REPORT

Coal Combustion Residuals Groundwater Monitoring System Certification, Revision 1

Great River Energy - Coal Creek Station

Submitted to:

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March 8, 2019

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1.0 INTRODUCTION

Golder Associates Inc. (Golder) has prepared this revision to the Coal Combustion Residual (CCR) Groundwater Monitoring System Certification Report on behalf of Great River Energy (GRE) to certify that the groundwater monitoring system for the CCR facilities at Coal Creek Station regulated by the United States Environmental Protection Agency's (EPA) CCR rule meets the requirements of 40 CFR 257.91.

2.0 SITE BACKGROUND

GRE's Coal Creek Station (CCS) is a coal-fired electric generation facility located in McLean County, North Dakota, approximately 10 miles northwest of Washburn, ND. CCRs are managed in composite-lined surface water impoundment cells and dry waste facilities regulated and permitted by the North Dakota Department of Health (NDDH) in accordance with North Dakota Administrative Code (NDAC) Article 33-10, Solid Waste Management and Land Protection.

Coal Creek Station has four CCR facilities that are within the purview of the EPA CCR rule (see Figure 1):

- Drains Pond System CCR Surface Impoundment (Drains Pond System) is located in the south-central portion of the plant site, northeast of the plant buildings.
- Upstream Raise 91 CCR Surface Impoundment (Upstream Raise 91) is located in the south-central portion of the plant site, east of the plant buildings.
- Upstream Raise 92 CCR Surface Impoundment (Upstream Raise 92) is located in the southeast portion of the plant site, between Upstream Raise 91 and Southeast Section 16.
- Southeast Section 16 CCR Landfill (Southeast 16) is located in the southeast portion of the plant site, east of Upstream Raise 92.

2.1 Site Setting

The area surrounding CCS is primarily characterized by the presence of mixed glacial deposits. The following section detail the regional and site geology and hydrogeology.

2.1.1 Regional and Site Geology

CCS and McLean County are situated at the eastern-most extent of the Williston Basin, a structural and sedimentary basin (USGS 1999). The region is characterized by the presence of glacial drift, reaching thicknesses of several hundred feet, and overlying the Sentinel Butte Member, the source of commercially mined coal in the direct vicinity of CCS (Falkirk 1979). The Sentinel Butte Member is the highest strata of the Paleocene Fort Union Formation, overlying the Tongue River, Ludlow, and Cannonball Members (USGS 1999). The Sentinel Butte Member is marked by drab-gray units, separating it from the lower Tongue River Member.

The site geology of CCS includes unconsolidated surficial deposits of the Coleharbor formation consisting of stratified and unstratified glacial drift. The near-surface materials are silty clay and sandy clay till with interbedded sand lenses (CP/UPA 1989).

2.1.2 Site Hydrogeology

Regional groundwater flow of the uppermost water-bearing unit in the vicinity of CCS is a subtle expression of the surface topography, which is influenced by the configuration of the eroded bedrock. Based on the October 2018

groundwater elevations (shown in Figure 1), the shallow groundwater at the CCR facilities generally follows surface topography, flowing the east and north towards Lower Samuelson Slough and Sayler Slough.

The groundwater gradient across the CCR sites was estimated from the October 2018 groundwater levels, and ranges from 0.002 to 0.03 feet per feet (ft/ft). Slug testing was performed at several site monitoring wells in 2007 and resulting in estimated hydraulic conductivity values between 8×10^{-3} centimeters per second (cm/sec; 22.7 feet/day) and 1×10^{-4} cm/sec (0.28 feet/day).

2.1.3 Geologic Cross Sections

Geologic cross sections were compiled based on boring information from current CCR monitoring wells and historic site monitoring wells and boreholes (Appendix A).

As shown in the cross sections and described previously, variability within the area of the site results in a range of geologic materials within the near-surface geologic units. Discontinuous seams of coal are located throughout the site, in addition to gravel, sand, silt, and clay.

2.2 Release Conceptual Model

A hypothetical subsurface release from any of the four facilities located at CCS, would be transported downgradient of each facility, as demonstrated by the groundwater information presented in Figure 1. The downgradient wells discussed in Section 3.2 are positioned along the downgradient edges of each CCR facility to detect a release.

3.0 GROUNDWATER MONITORING SYSTEM

The CCR groundwater monitoring system at CCS consists of a total of 23 monitoring locations (eight upgradient and fifteen downgradient wells). The monitoring locations are shown on Figure 1 and listed on Table 1.

3.1 Information Reviewed

Golder reviewed information from the operating record documenting the design, installation, and development of the monitoring wells and/or describing hydrogeologic conditions at the site to help assess the adequacy of the monitoring network. The information reviewed included:

Cooperative Power and United Power Associations. 1989. Application to Renew Permit SU-033 – Coal Creek Station, McLean County, North Dakota. Submitted to the North Dakota State Department of Health. February 1989.

Falkirk Mining Company. 1979. Land Use Analysis/Technical Examination/Environmental Assessment Record – Falkirk Coal Lease Application M-31053 (ND). Submitted to the United States Department of the Interior, July 1979.

Foth & Van Dyke and Associates, Inc. 1988. Hydrogeological Analysis – Coal Creek Station, McLean County, North Dakota. Prepared for Cooperative Power, Eden Prairie, Minnesota, and United Power Association, Elk River, Minnesota. December 1988.

Foth & Van Dyke and Associates, Inc. 1989. Drilling Data – Summer 1989 – Coal Creek Station, McLean County, North Dakota. Prepared for Cooperative Power, Eden Prairie, Minnesota, and United Power Association, Elk River, Minnesota. December 1989.

United States Geological Survey. 1999. Fort Union Coal in the Williston Basin, North Dakota: A Synthesis. Chapter WS in 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region, U.S. Geological Survey Professional Paper 1625-A.

3.2 Number, Locations, and Depths of Monitoring Wells

40 CFR 257.91 includes the following requirements for the number, locations, and depths of monitoring wells:

- The owner or operator of a CCR unit must install a groundwater monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the upper most aquifer that:
  - Accurately represent the quality of background groundwater.
  - Accurately represent the quality of groundwater passing the waste boundary of the CCR unit.
- The number, spacing, and depths of monitoring wells must be based on site-specific technical information that must include thorough characterization of the uppermost aquifer and overlying materials.
- The groundwater monitoring system must include the minimum number of monitoring wells necessary to meet the performance standards based on the site-specific information. The groundwater monitoring system must contain a minimum of one upgradient monitoring well and three downgradient monitoring wells per unit.

Each CCR unit has a monitoring network consisting of a least one upgradient and three downgradient monitoring wells as specified within the rule, as discussed below.

- The Drains Pond System has two upgradient and four downgradient monitoring wells.
- Upstream Raise 91 has two upgradient and three downgradient monitoring wells.
- Upstream Raise 92 has two upgradient and three downgradient monitoring wells.
- Southeast 16 has two upgradient and five downgradient monitoring wells.

Monitoring well construction details are provided on Table 1 and Appendix B. The monitoring wells assigned to each facility are as follows:

Table 2: CCR Units Monitoring Wells

Drains Pond System	Upgradient	MW-DP3
		MW-DP5
	Downgradient	MW-DP1
		MW-DP2
		MW-DP2B
		MW-DP4
Upstream Raise 91	Upgradient	MW-91-2
		MW-75
	Downgradient	MW-49
		MW-51
		MW-91-1
Upstream Raise 92	Upgradient	MW-16-6
		MW-16-7
	Downgradient	MW-10
		MW-16-0
		MW-16-1
Southeast 16	Upgradient	MW-42
		MW-72
	Downgradient	MW-16-2
		MW-16-3
		MW-16-4
		MW-16-5
		MW-15

The monitoring wells are installed and screened at appropriate locations and depths to obtain groundwater from the uppermost water bearing zone. The number and spacing of the downgradient monitoring wells were selected based on the hydrogeologic conditions at the site and the areal extent of the CCR units, such that impacts to groundwater quality in the uppermost water bearing unit can be detected along potential flow pathways if they were to occur.

General solid waste industry practice includes placing monitoring wells downgradient of the waste disposal area within the property boundary and within 150 meters of the waste boundary. The distance from the waste boundary to the monitoring wells should be based on the presumed flow directions, groundwater seepage velocity, access/location limitations, and distance to provide sufficient space between the waste boundary and the monitoring network to allow for hydrodynamic dispersion, which increases the probability of detection of a potential release. The downgradient monitoring wells at the CCR facilities at CCS were primarily installed as part of previous state monitoring requirements and are located at appropriate distances as close as practical to the waste boundary. Further, the downgradient wells for Section 16 have been placed based on the historic permitted waste boundary for the facility.

3.2.1 Drains Pond System

The Drains Pond System has four downgradient monitoring wells monitoring downgradient water at three locations. MW-DP2B was installed as a companion well to MW-DP2, which has on occasion not had enough groundwater present in the well for water quality sampling. The three downgradient monitoring locations are based on observations that show groundwater flows to the northeast corner of the facility. A hypothetical release from this facility is anticipated to impact a relatively small areal extent, based on the footprint of the system and groundwater flow information. Therefore, based on site geometry and the groundwater flow direction, the four downgradient wells shown on Figure 1 were deemed adequate to monitor the groundwater flow regime of the Drains Pond System.

3.2.2 Upstream Raise 91

Upstream Raise 91 has three downgradient monitoring wells based on the length of the northern boundary of the facility and observations that show groundwater flows from southwest to northeast across the facility towards Lower Samuelson Slough. Based on site geometry and the groundwater flow direction, the spacing of the downgradient wells across the northern boundary as shown on Figure 1 were deemed adequate to monitor the groundwater flow regime of Upstream Raise 91.

3.2.3 Upstream Raise 92

Upstream Raise 92 has three downgradient monitoring wells based on observations that show groundwater flows from southwest to northeast across the facility. Based on the footprint of the system, the areal extent of the northern boundary of the facility, and the groundwater flow information, the three downgradient wells shown on Figure 1 were deemed adequate to monitor the groundwater flow regime of Upstream Raise 92.

3.2.4 Southeast 16

Southeast 16 has five downgradient wells along the northern and eastern boundaries of the facility, based on observations that show groundwater flows generally to the northeast of the facility. Based on the site geometry and the groundwater flow direction within the facility, the five downgradient wells shown on Figure 1 were deemed adequate to monitor the groundwater flow regime of Southeast 16.

3.3 Monitoring Well Casing

40 CFR 257.91(e) includes the following requirements for monitoring well construction:

- “Monitoring wells must be cased in a manner that maintains the integrity of the well borehole.
- The casing must be screened or perforated and packed with gravel or sand to enable collection of groundwater samples.

- The annular space above the sampling depth must be sealed to prevent contamination of samples and the groundwater."

The monitoring wells at CCS have polyvinyl chloride (PVC) casings to maintain the integrity of the monitoring well boreholes. The casings are screened within the uppermost water bearing unit and packed with sand to enable collection of groundwater samples within the unit. The annular space above the screened interval in each monitoring well is sealed with a bentonite seal and cement-bentonite grout seal.

4.0 REVISION HISTORY

A history of revisions to this document:

Revision 0 – Published October 12, 2017.

Revision 1 – Revised to reflect: Published March 8, 2019

1) Addition of new wells at the site (MW-DP2B, MW-16-0, MW-91-1, MW-91-2);

2) New CCR unit naming convention (Upstream Raise to Upstream Raise 92 and Ash Pond 91 to Upstream Raise 91); and

3) Division of Upstream Raise 91 and Upstream Raise 92 into separately monitored CCR units.

5.0 CLOSING AND CERTIFICATION

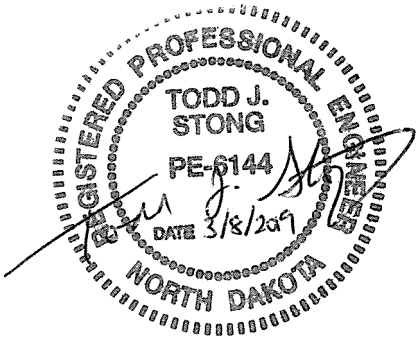
Based upon the review described in this report, the undersigned certifies that the groundwater monitoring system for the Drains Pond System, Upstream Raise 91, Upstream Raise 92, and Southeast 16 at Coal Creek Station has been designed and constructed to meet the requirements of 40 CFR 257.91.

Golder Associates Inc.

