17			Wet: 0% gravel, 20% sand, 80% fines. At 26.5': Thin sand lens less than 0.1" thick.		

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Date Boring Started: 10/20/14
 Date Boring Completed: 10/20/14
 Logged By: JEG3
 Drilling Contractor: Midwest Testing (Terracon)
 Drill Rig:

Remarks: Water encountered at 11.8' BGS in MW-80R while drilling on 10/20/14

Additional data may have been collected in the field which is not included on this log.
 Weather:



Barr Engineering Company
 4300 MarketPointe Drive Suite 200
 Minneapolis, MN 55435
 Telephone: 952-832-2600

LOG OF BORING MW-101 DRAFT

SHEET 1 OF 3

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438844.919° Long: 1868647.777°
 Datum: NAD 83

Surface Elevation: 1716.6 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 58.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL: Brown (5/4 7.5YR).		
1		1	4-4-4-6.			SANDY LEAN CLAY WITH GRAVEL (CL): fine to medium grained; Brown (5/3 7.5YR); moist; thinly laminated; some mottling; low plasticity; [Cannonball Formation]. At 2': Start to see gravel inclusions.	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs	1715
2		2	4-6-6-7.			At 4': Oxidized staining.	RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.98' ags - 34' bgs	1710
3		3	7-9-14-16.			At 5': Oxidized staining.		
4		4	8-9-12-15.			At 7': Oxidized staining and white staining.	GROUT Type: Neat cement Interval: 0 - 29' bgs	
5		5	10-15-21-26.				SEAL Type: Bentonite chips Interval: 29 - 32' bgs	
6		6	7-18-24-27.	CL		At 11': Oxidized staining.	SANDPACK Type: Silica 40-70 Interval: 32 - 56' bgs	1705
7		7	8-12-19-23.				SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 34 - 54' bgs	1700
8		8	8-14-18-23.			At 15': Gypsum. 16-20': No recovery.		
9		9	7-10-13-15.			At 20.5': Gypsum.		
10		10	7-9-13-15.	CL		LEAN CLAY (CL): Dark Brown (3/2 7.5YR); oxidized staining, some mottling; medium to high plasticity; [Cannonball Formation]. At 22': Color change to Brown (4/2 7.5YR).		1695
11						At 24': Interbedded sand, fine grained.		

25
 Date Boring Started: 8/18/15
 Date Boring Completed: 8/19/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Hole caved in from 56 - 58' bgs.
 DTW = 36.66' TOR on 9/23/2015 (elev. 1682.87)
 Additional data may have been collected in the field which is not included on this log.
 Weather:

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Barr Engineering Company
 4300 MarketPointe Drive Suite 200
 Minneapolis, MN 55435
 Telephone: 952-832-2600

LOG OF BORING MW-101 DRAFT

SHEET 2 OF 3

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438844.919° Long: 1868647.777°
 Datum: NAD 83

Surface Elevation: 1716.6 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 58.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
25		11	7-11-13-15.			LEAN CLAY (CL): Dark Brown (3/2 7.5YR); oxidized staining, some mottling; medium to high plasticity; [Cannonball Formation]. (continued) At 25' and 25.5': Gypsum.	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs	1690
		12	8-11-15-19.			At 26.5': Gypsum.		RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.98' ags - 34' bgs
30		13	8-11-13-15.			At 29.5': Gypsum.	GROUT Type: Neat cement Interval: 0 - 29' bgs	
		14	6-11-14-17.	CL				SEAL Type: Bentonite chips Interval: 29 - 32' bgs
35		15	8-13-17-22.			At 33': Gypsum.	SANDPACK Type: Silica 40-70 Interval: 32 - 56' bgs	
		16	8-14-19-21.			At 34.5': Gypsum.		SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 34 - 54' bgs
40		17	11-16-20-27.			FAT CLAY (CH): Black (2.5/1 7.5YR); very stiff; high plasticity; wet at 43'; [Cannonball Formation].		
		18	9-13-20-25.			At 38': Oxidized staining.		
45		19	7-14-23-26.			At 41': Oxidized staining.		
		20	9-16-23-26.	CH				

Date Boring Started: 8/18/15
 Date Boring Completed: 8/19/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Hole caved in from 56 - 58' bgs.
 DTW = 36.66' TOR on 9/23/2015 (elev. 1682.87)

Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-101
DRAFT

SHEET 3 OF 3

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438844.919° Long: 1868647.777°
 Datum: NAD 83

Surface Elevation: 1716.6 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 58.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
50						FAT CLAY (CH): Black (2.5/1 7.5YR); very stiff; high plasticity; wet at 43'; [Cannonball Formation]. (continued)	 PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.98' ags - 34' bgs GROUT Type: Neat cement Interval: 0 - 29' bgs SEAL Type: Bentonite chips Interval: 29 - 32' bgs SANDPACK Type: Silica 40-70 Interval: 32 - 56' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 34 - 54' bgs	1665
55					CH			1660
60						End of boring 58.0 feet		
65								
70								
75								

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Date Boring Started: 8/18/15
 Date Boring Completed: 8/19/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Hole caved in from 56 - 58' bgs.
 DTW = 36.66' TOR on 9/23/2015 (elev. 1682.87)
 Additional data may have been collected in the field which is not included on this log.
 Weather:



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LOG OF BORING MW-102 DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438161.145° Long: 1868782.871°
 Datum: NAD 83

Surface Elevation: 1703.8 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 46.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL: Brown (5/4 7.5YR).		
1		1	3-3-3-2.			LEAN CLAY (CL): medium grained; Brown (4/3 7.5YR); moist; low to medium plasticity; with gravel to 4"; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.85' ags - 10' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 8' bgs SANDPACK Type: Silica 40-70 Interval: 8 - 31' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 20 - 30' bgs	1700
2		2	3-2-2-3.					
3		3	3-3-4-5.	CL				
4		4	3-4-5-7.					
5		5	4-8-7-4.	ML				
6		6	4-3-5-9.	CL		LEAN CLAY WITH GRAVEL (CL): fine to medium grained; Brown (5/3 7.5YR); some mottling; medium plasticity; [Cannonball Formation].	1695	
7		7	3-5-7-9.			LEAN CLAY (CL): Dark Brown (3/2 7.5YR); medium to high plasticity; [Cannonball Formation].	1690	
8		8	6-8-12-14.					
9		9	6-10-12-16.					
10		10	5-9-14-16.	CL			1685	
11		11	5-12-15-18.					
12		12	9-15-18-22.			At 21': Color changes to Black (2.5/1).		1680

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Date Boring Started: 8/18/15
 Date Boring Completed: 8/18/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Lithological descriptions for a hole that was abandoned. Monitoring well blind drilled and installed next to abandoned hole.
 DTW = 17.09' TOR on 8/21/2015 (elev. 1689.51)

 Additional data may have been collected in the field which is not included on this log.
 Weather:



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LOG OF BORING MW-102
DRAFT

SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438161.145° Long: 1868782.871°
 Datum: NAD 83