Todd Stong, P.E.
Associate and Senior Consultant

Erin L. Hunter, PhD
Project Engineer

ELH/TJS/ds



https://golderassociates.sharepoint.com/sites/102406/deliverables/reports/rpt_networkcertr1_fnl_08mar19/19115185_rpt_networkcertrev1_fnl_08mar2019.docx

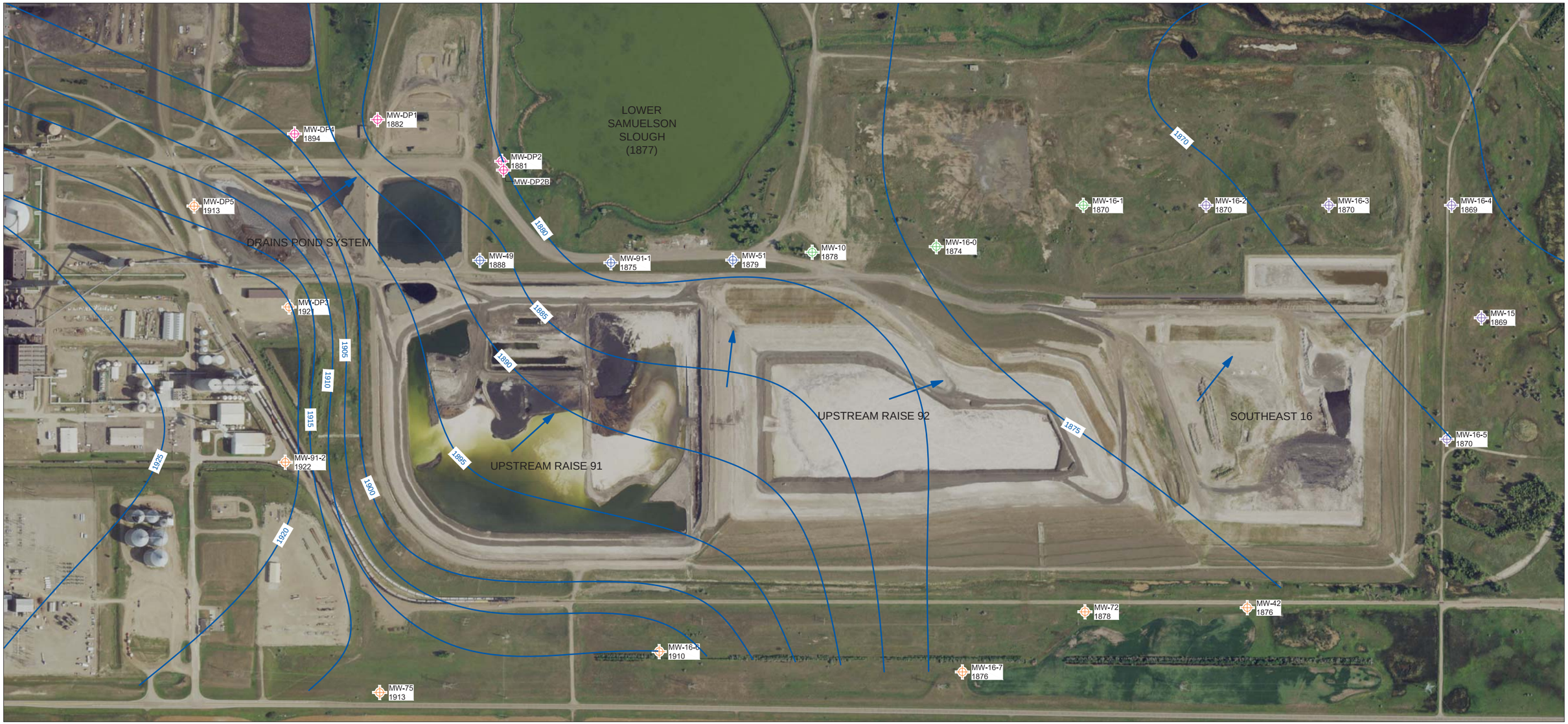
Table

Table 1: Monitoring Network Well Summary

Facility	Location	Well ID	Date Constructed	TOC Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Screen Interval (ft bgs)	Top of Screen Elevation (ft amsl)	Bottom of Screen Elevation (ft amsl)	Sand Pack Interval (ft bgs)	Geologic Unit(s) Completed In
Drains Pond System	Upgradient	MW-DP3	4/3/2015	1,932.7	1,929.6	9.0-19.0	1,920.6	1,910.6	6.0-19.0	fill, coal, clay
		MW-DP5 [1]	11/18/2015	1,939.2	*1,935.0*	18.0-43.0	1,919.0	1,892.0	16.0-43.0	sandy lean clay, clayey sand
	Downgradient	MW-DP1 [2]	6/10/2014	1,913.6	1,911.1	25.0-45.0	1,886.1	1,866.1	21.0-45.0	silt with sand, silty sand
		MW-DP2	4/3/2015	1,898.1	1,894.9	7.0-17.0	1,887.9	1,877.9	5.0-17.0	sandy lean clay, clay sand
		MW-DP2B [3]	11/20/2018	1,898.6	1,895.6	12.0-22.0	1,883.6	1,873.6	10.0-22.0	sandy lean clay, sand with silt/gravel, silty sand
		MW-DP4	4/3/2015	1,917.4	1,914.2	19.0-29.0	1,895.2	1,885.2	17.0-29.0	sandy clay, sand with silt/gravel, clay, clayey sand
Upstream Raise 91	Upgradient	MW-75	7/19/1989	1,941.4	1,938.9	30.0-40.0	1,908.9	1,898.9	27.7-40	clayey silt, silty sand
		MW-91-2	11/6/2017	1,938.5	1,938.7	21.0-31.0	1,917.7	1,907.7	19.0-31.0	fat clay, coal
	Downgradient	MW-49	5/20/1988	1,905.9	1,903.6	9.85-19.85	1,893.8	1,883.8	4.85-19.85	sandy gravelly clay, sandy silt, shale (rock)
		MW-51	5/20/1988	1,896.9	1,895.5	8.8-18.8	1,886.7	1,876.7	3.8-18.8	sand with silt and gravel
		MW-91-1	11/6/2017	1,905.1	1,902.0	16.0-26.0	1,886.0	1,876.0	14.0-26.0	sand with silt and gravel, fat clay
Upstream Raise 92	Upgradient	MW-16-6	7/14/2015	1,917.2	1,913.9	4.0-14.0	1,909.9	1,899.9	3.0-14.0	sandy lean clay, coal, lean clay
		MW-16-7	7/14/2015	1,889.1	1,886.6	22.0-32.0	1,864.6	1,854.6	20.0-32.0	fat clay, clayey sand, sandy clay
	Downgradient	MW-10	11/2/1979	1,895.2	1,892.2	15-25	1,877.2	1,867.2	13-25	sand
		MW-16-0	12/8/2017	1,883.4	1,880.4	4.5-9.5	1,875.9	1,870.9	2.5-9.5	lean clay with sand
		MW-16-1	10/31/2007	1,879.5	1,876.1	6.5-11.5	1,869.6	1,864.6	4.5-11.5	silty sand
Southeast Section 16 Facility	Upgradient	MW-42	5/28/1986	1,881.6	1,878.8	9.4-14.4	1,869.4	1,864.4	9-14.4	silty sand, lean clay
		MW-72	7/18/1989	1,884.6	1,882.4	7.5-17.5	1,874.9	1,864.9	6.5-23.0	silty clay, silty sand
	Downgradient	MW-15	11/7/1979	1,877.3	1,874.3	10-20	1,864.3	1,854.3	9-20	sand, clay till
		MW-16-2	10/31/2007	1,880.6	1,877.8	7-12	1,870.8	1,865.8	5-12	sandy lean clay
		MW-16-3	10/31/2007	1,878.5	1,875.6	7-12	1,868.6	1,863.6	5-12	sandy lean clay
		MW-16-4	10/31/2007	1,877.5	1,874.6	7-17	1,867.6	1,857.6	5-17	sandy lean clay
		MW-16-5	10/31/2007	1,880.2	1,877.1	6.5-11.5	1,870.6	1,865.6	4.5-11.5	sand with silt and gravel

Notes:
TOC: top of casing
ft amsl: feet above mean sea level
ft bgs: feet below ground surface
1. For MW-DP5, the ground surface elevation is taken from the original bore log, but is inconsistent with the available survey for the top of casing.
2. For MW-DP1 only the top of casing elevation was provided. The PVC riser was assumed to be 2.5 ft above ground surface.
3. For MW-DP2B only the top of casing elevation was provided. The PVC riser was assumed to be 3.0 ft above ground surface.
Well construction measurements are from the original bore log, well data sheet, or well construction form.
For some wells, elevations have been updated with more recent survey information than the original driller's logs.

Figure



LEGEND

- UPGRADIENT MONITORING WELL
- DOWNGRADIENT MONITORING WELL - UPSTREAM RAISE 91
- DOWNGRADIENT MONITORING WELL - UPSTREAM RAISE 92
- DOWNGRADIENT MONITORING WELL - SOUTHEAST 16
- DOWNGRADIENT MONITORING WELL - DRAINS POND SYSTEM
- GENERAL DIRECTION OF GROUNDWATER FLOW
- 1930 — POTENTIOMETRIC SURFACE CONTOURS (SEE NOTE 2)

NOTE(S)

1. GROUNDWATER ELEVATIONS SHOWN WERE MEASURED OCTOBER 2018.
2. POTENTIOMETRIC SURFACE CONTOURS WERE CREATED USING WATER LEVEL INFORMATION FROM THE OCTOBER 2018 GROUNDWATER ELEVATIONS SHOWN, AS WELL AS SURVEYED SURFACE WATER EXPRESSIONS, ADDITIONAL SITE WELLS, AND PIEZOMETERS NOT SHOWN. CONTOUR INTERVALS ARE 5 FEET.
3. AERIAL IMAGERY OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE, NATIONAL AERIAL IMAGERY PROGRAM, 2018.

N

0 300 600
1" = 300' FEET

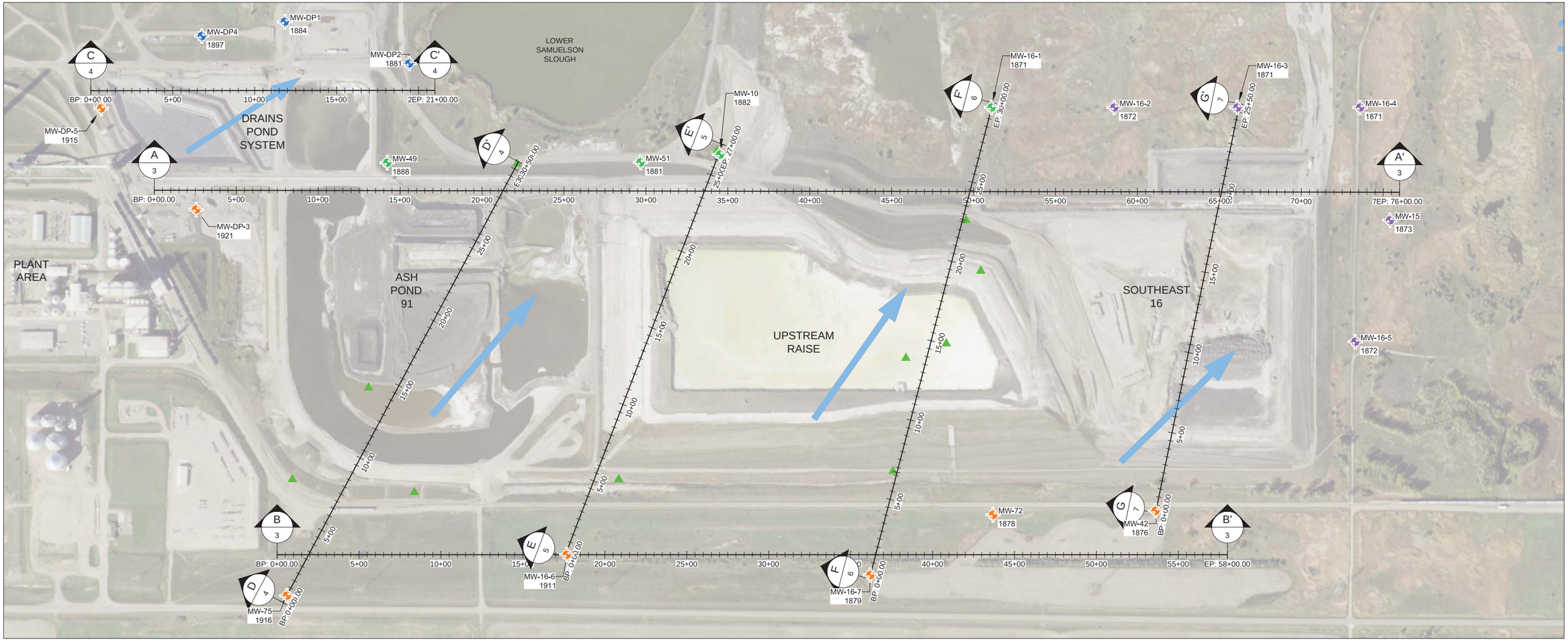
GOLDER

MONITORING WELL LOCATIONS
GREAT RIVER ENERGY - COAL CREEK STATION

FIGURE 1

APPENDIX A

Geologic Cross Sections



LEGEND

- MW-75 — UPGRADIENT MONITORING WELLS
- MW-DP1 — DOWNGRADIENT MONITORING WELLS - DRAINS POND SYSTEM
- MW-51 — DOWNGRADIENT MONITORING WELLS - ASH POND 91 AND UPSTREAM RAISE
- MW-16-3 — DOWNGRADIENT MONITORING WELLS - SOUTHEAST 16
- HISTORIC BOREHOLES
- GENERAL DIRECTION OF GROUNDWATER FLOW
- SECTION MARKER WITH FIGURE NUMBER (A 3 — A' 3)

NOTES

1. GROUNDWATER ELEVATIONS SHOWN WERE MEASURED JUNE 2017.
2. AERIAL IMAGERY TAKEN IN 2015 (OBTAINED FROM THE USDA NATIONAL AGRICULTURE IMAGERY PROGRAM).

N

0 300 600

1" = 300' FEET

CROSS-SECTION LOCATIONS

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FIGURE 1

UNIFIED SOIL CLASSIFICATION SYSTEM

- CH - HIGH PLASTICITY CLAY
- SW - WELL GRADED SAND
- CL-CH - LEAN-FAT CLAY
- CL - LOW PLASTICITY CLAY
- GP - POORLY GRADED GRAVEL
- ML - SANDY SILT
- SP - POORLY GRADED SAND
- ML-CL/CL-ML - SILTY LEAN CLAY/LEAN CLAY WITH SILT
- SP-SC - POORLY GRADED SAND WITH CLAYEY SAND
- SC - CLAYEY SAND
- GW- WELL GRADED GRAVEL
- SM-SC/SC-SM - SILTY SAND WITH CLAYEY SAND
- COAL
- OL- ORGANIC TOPSOIL
- COAL COMBUSTION RESIDUALS
- SM - SILTY SAND
- SP-SM - POORLY GRADED SAND WITH SILTY SAND
- CH-MH - CLAYEY SILT WITH SILTY FAT CLAY
- SM-ML/ML-SM - SILTY SAND WITH SANDY SILT/SANDY SILT WITH SILTY SAND
- ML-CH - SILTY CLAY/CLAY WITH SILT
- ROCK - SANDSTONE

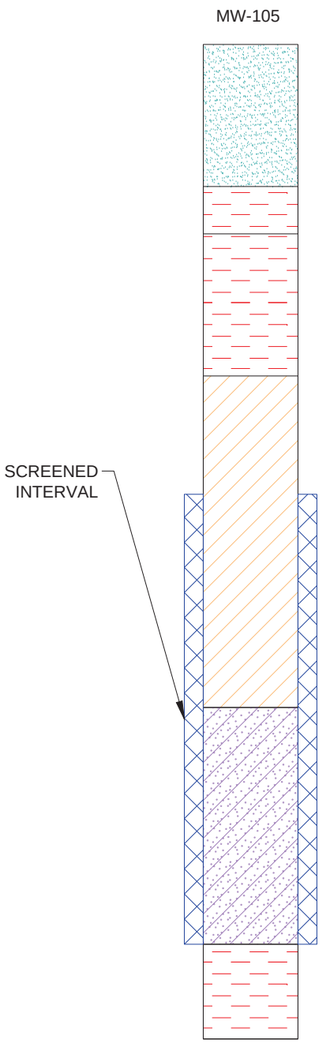
GEOLOGIC CLASSIFICATION

- OUTWASH - PRIMARILY SANDS AND GRAVELS
- CONFINING UNIT - PRIMARILY SILTS AND CLAYS
- TOPSOIL AND DISTURBED MATERIAL
- COAL COMBUSTION RESIDUALS

LINETYPES

- EXISTING GRADES
- APPROXIMATED GRADES
- TOP OF LINER
- ASSUMED MATERIAL BOUNDARY
- INFERRED MATERIAL BOUNDARY
- GROUNDWATER LEVELS (JUNE 2017)

TYPICAL WELL



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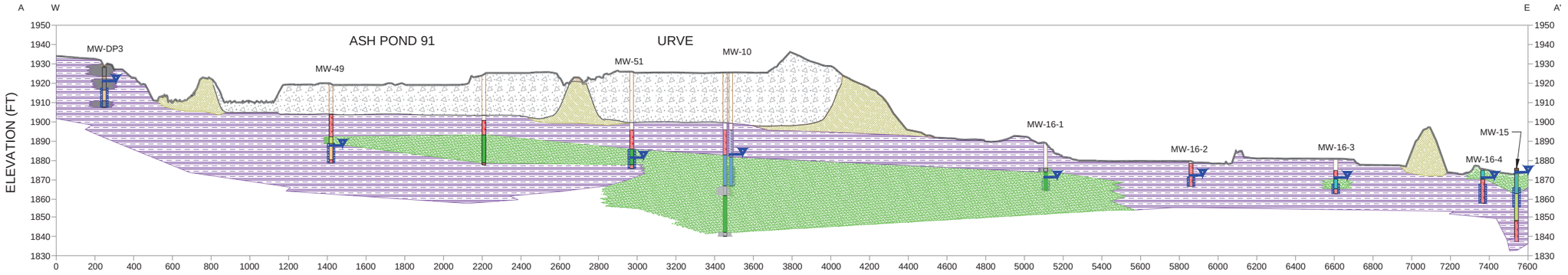
LEGEND FOR CROSS-SECTIONS

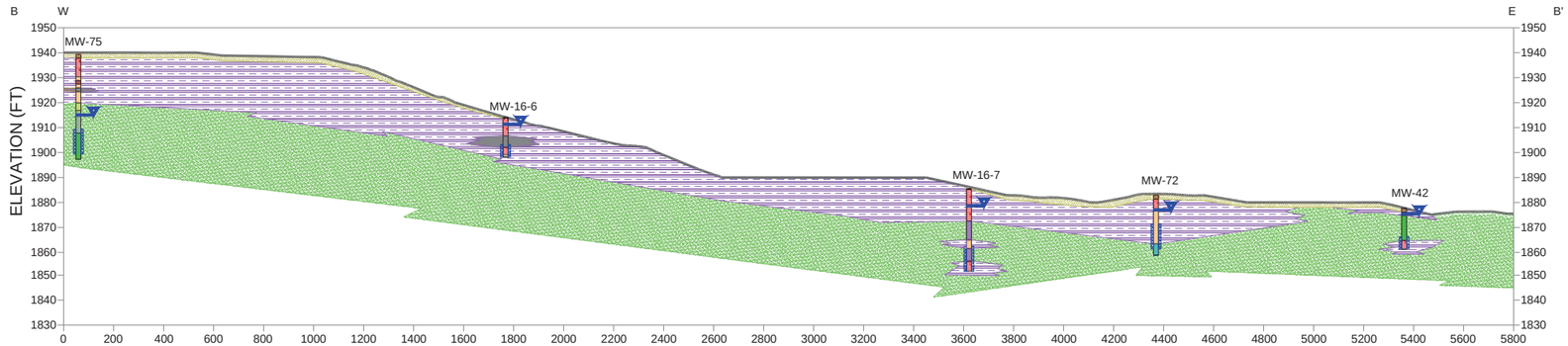
FIGURE 2



DISTANCE (FT)

NORTH DOWNGRADIENT

10x VERTICAL EXAGGERATION



DISTANCE (FT)

SOUTH UPGRADIENT

10x VERTICAL EXAGGERATION

NOTE(S)

1. EXISTING GRADES ARE APPROXIMATE AND MAY NOT REFLECT ACTUAL GRADES WITHIN CCR UNITS DUE TO ACTIVE HANDLING OF MATERIALS.
2. MONITORING WELLS AND BORING LOGS HAVE BEEN PROJECTED ONTO THE GEOLOGIC SECTIONS AND MAY NOT MATCH PRECISELY WITH THE EXISTING GRADES.

CROSS-SECTION A-A' AND CROSS-SECTION B-B'

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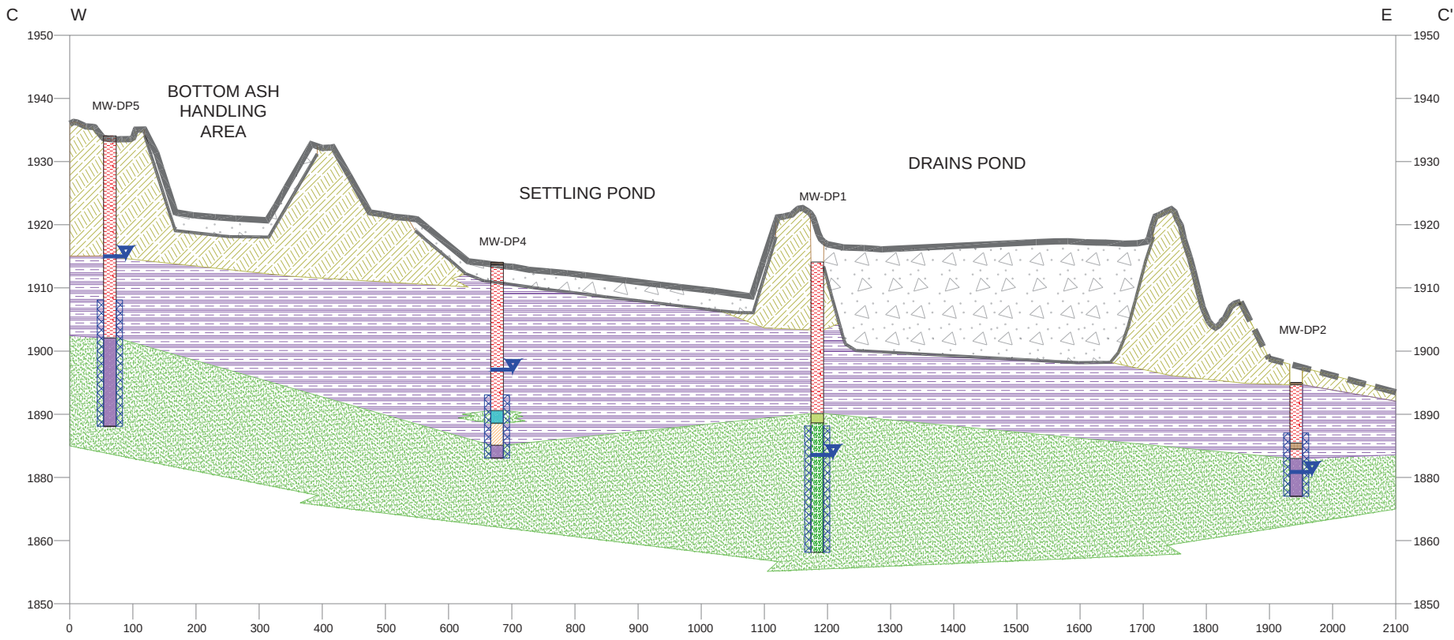
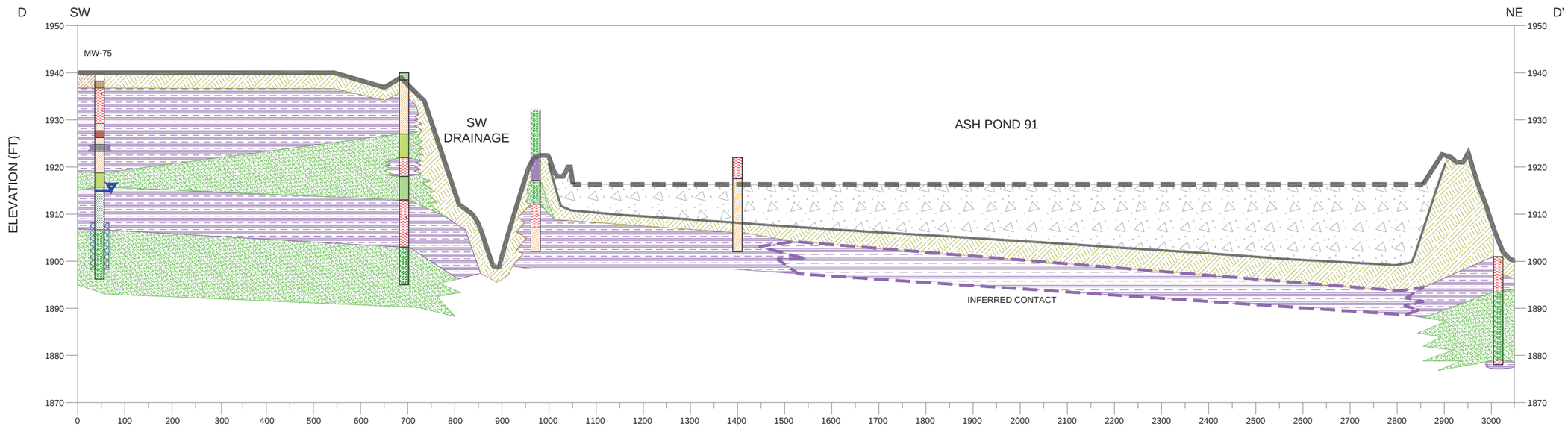
FIGURE 3



DISTANCE (FT)
DRAINS POND SYSTEM
10x VERTICAL EXAGGERATION



DISTANCE (FT)
ASH POND 91
10x VERTICAL EXAGGERATION

NOTE(S)

1. EXISTING GRADES ARE APPROXIMATE AND MAY NOT REFLECT ACTUAL GRADES WITHIN CCR UNITS DUE TO ACTIVE HANDLING OF MATERIALS.
2. MONITORING WELLS AND BORING LOGS HAVE BEEN PROJECTED ONTO THE GEOLOGIC SECTIONS AND MAY NOT MATCH PRECISELY WITH THE EXISTING GRADES.