Surface Elevation: 1703.8 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 46.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SPT	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet		
25		13	9-14-19-22.			LEAN CLAY (CL): Dark Brown (3/2 7.5YR); medium to high plasticity; [Cannonball Formation]. (continued)	<p>PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs</p> <p>RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.85' ags - 10' bgs</p> <p>GROUT Type: None Interval: None</p> <p>SEAL Type: Bentonite chips Interval: 0 - 8' bgs</p> <p>SANDPACK Type: Silica 40-70 Interval: 8 - 31' bgs</p> <p>SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 20 - 30' bgs</p>	1675		
		14	10-17-18-24.			At 29': Gypsum.				
		15	6-15-18-26.			At 29': Gypsum.				
30		16	7-14-18-22.			At 33.5' and 34': Gypsum.				
		17	11-16-20-27.			At 33.5' and 34': Gypsum.				
		18	10-14-15-24.			CL				
35		19	13-19-25-35.			CL				
		20	8-17-26-31.			CL				
40		21	10-20-27-38.			CL				
		22	13-20-27-37.			CL				
		23	15-27-27-32.			SM		SILTY SAND (SM): fine to medium grained; Dark Gray (4/1 7.5YR); wet; [Cannonball Formation].		
45								End of boring 46.0 feet		
										1660
50										

Date Boring Started: 8/18/15
 Date Boring Completed: 8/18/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: Lithological descriptions for a hole that was abandoned. Monitoring well blind drilled and installed next to abandoned hole.
 DTW = 17.09' TOR on 8/21/2015 (elev. 1689.51)

Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-103 DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 437578.205° Long: 1869355.992°
 Datum: NAD 83

Surface Elevation: 1714.7 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 44.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S U	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL (OL/OH): Brown (5/4 7.5YR).		
1		1	3-4-5-5.		OL/OH	LEAN CLAY (CL): Very Dark Gray (3/1 7.5YR); moist; stiff; medium to high plasticity; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs	1710
2		2	5-5-8-8.		CL			
3		3	5-8-10-11.		CL	POORLY GRADED SAND WITH GRAVEL (SP): fine to coarse grained; Brown (5/4 7.5YR); some oxidized staining, some mottling; [Cannonball Formation].	RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.79' ags - 24' bgs	1705
4		4	6-9-15-15.		SP			
5		5	5-6-5-4.		SP	POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; Brown (5/4 7.5YR); [Cannonball Formation].	GROUT Type: Neat cement Interval: 0 - 19' bgs	1700
6		6	4-5-5-7.		SP-SM			
7		7	2-2-2-3.		SP-SM	NO RECOVERY (16 - 20').	SEAL Type: Bentonite chips Interval: 19 - 22' bgs	1695
8		8	3-3-3-3.		SP-SM			
9		9	3-3-5-5.		CL	SANDY LEAN CLAY (CL): fine to medium grained; Light Brown (6/4 7.5YR); wet; some mottling and oxidized staining, cohesive; low to medium plasticity; [Cannonball Formation].	SANDPACK Type: Silica 40-70 Interval: 22 - 44' bgs	1690
10								
15								
20								
25								

Date Boring Started: 8/19/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 33.24' TOR on 8/20/2015 (elev. 1684.29)
 Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-103 DRAFT

SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 437578.205° Long: 1869355.992°
 Datum: NAD 83

Surface Elevation: 1714.7 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 44.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
25		10	2-2-4-4.	CL		SANDY LEAN CLAY (CL): fine to medium grained; Light Brown (6/4 7.5YR); wet; some mottling and oxidized staining, cohesive; low to medium plasticity; [Cannonball Formation]. <i>(continued)</i>	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 2.79' ags - 24' bgs GROUT Type: Neat cement Interval: 0 - 19' bgs SEAL Type: Bentonite chips Interval: 19 - 22' bgs SANDPACK Type: Silica 40-70 Interval: 22 - 44' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 24 - 44' bgs	1685
30		11	10-10-7-9.	SM		SILTY SAND WITH GRAVEL (SM): wet; [Cannonball Formation].		
		12	8-15-17-22.			LEAN CLAY (CL): Brown (4/4 7.5YR); moist; oxidized staining; medium to high plasticity; [Cannonball Formation]. At 32.5': Sand lens, color changes to Black (2.5/1 7.5YR). At 33.5': Sand lens. At 34': Interbedded sand with oxidized staining.		
35		13	7-19-15-25.					1680
		14	11-16-21-50 for 5".	CL		At 36.5': Sand lens. At 37': Sand lens. At 37.5': Color change to Gray (5/1 7.5YR). At 38-38.5': 6" thick layer of hard material.		
40		15	50 for 2"-.					1675
		16	12-17-22-30.					
		17	9-18-24-50.			At 42-42.5': Silt layer. At 43.5-44': Silt layer.		
45						End of boring 44.0 feet		

Date Boring Started: 8/19/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 33.24' TOR on 8/20/2015 (elev. 1684.29)

 Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-104 DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438853.542° Long: 1869832.72°
 Datum: NAD 83

Surface Elevation: 1681.5 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 32.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	SCUC	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0						TOPSOIL: Brown (5/4 7.5YR).		
1		1	4-5-5-5.			LEAN CLAY WITH SAND (CL): fine to medium grained; Brown (5/4 7.5YR); moist; gravel; medium plasticity; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs	1680
2		2	3-5-6-8.	CL				
3		3	3-7-9-10.			LEAN CLAY (CL): Brown (4/4 7.5YR); oxidized staining and mottling; medium to high plasticity; with gypsum throughout; [Cannonball Formation].	RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.06' ags - 9' bgs	1675
4		4	5-7-9-10.					
5		5	5-9-9-10.					
6		6	5-7-9-10.	CL			GROUT Type: None Interval: None	
7		7	5-8-8-12.			At 12': Heavily oxidized.		
8		8	5-9-11-15.			At 15': Start seeing black staining.	SEAL Type: Bentonite chips Interval: 0 - 7' bgs	1670
9		9	6-9-11-13.			At 17': Heavily oxidized.		
10		10	4-7-16-19.			SILTY SAND (SM): Strong Brown (5/6 7.5YR); wet; [Cannonball Formation].	SANDPACK Type: Silica 40-70 Interval: 7 - 32' bgs	
11		11	5-16-22-26.	SM		At 19.5': Color change to Brown (5/4 7.5YR). At 21': Oxidized layer.		
12		12	7-11-14-16.	CH		FAT CLAY (CH): Dark Gray (4/1 7.5YR); moist; stiff; high plasticity; with interbedded sand layers below 27'; [Cannonball Formation].		
13							SCREEN Diameter: 2"; No. 6 slot Type: PVC SCH 80 Interval: 9 - 29' bgs	1665
14								
15								1660
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

Date Boring Started: 8/20/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 13.25' TOR on 8/21/2015 (elev. 1671.26)

Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-104
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SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438853.542° Long: 1869832.72°
 Datum: NAD 83

Surface Elevation: 1681.5 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 32.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet	
25		13	6-12-16-17.			FAT CLAY (CH): Dark Gray (4/1 7.5YR); moist; stiff; high plasticity; with interbedded sand layers below 27'; [Cannonball Formation]. (continued)	 PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.06' ags - 9' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 7' bgs SANDPACK Type: Silica 40-70 Interval: 7 - 32' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 9 - 29' bgs	1655	
		14	8-12-16-21.	CH					
		15	8-12-16-20.						
30		16				Driller notes: sluff.		1650	
						End of boring 32.0 feet			

Date Boring Started: 8/20/15
 Date Boring Completed: 8/20/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 13.25' TOR on 8/21/2015 (elev. 1671.26)

 Additional data may have been collected in the field which is not included on this log.
 Weather:

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LOG OF BORING MW-105 DRAFT

SHEET 1 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438042.079° Long: 1870325.657°
 Datum: NAD 83

Surface Elevation: 1686.0 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 30.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet			
0						TOPSOIL: Brown (5/4 7.5YR).		1685			
1		1	6-7-6-5.	CL		SANDY LEAN CLAY (CL): fine to medium grained; Brown (4/2 7.5YR); moist; gravel; medium plasticity; [Cannonball Formation].	PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.16' ags - 10' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 7' bgs SANDPACK Type: Silica 40-70 Interval: 7 - 30' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 10 - 30' bgs	1685			
2		2	5-5-5-6.								
3		3	3-2-4-5.								
4		4	2-2-2-3.								
5				CL		LEAN CLAY (CL): Brown (4/2 7.5YR); soft; high plasticity; wet at 16"; [Cannonball Formation].		1680			
6		5	2-1-2-2.								
7		6	2-1-2-1.						At 10.5': Color change to Reddish-Yellow (6/6 7.5YR).		
8		7	2-1-1-3.								
9		8	4-3-5-5.						At 14.5-15.5': Gravel inclusions.		
10		9	7-9-11-13.						At 15.5': Color change to Brown (4/3 7.5YR).		
11		10	7-9-11-13.		At 18': Color change to Brown (5/3 7.5YR).						
12		11	7-9-13-15.	SP-SM		POORLY GRADED SAND WITH SILT (SP-SM): medium to coarse grained; Brown (5/4 7.5YR); [Cannonball Formation].		1675			
13		12	19-26-28-30.								
14								1670			
15								1665			
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

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Date Boring Started: 8/17/15
 Date Boring Completed: 8/17/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

Remarks: DTW = 13.22' TOR on 8/21/2015 (elev. 1675.92)

Additional data may have been collected in the field which is not included on this log.
 Weather:



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LOG OF BORING MW-105
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SHEET 2 OF 2

Project: R.M. Haskett Station CCR Monitoring Network
 Project No.: 34300014.12
 Location: Mandan, ND
 Coordinates: Lat: 438042.079° Long: 1870325.657°
 Datum: NAD 83

Surface Elevation: 1686.0 ft
 Drilling Method: HSA
 Sampling Method: SPT
 Completion Depth: 30.0 ft

Unique Well No.:

Depth, feet	Sample Type & Recovery	Sample No.	Blows/6in.	S C S C	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
25		13	15-25-31-40.			FAT CLAY (CL): Dark Brown (3/4 7.5YR); high plasticity; sand lens at 26.5'; [Cannonball Formation]. At 26': Color change to Gray (5/1 7.5YR).	 PRO. CASING Diameter: 4" Type: Steel pipe Interval: 3.5' ags - 1.5' bgs RISER CASING Diameter: 2" Type: PVC SCH 80 Interval: 3.16' ags - 10' bgs GROUT Type: None Interval: None SEAL Type: Bentonite chips Interval: 0 - 7' bgs SANDPACK Type: Silica 40-70 Interval: 7 - 30' bgs SCREEN Diameter: 2"; No.6 slot Type: PVC SCH 80 Interval: 10 - 30' bgs	1660
		14	10-15-18-30.	CL				
		15	11-16-22-32.					
30						End of boring 30.0 feet		

Date Boring Started: 8/17/15
 Date Boring Completed: 8/17/15
 Logged By: JEG3
 Drilling Contractor: Terracon
 Drill Rig: Rig mounted HSA

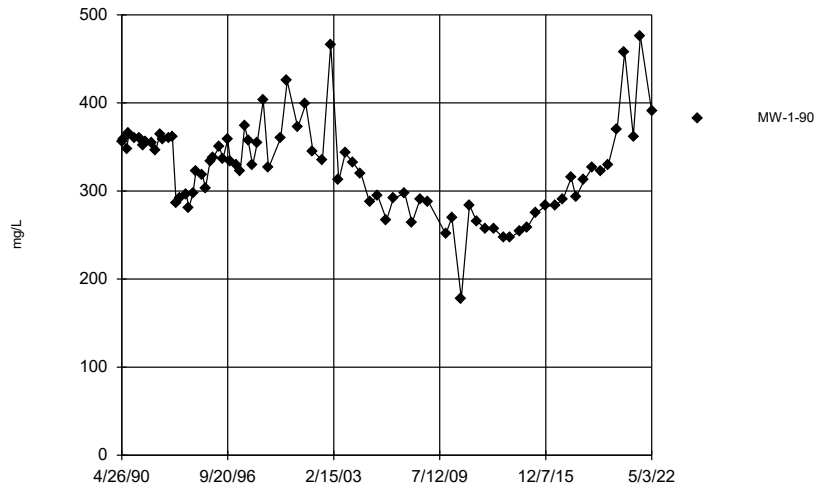
Remarks: DTW = 13.22' TOR on 8/21/2015 (elev. 1675.92)
 Additional data may have been collected in the field which is not included on this log.
 Weather:

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Appendix F

MW1-90 Time Series Plots

Alkalinity, bicarbonate

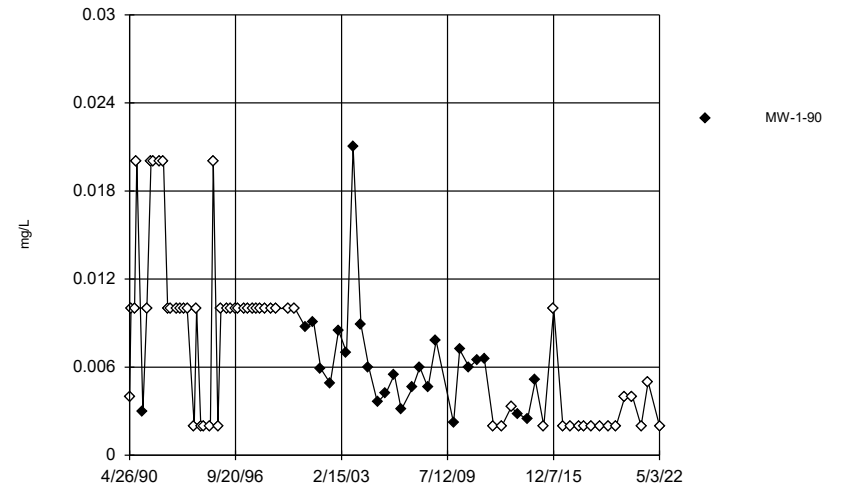


Time Series Analysis Run 12/14/2022 1:52 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Hollow symbols indicate censored values.