CROSS-SECTION C-C' AND CROSS-SECTION D-D'

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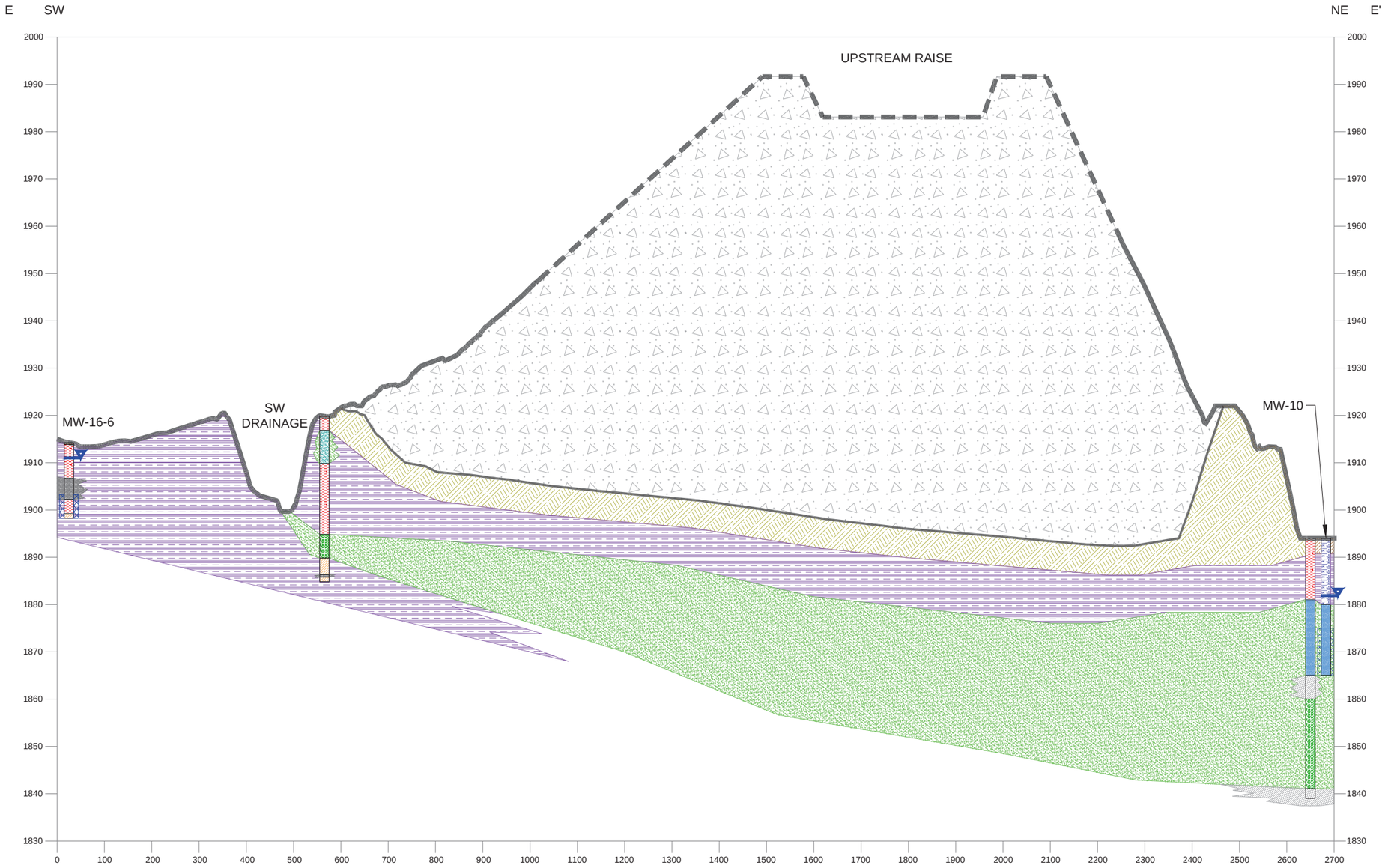
FIGURE 4



DISTANCE (FT)

UPSTREAM RAISE

10x VERTICAL EXAGGERATION

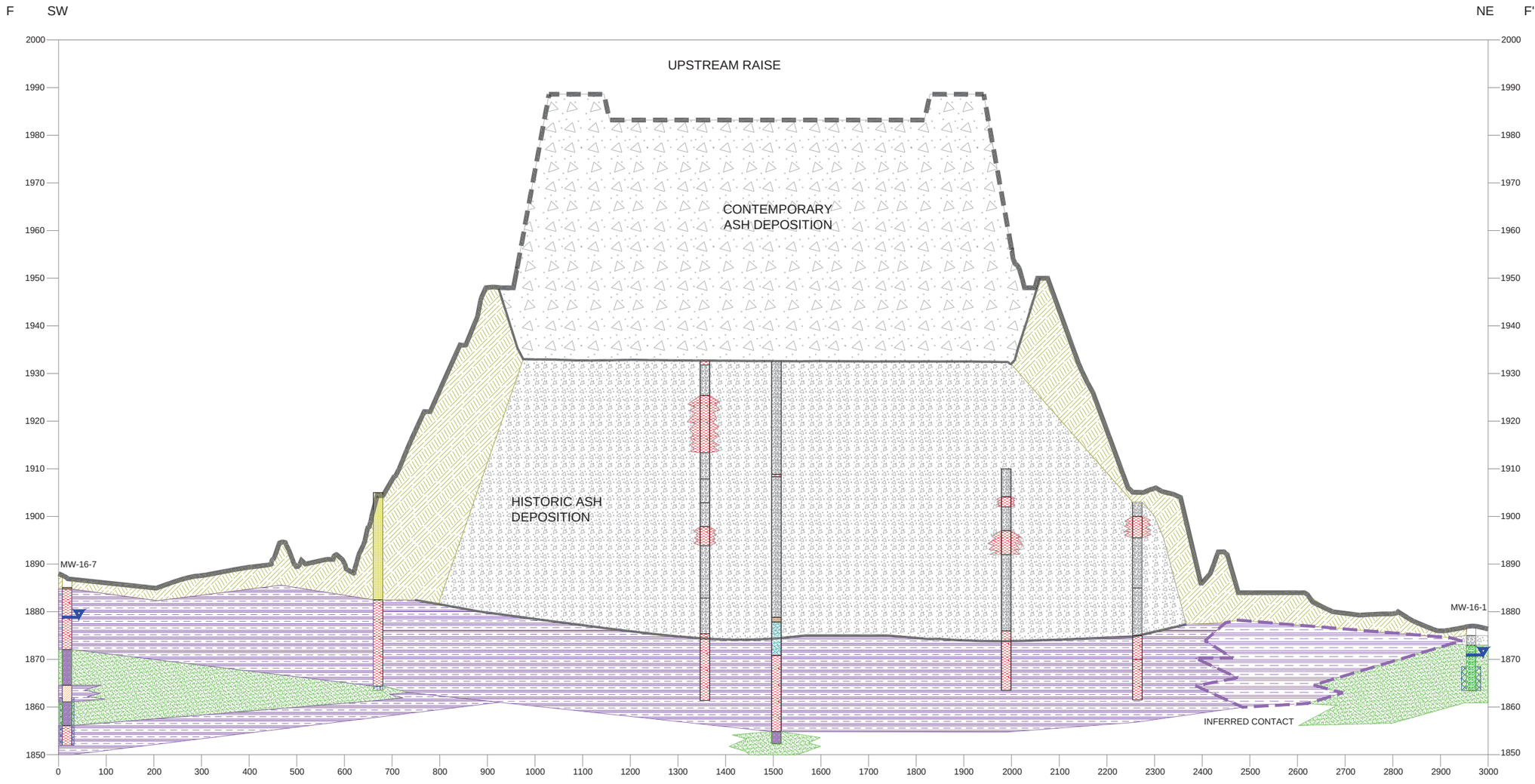
NOTE(S)

1. EXISTING GRADES ARE APPROXIMATE AND MAY NOT REFLECT ACTUAL GRADES WITHIN CCR UNITS DUE TO ACTIVE HANDLING OF MATERIALS.
2. MONITORING WELLS AND BORING LOGS HAVE BEEN PROJECTED ONTO THE GEOLOGIC SECTIONS AND MAY NOT MATCH PRECISELY WITH THE EXISTING GRADES.

CROSS-SECTION E-E'

Golder Associates

FIGURE 5



DISTANCE (FT)

UPSTREAM RAISE

10x VERTICAL EXAGGERATION

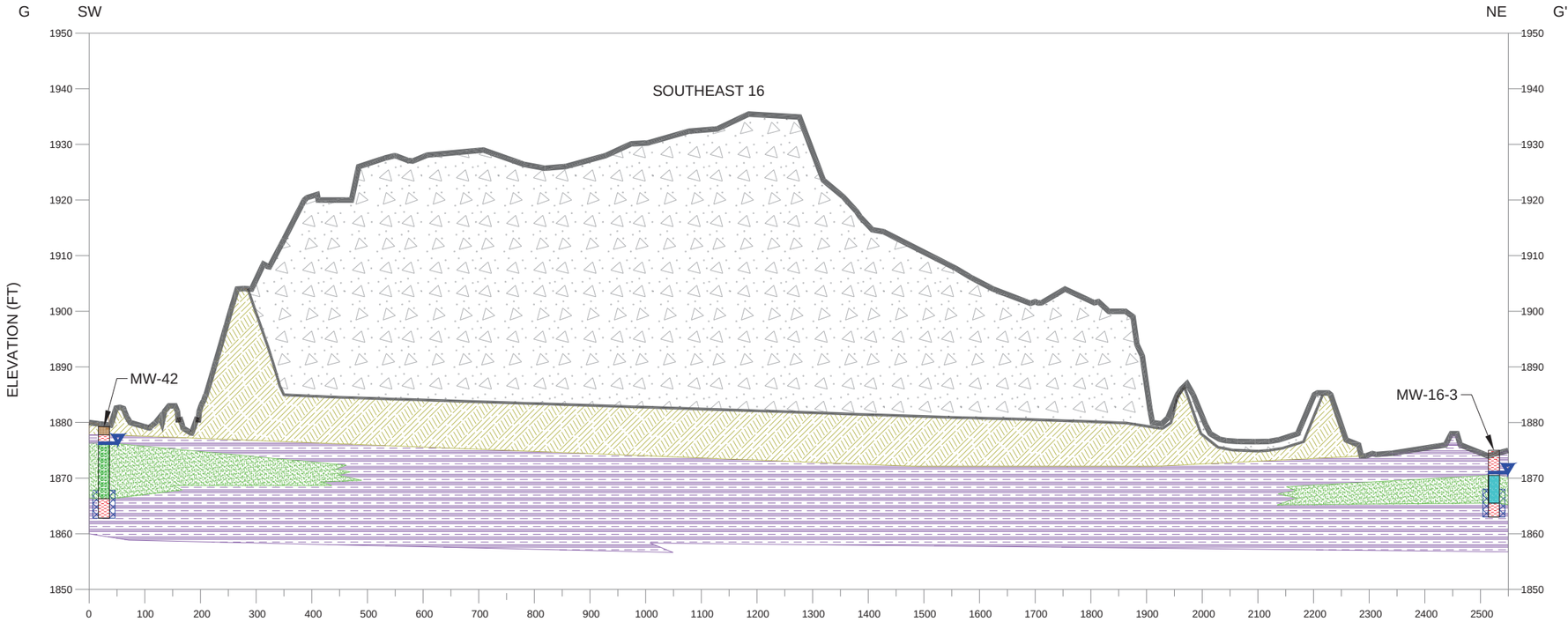
NOTE(S)

1. EXISTING GRADES ARE APPROXIMATE AND MAY NOT REFLECT ACTUAL GRADES WITHIN CCR UNITS DUE TO ACTIVE HANDLING OF MATERIALS.
2. MONITORING WELLS AND BORING LOGS HAVE BEEN PROJECTED ONTO THE GEOLOGIC SECTIONS AND MAY NOT MATCH PRECISELY WITH THE EXISTING GRADES.