Arsenic

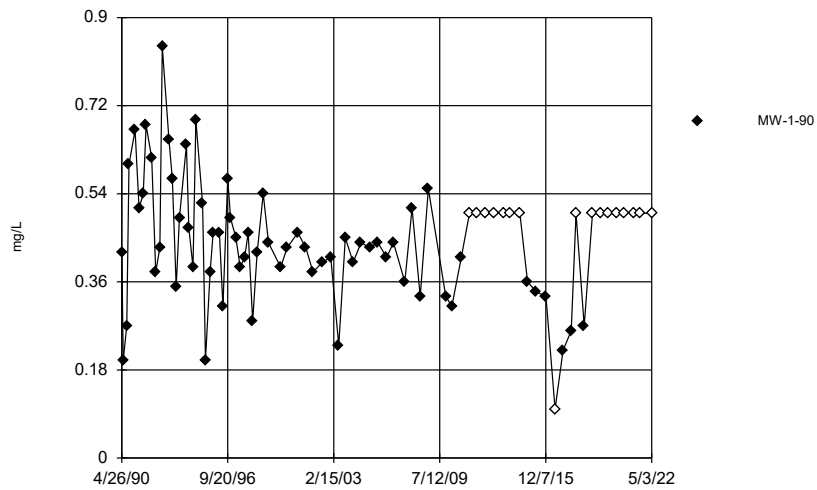


Time Series Analysis Run 12/14/2022 1:52 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

Hollow symbols indicate censored values.

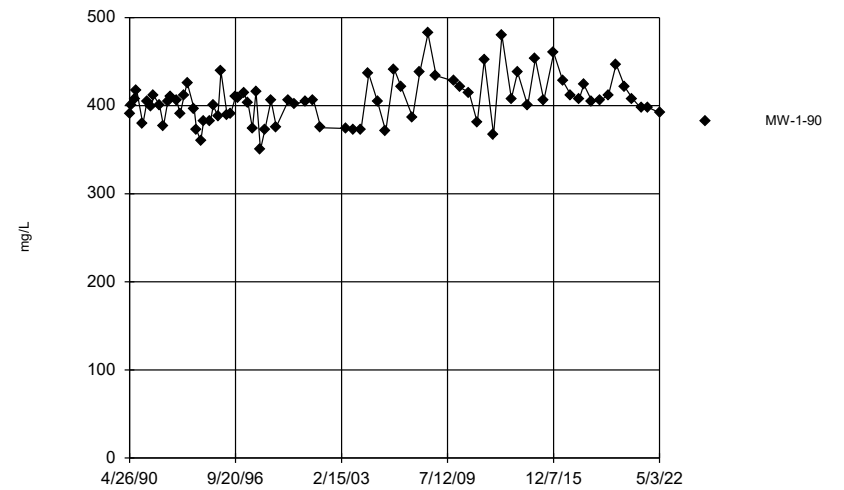
Boron



Time Series Analysis Run 12/14/2022 1:52 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

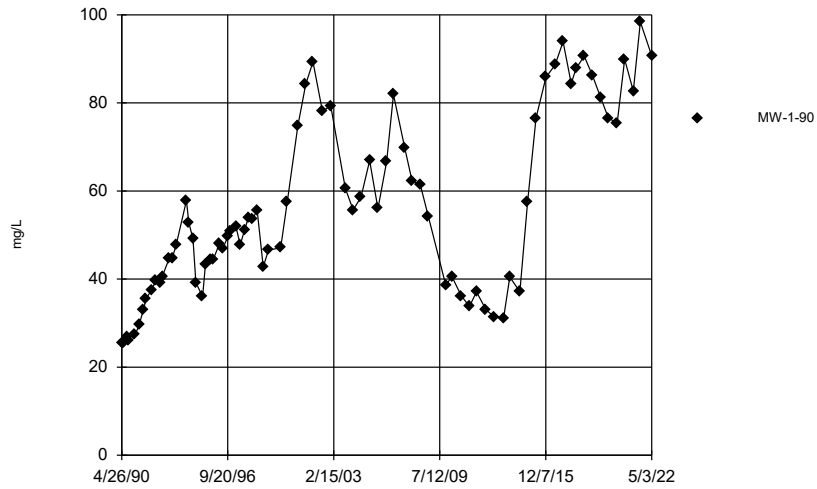
Calcium



Time Series Analysis Run 12/14/2022 1:52 PM

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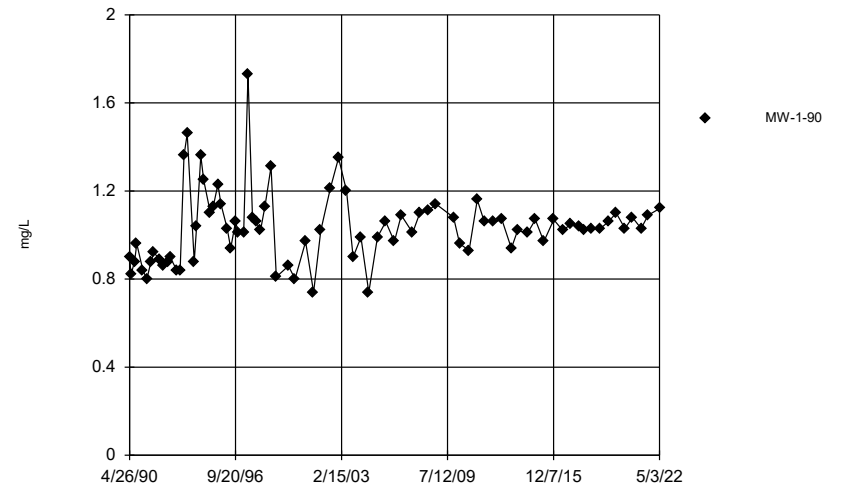
Chloride



Time Series Analysis Run 12/14/2022 1:52 PM

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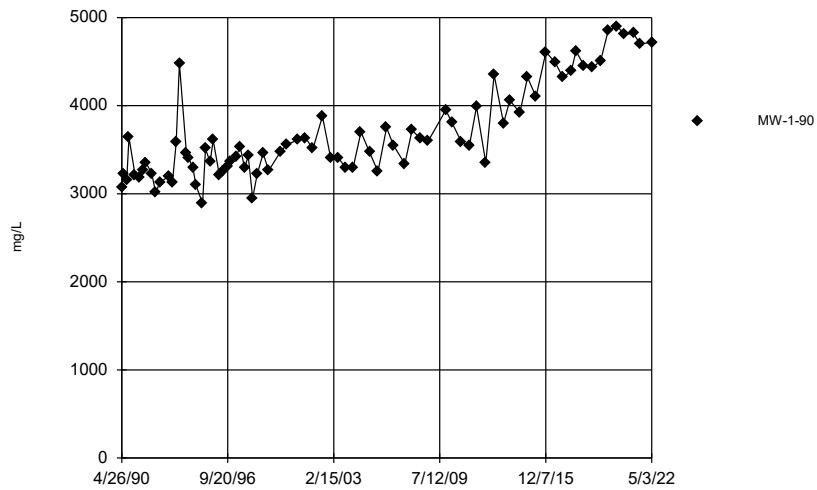
Fluoride



Time Series Analysis Run 12/14/2022 1:52 PM

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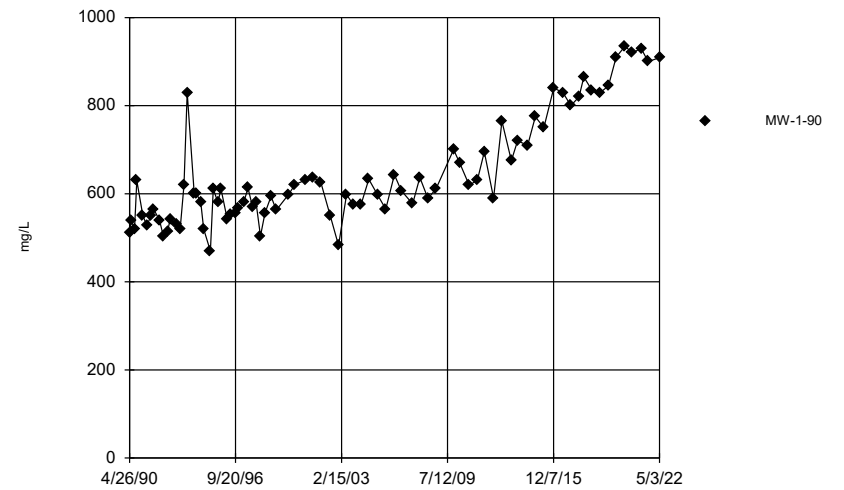
Hardness



Time Series Analysis Run 12/14/2022 1:52 PM

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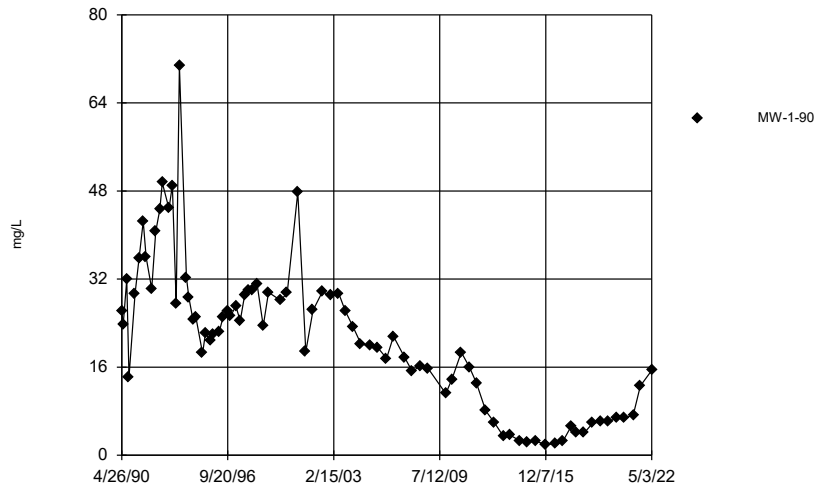
Magnesium



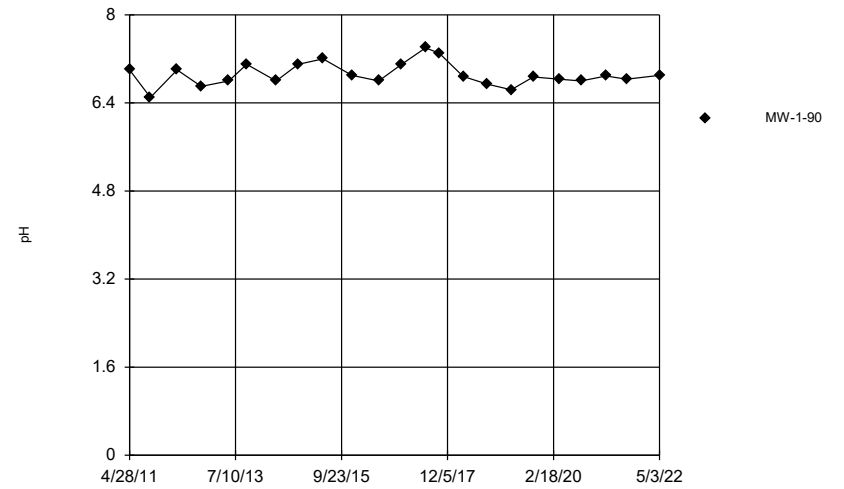
Time Series Analysis Run 12/14/2022 1:52 PM

R.M. Heskett Station Client: Montana-Dakota Utilities Co. Data: MDUHeskett_AMR_MW190