CROSS-SECTION F-F'

Golder Associates

FIGURE 6



DISTANCE (FT)
SOUTHEAST 16
10x VERTICAL EXAGGERATION

NOTE(S)

1. EXISTING GRADES ARE APPROXIMATE AND MAY NOT REFLECT ACTUAL GRADES WITHIN CCR UNITS DUE TO ACTIVE HANDLING OF MATERIALS.
2. MONITORING WELLS AND BORING LOGS HAVE BEEN PROJECTED ONTO THE GEOLOGIC SECTIONS AND MAY NOT MATCH PRECISELY WITH THE EXISTING GRADES.

CROSS-SECTION G-G'

Golder Associates

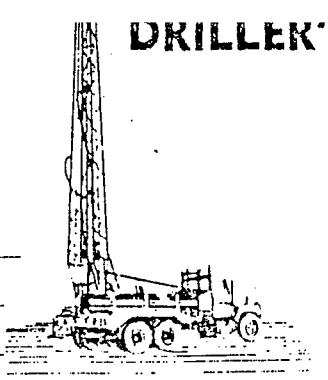
FIGURE 7

APPENDIX B

Monitoring Well Boring Logs and Installation Information

WATER SUPPLY, INC.

BOX 1191
BISMARCK, N.D. 58501



DRILLER'S LOG

State Coordinates

N. 139,000
E. 1,843,300

sec. 16abc
Tp. 145
Rg. 82

Project: CPA
State: ND
County: McLean

Hole No. [redacted] MW-10
Hole Elev. North well of pair

Core Recovery (Thickness)	From	To	Sample Description	Comments
	0	14	Till, very silty and sandy, yellowish brown some gravel, larger gravel fraction from 11 - 14 ft.	
	14	29	Sand, Fine to very coarse, eccasional lenses with larger gravel content yellowish brown.	Started maring water at approximately 15 ft.
				Hole caved at 12 ft. washed pipe from 12 - 25 ft. where it would go no further
				Installed 18 ft. 2" PVC casing and 10 ft. 2" PVC screen. 3 ft. pipe above land surface screened interval 15 - 25 ft.
				Formation caved at approximately 15½ ft - Installed sand pack to 13 ft. cemented from 13 ft. to surface.

Footage Drilled w/Air
Footage Drilled w/Water
Amount Water Used

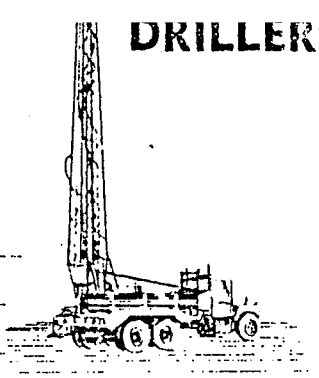
Measuring Point + 3.0 ft.
Water Level
Screened Interval 15 - 25 ft.

From To Hrs.
Co. Rep. on Job Title

Date 2 Nov. 1979 Driller Tom Brewster
Helpers: Joel Fricke

WATER SUPPLY, INC.

BOX 1191
BISMARCK, N.D. 58501



DRILLER'S LOG

State Coordinates

N. 138,500
E. 1,846,400

sec. 15cbb
Tp. 145
Rg. 82

Project: CPA

State: ND

County: McLean

Hole No. [redacted] MW-15

Hole Elev.

Core Recovery (Thickness)	From	To	Sample Description	Comments
	0	1	Top soil	
	1	13	Sand, fine to coarse, some fine to medium Gravel, poorly sorted, yellowish brown	
			Started making water at approximately 8 ft.	
	13	27	Till, light olive gray, very sandy and silty	
	27	38	Clay, light olive gray, moderately silty, very cohesive and plastic (Till?)	
			Backed up 2 ft. and drilled to 20 ft. - Formation was the same, but the hole did not make as much water as it was drilled.	
			Falkirk mining drill crew and CPA personnel were to set 13 ft. 2-inch PVC casing with 10 ft. of screen from 10-20 ft. MP- +3 ft. Sand pack to 9 ft. and place 1 bag cement.	

Footage Drilled w/Air

Footage Drilled w/Water

Amount Water Used

Measuring Point +3 ft.

Water Level

Screened Interval 10' - 20'

From To Hrs

Co. Rep. on Job Title

Date 7 Nov. 1979 Driller Tom Brewster

Helpers: Joel Fricke

BORING LOG NO. MW-16-0

PROJECT: Monitoring Well Installations

CLIENT: Golder Associates, Inc.
Lakewood, CO

SITE: GRE Coal Creek Station
McLean County, ND

LOCATION: See Exhibit A-2

Northing: 139015 Easting: 1843118

Surface Elev.: 1880.4 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	INSTALLATION DETAILS
			PVC Cap
			PVC Riser
SANDY LEAN CLAY WITH GRAVEL (CL)			
1.5	1879		Bentonite
LEAN CLAY WITH SAND (CL), with gravel			
4.5	1876		Silica Sand
LEAN CLAY WITH SAND (CL)			
			PVC Screen
9.5	1871		PVC End Cap
Boring Terminated at 9.5 Feet			

DEPTH (Ft.): 5

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" ID Hollow Stem Auger 0-9½'

Abandonment Method:
Boring converted to monitoring well upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:
Northing, easting and elevation provided by Golder Associates, Inc. No sampling performed at the direction of a Golder Associates, Inc. representative on site.

WATER LEVEL OBSERVATIONS

None encountered

Terracon
1805 Hancock Dr PO Box 2084
Bismarck, ND

Boring Started: 12-08-2017	Boring Completed: 12-08-2017
Drill Rig: D-90	Driller: E. Mayer
Project No.: M2175093	Exhibit: A-6

MIDWEST TESTING LABORATORY

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT: Section 16 Monitoring Wells, Permit No. SP-033, Great River Energy, Underwood, ND

PROJECT NO: B8749

Monitoring Well No:	SP033-MW-1 (16-1)	**Ground Surface Elevation:**	1875.6
Date of Installation:	10-31-07	**Top of Riser Elevation:**	1879.0
Crew Chief:	Mike Roberts		

Protective Casing

Material:	Steel
Diameter x Length:	4" x 4" x 5'
Length Above Ground:	3½'
	2 bumper posts

Riser Pipe

Material:	Schedule 40 PVC
Diameter x Length:	2" x 10'
Length Above Existing Grade:	3.4'

Annular Space Backfill Material: Neat cement grout

Seal Above Screen

Material:	Bentonite chips
Thickness:	2'

Filter Sand

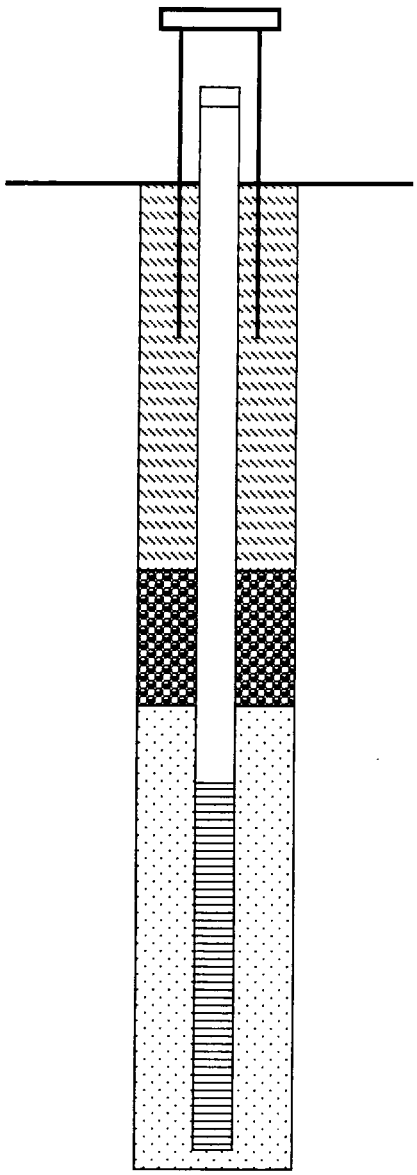
Material:	#10 Silica sand
Depth to Top of Filter Sand:	4½'
Depth to Bottom of Filter Sand:	11½'

Well Screen

Material:	Schedule 40 PVC
Diameter x Length:	2" x 5'
Slot No. or Size:	#10 Slot
Depth to Bottom of Screen:	11½' (1864.1)

Borehole

Diameter:	6¼"
Depth to Bottom of Borehole:	11½'
Method of Advancement:	Hollow stem auger



WATER LEVEL MEASUREMENTS BELOW TOP OF RISER PIPE

DATE	TIME	WATER LEVEL
11-2-07	8:45	9.0'

(1870)

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION (SP033- MW-1) **(16-1)**

Address (if in city) State Plane Coordinates

N139,269, E1,844,016

County McLean

__ ¼ __ ¼ SW ¼ Sec. 16 Twp. 145 N. Rge. 82 W.

Lat. _____ Long.: _____

Altitude: _____

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6 ¼ inches Depth 11½ feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +3.4 ft. to 6½ ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 6½ feet to 11½ feet

Sand packed from 4½' to 11½'

Depth grouted from surface to 2½'

Grouting Material

Bentonite _____ Other x

If other explain: Neat cement grout

bentonite seal from 2½'-4½'

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' steel cover

Was protective casing installed? ■ Yes No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 5.6 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
FLY ASH	0	2
SILTY SAND	2	11½

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

2 - 4" x 4" x 6' timber bumper posts installed

9. DATE COMPLETED 11-5-07

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Midwest Testing Laboratory, Inc. 444

Monitoring Well Contractor Certificate No.

P.O. Box 2084, Bismarck, ND 58502-2084

Address

Signature Date

MIDWEST TESTING LABORATORY

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT: Section 16 Monitoring Wells, Permit No. SP-033, Great River Energy, Underwood, ND

PROJECT NO: B8749

Monitoring Well No: SP033-MW-2 (16-2)
Ground Surface Elevation: 1877.7
Date of Installation: 10-31-07
Top of Riser Elevation: 1880.5
Crew Chief: Mike Roberts

Protective Casing
- Material: Steel
- Diameter x Length: 4" x 4" x 5'
- Length Above Ground: 3'
- 2 bumper posts

Riser Pipe
- Material: Schedule 40 PVC
- Diameter x Length: 2" x 10'
- Length Above Existing Grade: 2.8'

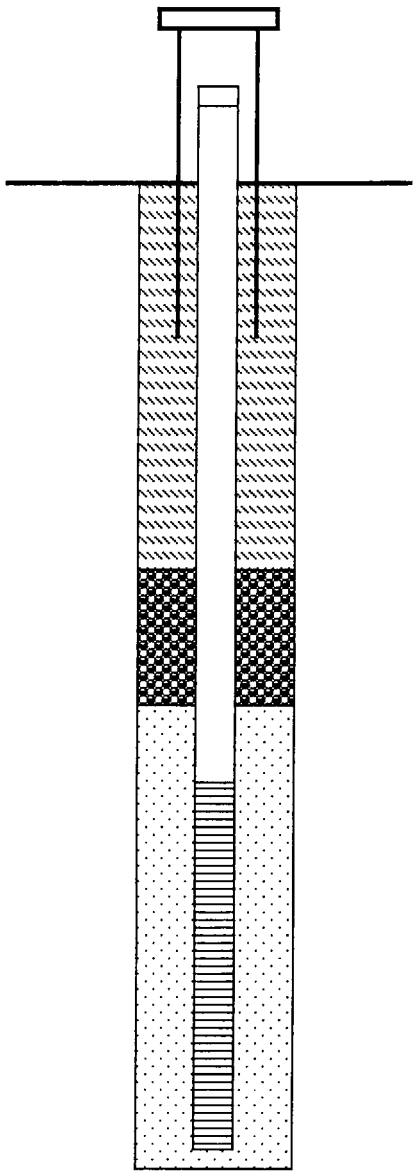
Annular Space Backfill Material: Neat cement grout

Seal Above Screen
- Material: Bentonite chips
- Thickness: 2'

Filter Sand
- Material: #10 Silica sand
- Depth to Top of Filter Sand: 5'
- Depth to Bottom of Filter Sand: 12'

Well Screen
- Material: Schedule 40 PVC
- Diameter x Length: 2" x 5'
- Slot No. or Size: #10 Slot
- Depth to Bottom of Screen: 12' (1865.7)

Borehole
- Diameter: 6¼"
- Depth to Bottom of Borehole: 12'
- Method of Advancement: Hollow stem auger



WATER LEVEL MEASUREMENTS BELOW TOP OF RISER PIPE

DATE	TIME	WATER LEVEL
11-2-07	8:25	10½'

(1870)

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION (SP033- MW-2) **(16-2)**

Address (if in city) State Plane Coordinates

N139,269, E1,844,766

County McLean

__ ¼ __ ¼ SW ¼ Sec. 16 Twp. 145 N. Rge. 82 W.

Lat. _____ Long.: _____

Altitude: _____

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6 ¼ inches Depth 12 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.8 ft. to 7 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 7 feet to 12 feet

Sand packed from 5' to 12'

Depth grouted from surface to 3'

Grouting Material

Bentonite _____ Other x

If other explain: Neat cement grout

bentonite seal from 3'-5'

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' steel cover

Was protective casing installed? ■ Yes No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 7.7 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
LEAN CLAY WITH SAND	0	4½
LEAN CLAY	4½	9
SANDY LEAN CLAY	9	12

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

2 - 4" x 4" x 6' timber bumper posts installed

9. DATE COMPLETED 11-5-07

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Midwest Testing Laboratory, Inc. 444

Monitoring Well Contractor Certificate No.