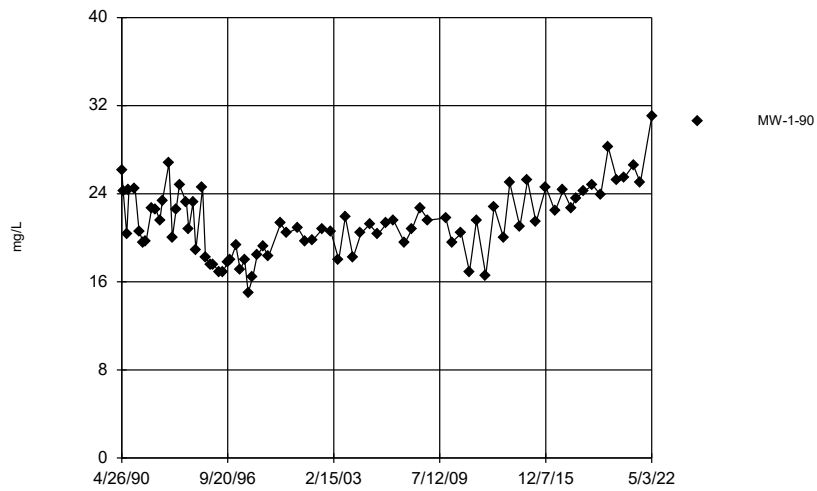
Nitrogen



pH

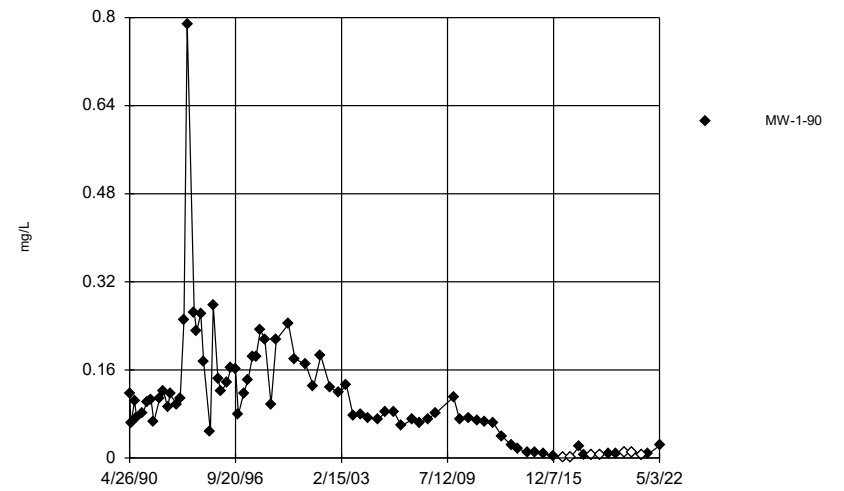


Potassium

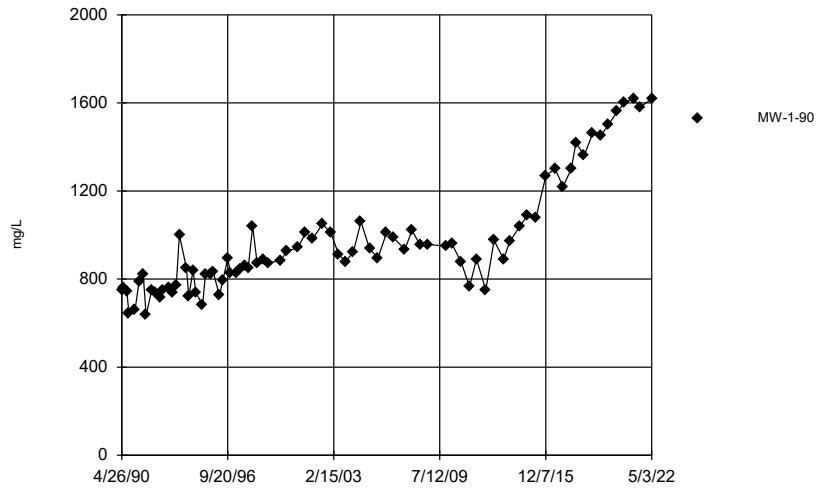


Hollow symbols indicate censored values.

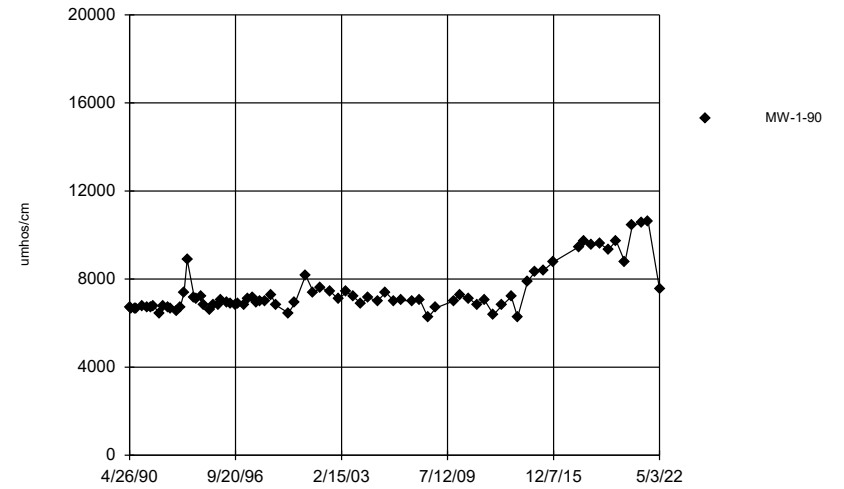
Selenium



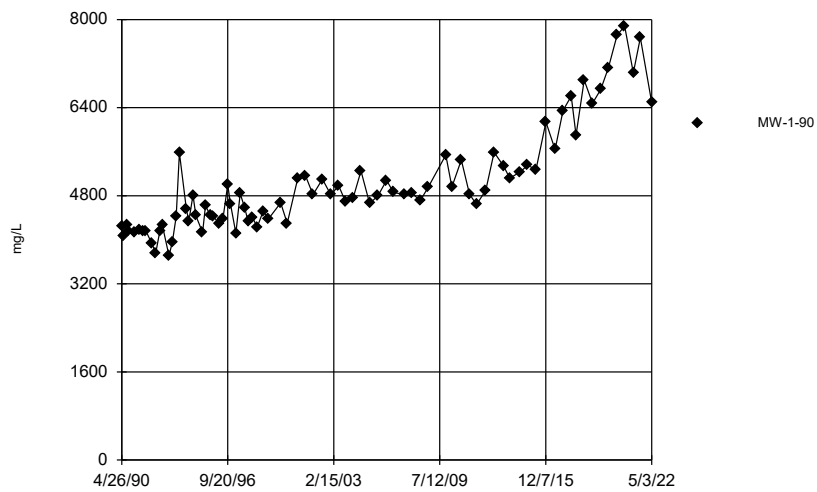
Sodium



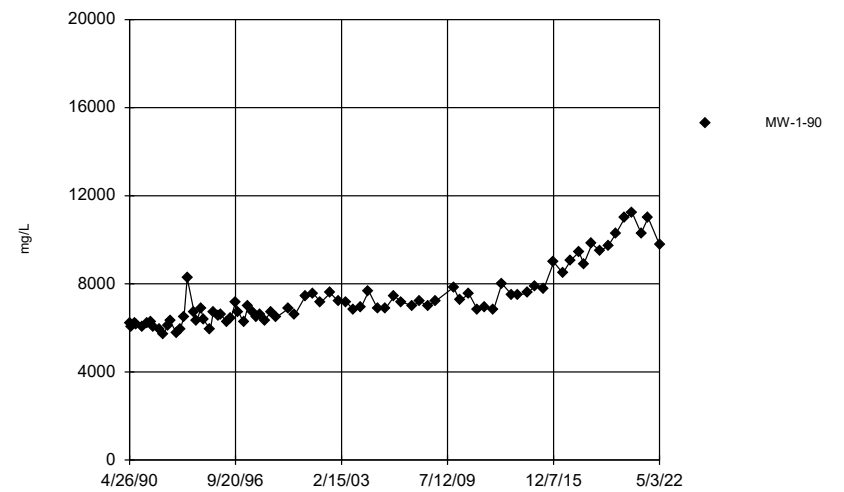
Specific conductance



Sulfate



TDS



Appendix G

Geochemist's Workbench Results

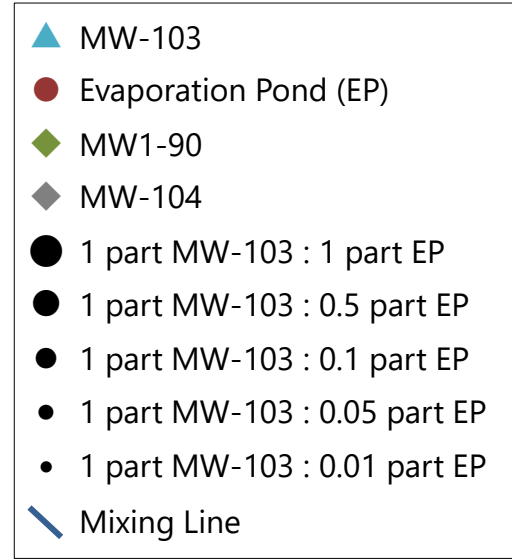
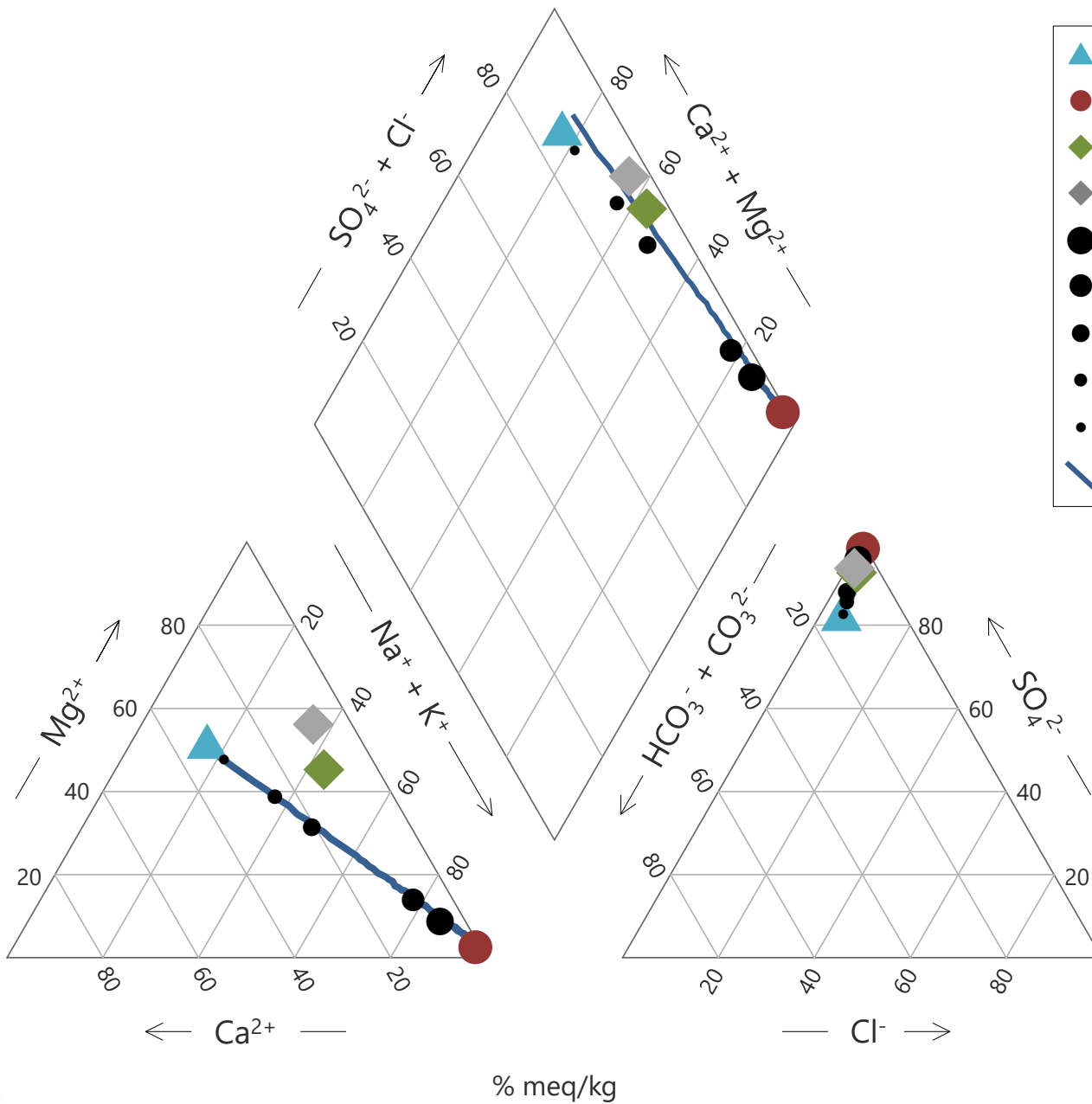


Figure G.1
 PIPER PLOT: EVAPORATION
 POND MIXING
 R.M. Heskett Station
 Mandan, North Dakota

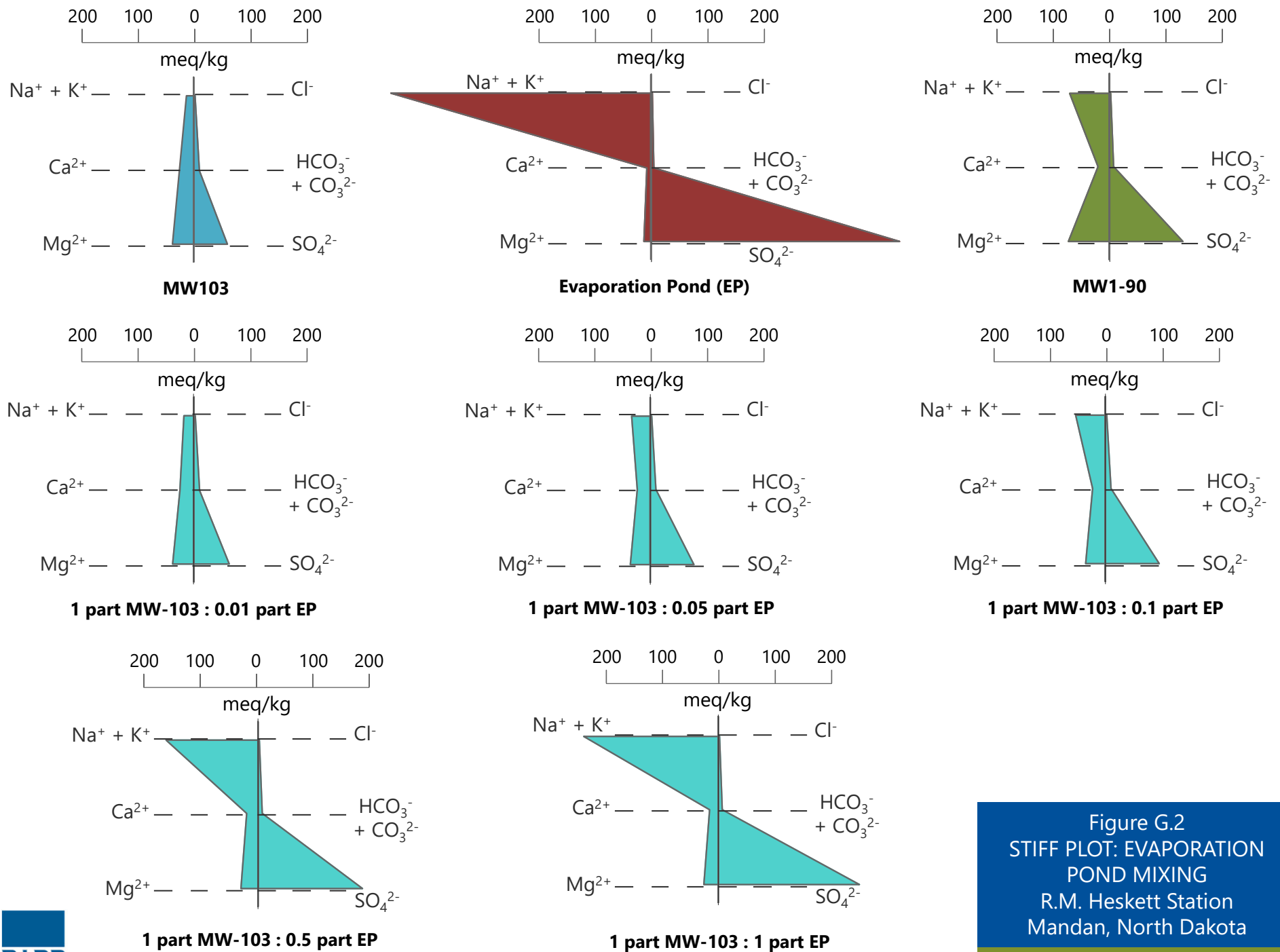


Figure G.2
 STIFF PLOT: EVAPORATION
 POND MIXING
 R.M. Heskett Station
 Mandan, North Dakota