P.O. Box 2084, Bismarck, ND 58502-2084

Address

Signature Date

MIDWEST TESTING LABORATORY

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT: Section 16 Monitoring Wells, Permit No. SP-033, Great River Energy, Underwood, ND

PROJECT NO: B8749

Monitoring Well No:	SP033-MW-3 (16-3)	**Ground Surface Elevation:**	1875.0
Date of Installation:	10-31-07	**Top of Riser Elevation:**	1877.9
Crew Chief:	Mike Roberts		

Protective Casing

Material:	Steel
Diameter x Length:	4" x 4" x 5'
Length Above Ground:	3'
	2 bumper posts

Riser Pipe

Material:	Schedule 40 PVC
Diameter x Length:	2" x 10'
Length Above Existing Grade:	2.9'

Annular Space Backfill Material: Neat cement grout

Seal Above Screen

Material:	Bentonite chips
Thickness:	2'

Filter Sand

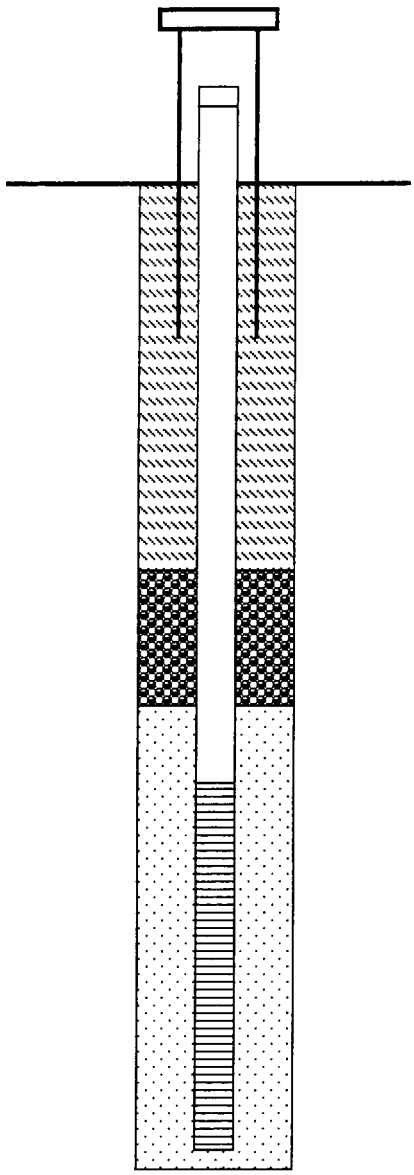
Material:	#10 Silica sand
Depth to Top of Filter Sand:	5'
Depth to Bottom of Filter Sand:	12'

Well Screen

Material:	Schedule 40 PVC
Diameter x Length:	2" x 5'
Slot No. or Size:	#10 Slot
Depth to Bottom of Screen:	12' (1863)

Borehole

Diameter:	6¼"
Depth to Bottom of Borehole:	12'
Method of Advancement:	Hollow stem auger



WATER LEVEL MEASUREMENTS BELOW TOP OF RISER PIPE

DATE	TIME	WATER LEVEL
11-2-07	9:05	8½'

(1869.4)

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION (SP033- MW-3) **(16-3)**

Address (if in city) State Plane Coordinates

N139,269, E1,845,516

County McLean

__ ¼ __ ¼ SW ¼ Sec. 16 Twp. 145 N. Rge. 82 W.

Lat. _____ Long.: _____

Altitude: _____

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6 ¼ inches Depth 12 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.9 ft. to 7 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 7 feet to 12 feet

Sand packed from 5' to 12'

Depth grouted from surface to 3'

Grouting Material

Bentonite _____ Other x

If other explain: Neat cement grout

bentonite seal from 3'-5'

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' steel cover

Was protective casing installed? ■ Yes No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 5.6 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG

Formation	Depth (Ft.) From	To
LEAN CLAY	0	4½
POORLY-GRADED SAND WITH SILT	4½	9½
SANDY LEAN CLAY	9½	12

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

2 - 4" x 4" x 6' timber bumper posts installed

9. DATE COMPLETED 11-5-07

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Midwest Testing Laboratory, Inc. 444

Monitoring Well Contractor Certificate No.

P.O. Box 2084, Bismarck, ND 58502-2084

Address

Signature Date

MIDWEST TESTING LABORATORY

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT: Section 16 Monitoring Wells, Permit No. SP-033, Great River Energy, Underwood, ND

PROJECT NO: B8749

Monitoring Well No:	SP033-MW-4 (16-4)	**Ground Surface Elevation:**	1874.5
Date of Installation:	10-31-07	**Top of Riser Elevation:**	1877.4
Crew Chief:	Mike Roberts		

Protective Casing

Material:	Steel
Diameter x Length:	4" x 4" x 5'
Length Above Ground:	3'
	2 bumper posts

Riser Pipe

Material:	Schedule 40 PVC
Diameter x Length:	2" x 10'
Length Above Existing Grade:	2.9'

Annular Space Backfill Material: Neat cement grout

Seal Above Screen

Material:	Bentonite chips
Thickness:	2'

Filter Sand

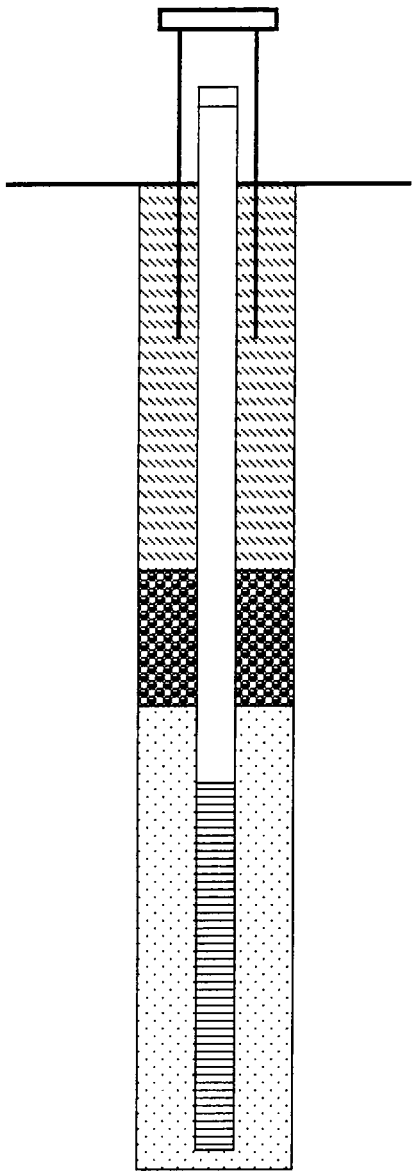
Material:	#10 Silica sand
Depth to Top of Filter Sand:	5'
Depth to Bottom of Filter Sand:	17'

Well Screen

Material:	Schedule 40 PVC
Diameter x Length:	2" x 5'
Slot No. or Size:	#10 Slot
Depth to Bottom of Screen:	17' (1857.5)

Borehole

Diameter:	6¼"
Depth to Bottom of Borehole:	17'
Method of Advancement:	Hollow stem auger



WATER LEVEL MEASUREMENTS BELOW TOP OF RISER PIPE

DATE	TIME	WATER LEVEL
11-2-07	8:55	13.9'

(1863.5)

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION (SP033- MW-4) (16-4)

Address (if in city) State Plane Coordinates

N139,269, E1,846,266

County McLean

__ ¼ __ ¼ SW ¼ Sec. 16 Twp. 145 N. Rge. 82 W.

Lat. _____ Long.: _____

Altitude: _____

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6 ¼ inches Depth 17 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.9 ft. to 7 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 17 feet to 7 feet

Sand packed from 5' to 17'

Depth grouted from surface to 3'

Grouting Material

Bentonite _____ Other x

If other explain: Neat cement grout

bentonite seal from 3'-5'

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' steel cover

Was protective casing installed? ■ Yes No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 11 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG

Formation	Depth (Ft.) From	To
POORLY-GRADED SAND WITH SILT & GRAVEL	0	4½
SANDY LEAN CLAY	4½	17

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

2 - 4" x 4" x 6' timber bumper posts installed

9. DATE COMPLETED 11-5-07

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Midwest Testing Laboratory, Inc. 444

Monitoring Well Contractor Certificate No.

P.O. Box 2084, Bismarck, ND 58502-2084

Address

Signature Date

MIDWEST TESTING LABORATORY

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT: Section 16 Monitoring Wells, Permit No. SP-033, Great River Energy, Underwood, ND

PROJECT NO: B8749

Monitoring Well No:	SP033-MW-5 (16-5)	**Ground Surface Elevation:**	1876.5
Date of Installation:	10-31-07	**Top of Riser Elevation:**	1879.9
Crew Chief:	Mike Roberts		

Protective Casing

Material:	Steel
Diameter x Length:	4" x 4" x 5'
Length Above Ground:	3½'
	2 bumper posts

Riser Pipe

Material:	Schedule 40 PVC
Diameter x Length:	2" x 10'
Length Above Existing Grade:	3.4'

Annular Space Backfill Material: Neat cement grout

Seal Above Screen

Material:	Bentonite chips
Thickness:	2'

Filter Sand

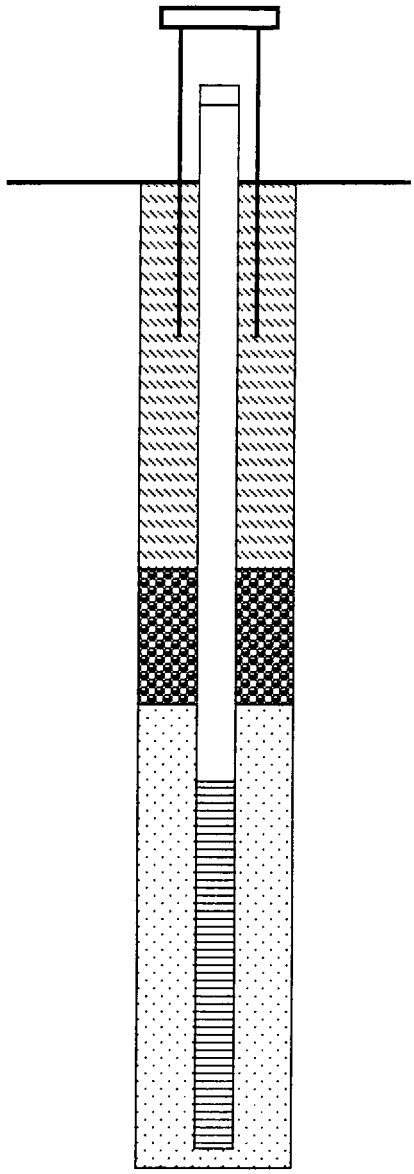
Material:	#10 Silica sand
Depth to Top of Filter Sand:	4½'
Depth to Bottom of Filter Sand:	11½'

Well Screen

Material:	Schedule 40 PVC
Diameter x Length:	2" x 5'
Slot No. or Size:	#10 Slot
Depth to Bottom of Screen:	11½' (1865)

Borehole

Diameter:	6¼"
Depth to Bottom of Borehole:	11½'
Method of Advancement:	Hollow stem auger



WATER LEVEL MEASUREMENTS BELOW TOP OF RISER PIPE

DATE	TIME	WATER LEVEL
11-2-07	8:20	10'

(1869.9)

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

*REVISED COPY 12/11/07

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION (SP033- MW-5) (16-5)

Address (if in city) State Plane Coordinates

N137,839, E1,846,237

County McLean

__ ¼ __ ¼ SW ¼ Sec. 16 Twp. 145 N. Rge. 82 W.

Lat. _____ Long.: _____

Altitude: _____

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6 ¼ inches Depth *11½ feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +3.4 ft. to 6½ ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 6½ feet to 11½ feet

Sand packed from 4½' to 11½'

Depth grouted from surface to 2½'

Grouting Material Bentonite _____ Other x

If other explain: Neat cement grout

bentonite seal from 2½'-4½'

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' steel cover

Was protective casing installed? ■ Yes No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 6.6 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
SANDY LEAN CLAY	0	2
POORLY-GRADED SAND WITH SILT & GRAVEL	2	11½

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

2 - 4" x 4" x 6' timber bumper posts installed

9. DATE COMPLETED 11-5-07

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Midwest Testing Laboratory, Inc. 444

Monitoring Well Contractor Certificate No.