**Table G.1
Geochemist's Workbench Mixing Model Results**

Description		Upgradient	Evap Pond	Mixing Evap Pond into MW 103					Downgradient	
Sample ID		MW-103	Evap Pond	1 : 0.01	1 : 0.05	1 : 0.1	1 : 0.5	1 : 1	MW1 90	MW 104
Sample Date		8/23/2021	9/16/2014	n/a					5/3/2022	8/24/2021
HCO3	mg/l	645	340	642	630	617	543	492	476	820
Ca++	mg/l	500	125	496	482	466	375	313	392	422
Cl	mg/l	119	79.8	119	117	115	106	99	90.7	94.1
F	mg/l	0.30	0.1	0.30	0.29	0.28	0.23	0.20	1.12	0.54
Mg++	mg/l	464	165	461	450	437	364	315	909	1,640
K+	mg/l	20.0	734	27.1	54.0	84.9	258	377	31.0	34
Na+	mg/l	266	10,600	368	758	1,210	3,710	5,430	1,620	1,940
SO4	mg/l	3,000	22,100	3,190	3,910	4,740	9,370	12,500	6,490	11,600
pH	SU	6.6	10.7	6.6	6.7	6.7	7.4	8.9	6.9	6.9
TDS	mg/kg	4,950	34,100	5,240	6,350	7,610	14,700	19,600	9,980	16,500

Appendix C

Groundwater Elevation and Flow Rate

Appendix C
Groundwater Levels
2022 Annual Monitoring Report
Heskett CCR Groundwater Compliance

Location	Date	Top of Riser Elevation ft amsl	Depth to Water ft	Water Level Elevation ft amsl
MW101	5/2/2022	1719.53	37.94	1681.59
MW102	5/2/2022	1706.64	19.50	1687.14
MW103	5/2/2022	1717.53	36.74	1680.79
MW104	5/2/2022	1684.51	14.18	1670.33
MW105	5/2/2022	1689.14	11.78	1677.36
MW13	5/2/2022	1724.27	31.25	1693.02
MW33	5/2/2022	1717.95	42.76	1675.19
MW44R	5/2/2022	1711.57	27.14	1684.43
MW70	5/2/2022	1706.34	21.78	1684.56
MW80R	5/2/2022	1686.78	12.96	1673.82
MW1-90	5/3/2022	1675.86	9.99	1665.87
MW2-90	5/3/2022	1687.08	21.28	1665.80
MW3-90	5/3/2022	1686.46	18.31	1668.15
MW2-90	8/8/2022	1687.08	22.25	1664.83
MW3-90	8/8/2022	1686.46	19.75	1666.71
MW80R	8/8/2022	1686.78	14.85	1671.93
MW1-90	8/11/2022	1675.86	14.15	1661.71
MW101	10/17/2022	1719.53	38.50	1681.03
MW102	10/17/2022	1706.64	19.28	1687.36
MW103	10/17/2022	1717.53	35.68	1681.85
MW104	10/17/2022	1684.51	15.54	1668.97
MW105	10/17/2022	1689.14	13.53	1675.61
MW13	10/17/2022	1724.27	30.63	1693.64
MW33	10/17/2022	1717.95	44.10	1673.85
MW44R	10/17/2022	1711.57	28.91	1682.66
MW70	10/17/2022	1706.34	22.50	1683.84
MW80R	10/17/2022	1686.78	15.40	1671.38
MW1-90	10/18/2022	1675.86	>14.48	<1661.38
MW2-90	10/18/2022	1687.08	>22.40	<1664.68
MW3-90	10/18/2022	1686.46	>20.22	<1666.24

Appendix C
Groundwater Flow Rate
2022 Annual Monitoring Report
Heskett CCR Groundwater Compliance

Heskett Groundwater Velocity Calculation

Sampling Date	5/2/2022-5/3/2022
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Upgradient: MW13

Top of Casing Elevation	1724.27	ft amsl	<i>Groundwater Monitoring System Report (Barr, 2016)</i>
Depth to Water	31.25	ft below TOC	
Water Level Elevation	1693.02	ft amsl	

Downgradient: MW1-90

Top of Casing Elevation	1675.86	ft amsl	<i>Groundwater Monitoring System Report (Barr, 2016)</i>
Depth to Water	9.99	ft below TOC	
Water Level Elevation	1665.87	ft amsl	

horizontal hydraulic conductivity (Kh)	1.00E-04	cm/s	<i>Groundwater Monitoring System Documentation (Barr, 2017)</i>
	2.83E-01	ft/day	
porosity (n)	0.25		<i>Groundwater Monitoring System Documentation (Barr, 2017)</i>
horizontal distance	1850	ft	
WL elevation difference	27.15	ft	
gradient (i)	0.015	ft/ft	
linear velocity (V)	0.0166401	ft/day	
V	6.1	ft/yr	

Appendix C
Groundwater Flow Rate
2022 Annual Monitoring Report
Heskett CCR Groundwater Compliance

Heskett Groundwater Velocity Calculation

Sampling Date	10/17/2022-10/18-2022
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Upgradient: MW13

Top of Casing Elevation	1724.27	ft amsl	<i>Groundwater Monitoring System Report (Barr, 2016)</i>
Depth to Water	30.63	ft below TOC	
Water Level Elevation	1693.64	ft amsl	

Downgradient: MW104

Top of Casing Elevation	1684.51	ft amsl	<i>Groundwater Monitoring System Report (Barr, 2016)</i>
Depth to Water	15.54	ft below TOC	
Water Level Elevation	1668.97	ft amsl	

horizontal hydraulic conductivity (Kh)	1.00E-04	cm/s	<i>Groundwater Monitoring System Documentation (Barr, 2017)</i>
	2.83E-01	ft/day	
porosity (n)	0.25		<i>Groundwater Monitoring System Documentation (Barr, 2017)</i>
horizontal distance	1640	ft	
WL elevation difference	24.67	ft	
gradient (i)	0.015	ft/ft	
linear velocity (V)	0.0170563	ft/day	
V	6.2	ft/yr	