P.O. Box 2084, Bismarck, ND 58502-2084

Address

Signature 12-11-07

Date

BORING LOG NO. MW-16-6

PROJECT: Monitoring Well Installations

CLIENT: Golder Asssociates, Inc
Lakewood, Colorado

SITE: GRE - Coal Creek Station
McLean County, North Dakota

LOCATION: See Exhibit A-2

Latitude: 47.37249° Longitude: -101.14037°
Northing: 136540 Easting: 1841424

Surface Elev.: 1914 (Ft.)

DEPTH		ELEVATION (Ft.)
0.3	**TOPSOIL**, dark brown	1913.5
	SANDY LEAN CLAY (CL), trace gravel, brown, soft to medium stiff	
7.5		1906.5
	COAL, very dark brown, waterbearing	
12.0		1902
	LEAN CLAY (CL), gray, very stiff	
15.0		1899
16.0	**FAT CLAY (CH)**, dark brown, very stiff, silt laminations	1898
	Boring Terminated at 16 Feet	

INSTALLATION DETAILS: Steel Casing, PVC Riser, Grout, Bentonite, Silica Sand, PVC Screen, Sluff

DEPTH (Ft.)	FIELD TEST RESULTS
	2-2-2 N=4
	2-2-3 N=5
5	2-3-4 N=7
	2-3-4 N=7
10	9-10-6 N=16
	7-9-11 N=20
15	7-9-13 N=22

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" ID HSA 0-14½'

Abandonment Method:
Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:

Elevation, Northing and Easting provided by client.
Latitude and Longitude measured by Terracon.
Sloping concrete collar at the surface.
Three steel bollards installed around well.
Well developed July 17. Pumped water until clear (0.5 hrs).

WATER LEVEL OBSERVATIONS

- *While drilling*
- *At completion of drilling*
- *After 70 hrs*

Terracon
1805 Hancock Drive
Bismarck, North Dakota

Boring Started: 7/14/2015	Boring Completed: 7/14/2015
Drill Rig: D-90	Driller: MR
Project No.: M2155060	Exhibit: A-9

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION **(Well MW-16-6)**

Address (if in city) (see attached drawing)

County McLean

SW ¼ SW¼ SW¼ Sec. 16 Twp. 145 N. Rge. 82 W

Lat: 47.37249 Long.: -101.14037

Ground Elevation: 1914

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6.25 inches Depth 16 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.75 ft. to 4 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 4 feet to 14 feet

Sand packed from 3 feet to 14 feet

Depth grouted from 1 foot to 3 feet

Grouting Material

Bentonite x Other _____

If other explain:

One foot thick concrete collar at the surface.

Sluff: 14 feet to 16 feet

Three steel bollards installed around well.

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' square steel protective cover

Was protective casing installed? ■ Yes □ No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 1 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
SANDY LEAN CLAY	0	7.5
COAL	7.5	12
LEAN CLAY	12	15
FAT CLAY	15	16

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

Water level monitoring only

9. DATE COMPLETED 7-17-15

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Terracon 444

Monitoring Well Contractor Certificate No.

PO Box 2084

Address

Bismarck, ND 58502-2084

Signature Date

7/27/15

BORING LOG NO. MW-16-7

PROJECT: Monitoring Well Installations

CLIENT: Golder Asssociates, Inc
Lakewood, Colorado

SITE: GRE - Coal Creek Station
McLean County, North Dakota

LOCATION: See Exhibit A-2

Latitude: 47.3722° Longitude: -101.13292°
Northing: 136540 Easting: 1843239

Surface Elev.: 1907 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.3	1906.5	**TOPSOIL**, dark brown
		SANDY LEAN CLAY (CL), trace gravel, brown, stiff
13.0	1894	
		CLAYEY SAND (SC), grayish-brown, medium dense, fine-grained
20.5	1886.5	
		FAT CLAY (CH), light brown, very stiff, silt lamination
24.0	1883	
		CLAYEY SAND (SC), light brown, dense, fine-grained, waterbearing
29.0	1878	
		SANDY LEAN CLAY (CL), light brown, very stiff
33.0	1874	
		Boring Terminated at 33 Feet

INSTALLATION DETAILS: Steel Casing, PVC Riser, Grout, Bentonite, Silica Sand, PVC Screen, Sluff

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
		4-5-7 N=12
		3-4-5 N=9
5		3-4-6 N=10
		3-3-5 N=8
10		3-4-5 N=9
		3-5-8 N=13
15		5-8-10 N=18
20		7-12-18 N=30
25		11-13-19 N=32
30		11-13-16 N=29

WATER LEVEL OBSERVATIONS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" ID HSA 0-33'

Abandonment Method:
Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:

Elevation, Northing and Easting provided by client.
Latitude and Longitude measured by Terracon.
Sloping concrete collar at the surface.
Three steel bollards installed around well.
Well developed July 17. Pumped water until clear (0.5 hrs).

WATER LEVEL OBSERVATIONS

- *While drilling*
- *At completion of drilling*
- *After 68 hrs*

Terracon
1805 Hancock Drive
Bismarck, North Dakota

Boring Started: 7/14/2015	Boring Completed: 7/14/2015
Drill Rig: D-90	Driller: MR
Project No.: M2155060	Exhibit: A-10

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION **(Well MW-16-7)**

Address (if in city) (see attached drawing)

County McLean

SE ¼ SE¼ SW¼ Sec. 16 Twp. 145 N. Rge. 82 W

Lat: 47.3722 Long.: -101.13292

Ground Elevation: 1907

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6.25 inches Depth 33 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.75 ft. to 22 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 22 feet to 32 feet

Sand packed from 20 feet to 32 feet

Depth grouted from 1 foot to 20 feet

Grouting Material

Bentonite x Other _____

If other explain:

One foot thick concrete collar at the surface.

Sluff: 32 feet to 33 feet

Three steel bollards installed around well.

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' square steel protective cover

Was protective casing installed? ■ Yes □ No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 24 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
SANDY LEAN CLAY	0	13
CLAYEY SAND	13	20.5
FAT CLAY	20.5	24
CLAYEY SAND	24	29
SANDY LEAN CLAY	29	33

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

Water level monitoring only

9. DATE COMPLETED 7-17-15

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Terracon 444

Monitoring Well Contractor Certificate No.

PO Box 2084

Address

Bismarck, ND 58502-2084

Signature Date

7/27/15

LOG OF TEST BORING

JOB NO 5200-86-256 VERTICAL SCALE 1" = 3' BORING NO 42

PROJECT MONITORING WELL CONSTRUCTION - COAL CREEK STATION - UNDERWOOD, NORTH DAKOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ≈ 1885')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	LL/PL	Qu
	SANDY LEAN CLAY WITH A LITTLE GRAVEL, black, rather stiff (OL)	TOPSOIL	12		1	SB				
1½	SANDY LEAN CLAY WITH A LITTLE GRAVEL, brown (CL)	GLACIAL TILL		▼	2	FA				
3	SILTY SAND WITH GRAVEL, brown, wet, medium dense to loose (SM)	COARSE ALLUVIUM	15		3	SB				
			5		4	SB				
13	SANDY LEAN CLAY WITH A LITTLE GRAVEL, gray, rather stiff (CL)	GLACIAL TILL	9		5	SB				
16½	END OF BORING									

WATER LEVEL MEASUREMENTS

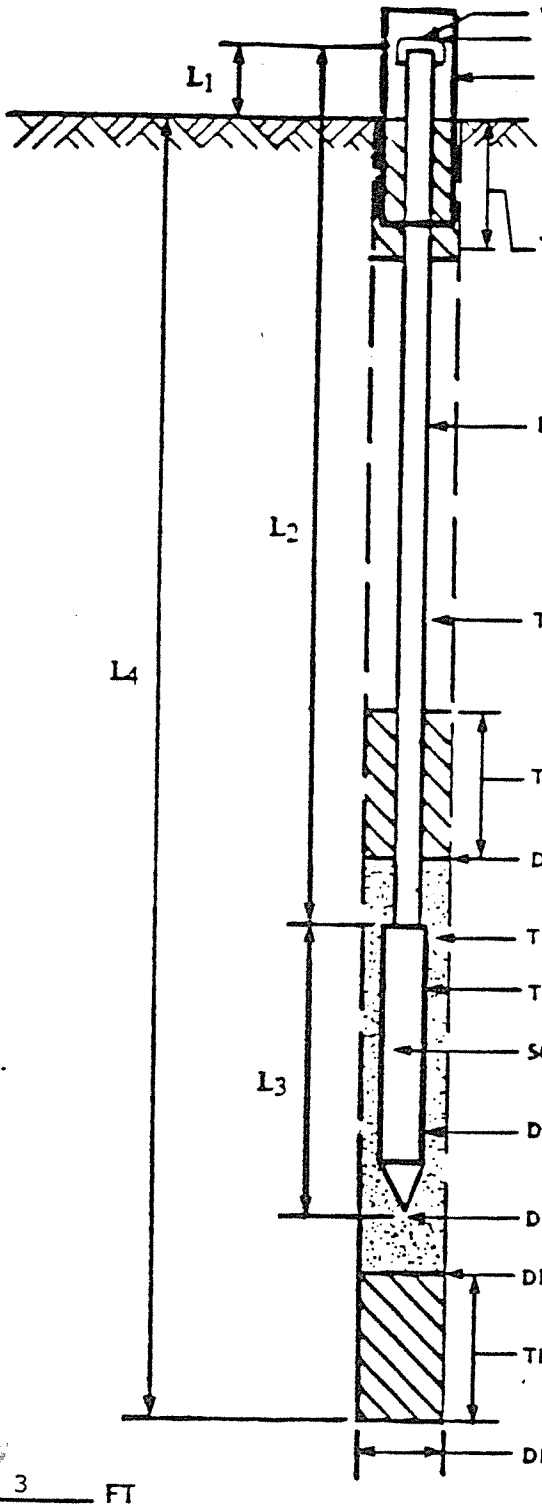
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-28	3:34	6'	4½'	5'	to	4'
See monitoring well data sheets for additional water level information.					to	

START 5-28-86 COMPLETE 5-28-86

METHOD 3¼"HSA 0-15' @ 4:00

NO. 5200-86-256 PIEZOMETER NO. 42

GROUND ELEVATION AND DATUM ≈1885'



ELEVATION OF TOP OF RISER PIPE	≈1888'
Diameter and Type	6" Steel
Total Length	5'
Length Above Ground	3.3'
THICKNESS AND TYPE OF SEAL	Neat Cement Grout
DIAMETER AND TYPE OF RISER PIPE	Timco 2" Flush Threaded PVC Monitoring Well Pipe
TYPE OF BACKFILL AROUND RISER	Neat Cement Grout
THICKNESS AND TYPE OF SEAL	12" Bentonite
DEPTH TO TOP OF FILTER SAND	9'
TYPE OF FILTER AROUND SCREEN	Silica Filter Sand
TYPE OF PIEZOMETER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	10 Slot
DIAMETER AND LENGTH OF SCREEN	2" x 5'
DEPTH TO BOTTOM OF PIEZOMETER	14.4'
DEPTH TO BOTTOM OF FILTER SAND	15'
THICKNESS AND TYPE OF SEAL	N/A
DIAMETER OF BOREHOLE	6

L_1 = 3 FT

L_2 = 12.4 FT

L_3 = 5 FT

16 FT

INSTALLATION COMPLETED:
Date 5-28-86 Time 4:15

PIEZOMETER WATER LEVEL MEASUREMENTS

DATE	TIME	BAILED DEPTHS	WATER LEVEL
5-28-86	4:25	-	2.6
6-4-86	PM7:25	2.9'-14'	2.9'
6-5-86	1:00	-	2.9'

LOG OF TEST BORING NO.: MW-49

CLIENT: Cooperative Power/United Power Association
PROJECT: Coal Creek Station
PROJECT NUMBER: 87C61
LOCATION: Underwood, ND

SURFACE ELEVATION: 1903.6
BORING DEPTH: 25.0 feet
DATE: 05/20/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (in)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1903.6	0	0.0 - 1.5	SS	1	12		Lean br. sandy, gravelly CLAY, tr. silt, firm - fill	CL	NA	
1898.6	5	5.0 - 6.5	SS	2	32		Same as above	CL	NA	
1893.6	10	10.0-11.5	SS	3	20		Same as above	CL	NA	
							Grey green sandy SILT with clay, damp, soft to firm	ML	NA	
1888.6	15	15.0-16.5	SS	4	13		Fat dk. grey CLAY (shale), damp, hard to very hard	CH	NA	
1883.6	20	20.0-21.5	SS	5	8		Same as above exc. siltier, wet, firm	CH	NA	
		23.5-25.0	SS	6	10		Lean grey/green sandy CLAY w/ silt	CL	NA	
1878.6	25									EOB @ 25.0 feet
1873.6	30									
1868.6	35									
1863.6	40									
1858.6	45									
1853.6	50									
1848.6	55									

DRILLING DATA

START DATE: 05/20/88
COMPLETION DATE: 05/20/88
LOGGED BY: KAD
DRILLING METHOD: 3 1/4" ID HSA SS Samples every 5 feet
DRILLING CONTRACTOR: Great Plains Engineering Laboratory

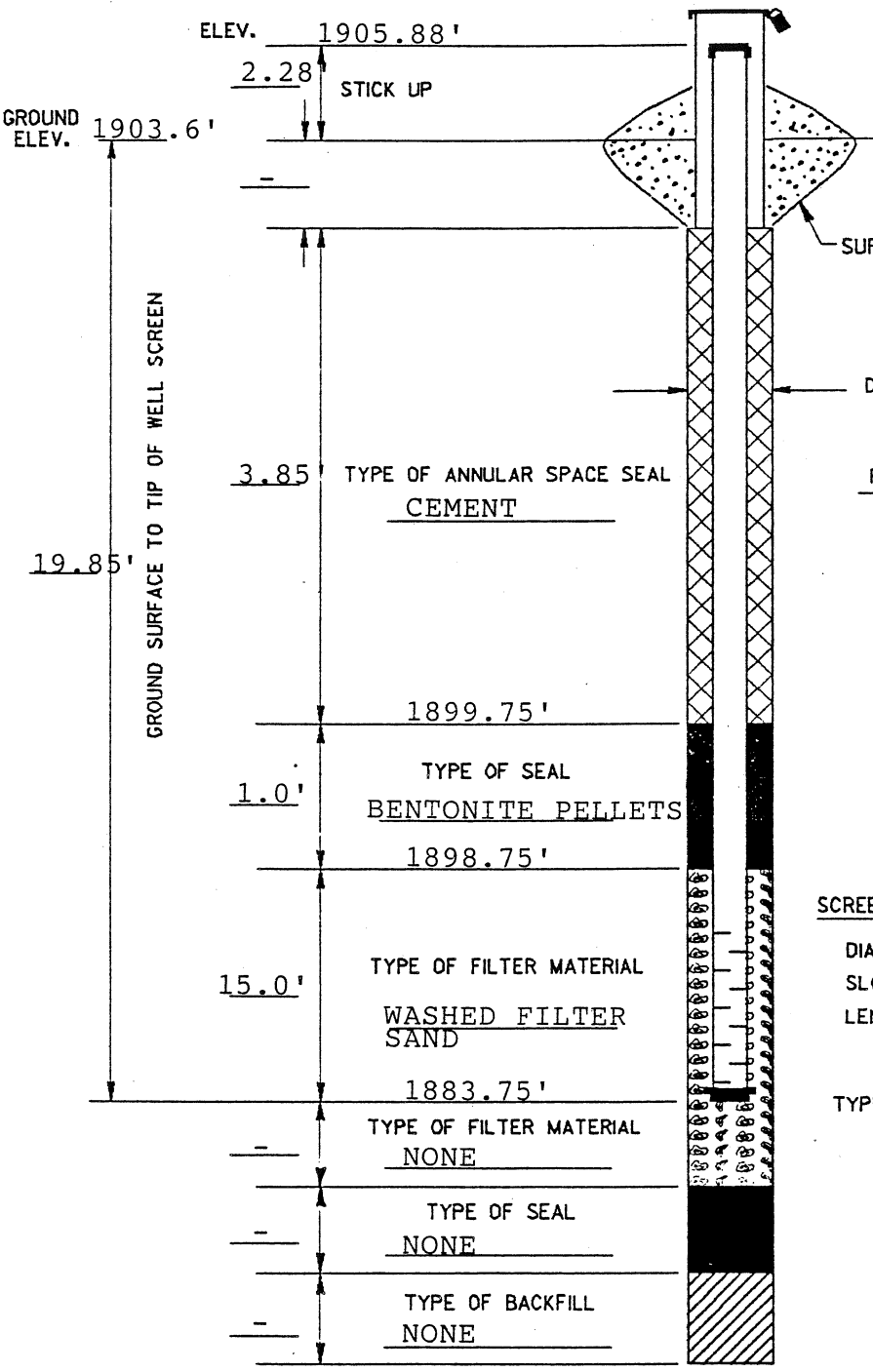
WATER LEVEL INFORMATION

DEPTH AT COMPLETION: 10.0 feet
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

MONITORING WELL CONSTRUCTION DIAGRAM

WELL NO: MW-49
DATE INSTALLED: 05/20/88
DRILLER: GREAT PLAINS ENGINEERING LABORATORY
DRILLING METHOD: HOLLOW STEM AUGER

CLIENT: COOPERATIVE POWER/UNITED ASSOCIATION
PROJECT: COAL CREEK STATION
SCOPE I.D.: 87061
BY: KAD



PROTECTOR PIPE:
SIZE 4"
MATERIAL STEEL
LOCK NO. 3945

SURFACE SEAL MATERIAL CEMENT

DRILL HOLE DIAMETER 8"

PIPE:
DIAMETER 2"
MATERIAL PVC
SCH. 40
TYPE OF JOINTS FLUSH THREADED

SCREEN:
DIAMETER 2"
SLOT SIZE .010"
LENGTH 10'

TYPE OF CAP FLAT PVC

Foth & Van Dyke
Geosciences & Environmental Management Division
Revised 3/88 By BJS
Drawn By MRS

LOG OF TEST BORING NO.: MW-51

CLIENT: Cooperative Power/United Power Association
PROJECT: Coal Creek Station
PROJECT NUMBER: 87C61
LOCATION: Underwood, ND

SURFACE ELEVATION: 1895.5
BORING DEPTH: 20.0 feet
DATE: 05/20/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (in)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1895.5	0	0.0 - 1.5	SS	1	15	18	Lean sandy CLAY with silt and org., med. dense - fill	CL	NA	
1890.5	5	5.0 - 6.5	SS	2	9	18	Same as above without roots plus tr. gravel, loose - fill	CL	NA	
1885.5	10	10.0-11.5	SS	3	16	18	Grey green silty f SAND, tr. clay, wet, med. dense	SM	NA	
1880.5	15	15.0-16.5	SS	4	10	18	Br. gravelly SAND with silt, tr. clay, very wet, loose	SM	NA	
		18.0-19.5	SS	5	16	10	Lean sandy CLAY with silt	CL	NA	
1875.5	20									EOB @ 20.0 feet
1870.5	25									
1865.5	30									
1860.5	35									
1855.5	40									
1850.5	45									
1845.5	50									
1840.5	55									

DRILLING DATA

START DATE: 05/20/88
COMPLETION DATE: 05/20/88
LOGGED BY: KAD
DRILLING METHOD: 3 1/4" ID HSA SS Samples every 5 feet
DRILLING CONTRACTOR: Midwest Testing

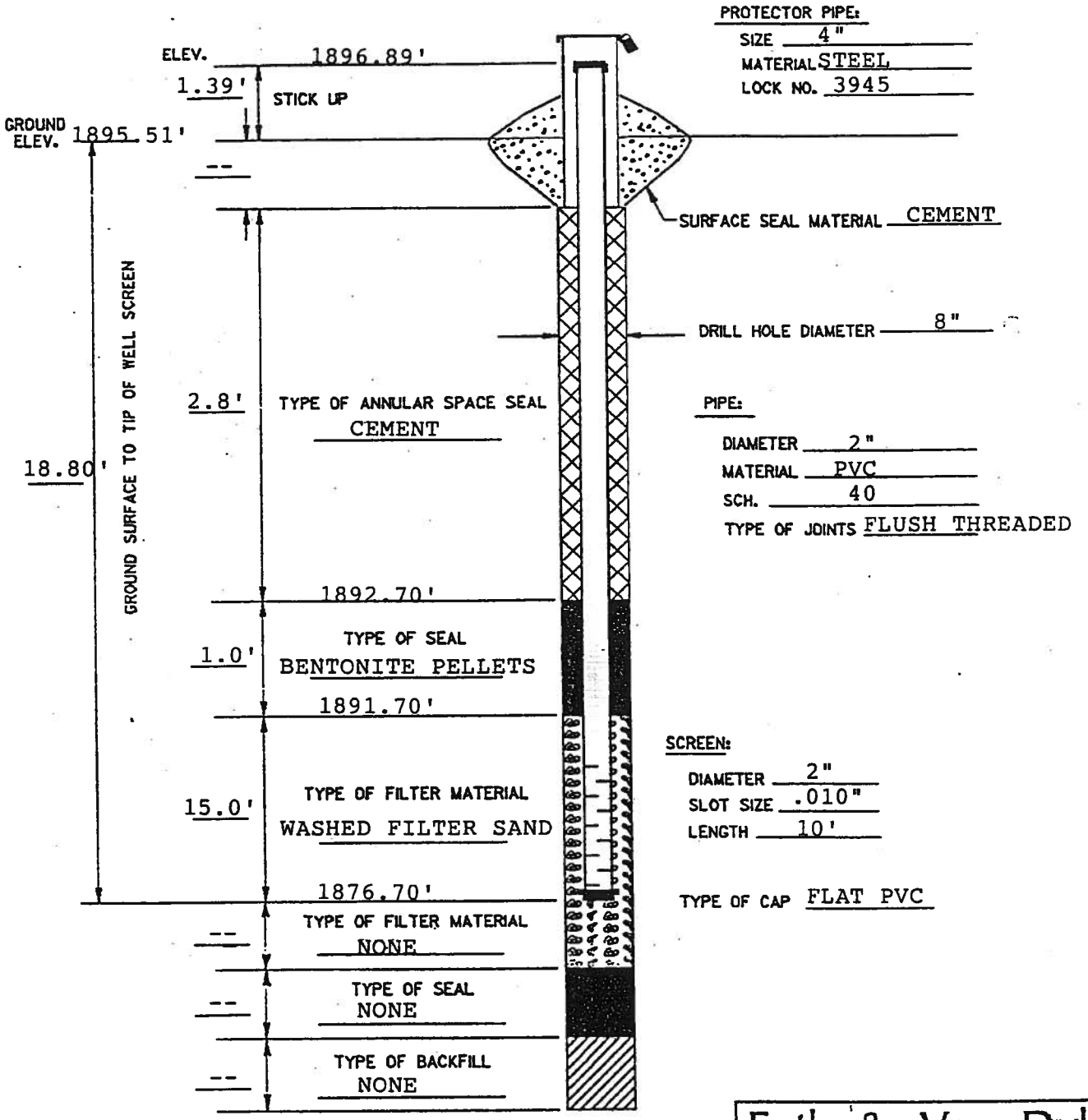
WATER LEVEL INFORMATION

DEPTH AT COMPLETION: 9.4 feet
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

MONITORING WELL CONSTRUCTION DIAGRAM

WELL NO: MW-51
DATE INSTALLED: 5/20/88
DRILLER: MIDWEST TESTING
DRILLING METHOD: HOLLOW STEM AUGER

CLIENT: COOPERATIVE POWER/ UNITED POWER ASSOCIATION
PROJECT: COAL CREEK STATION
SCOPE I.D.: 87C61
BY: KAD



Foth & Van Dyke
Geosciences & Environmental Management Division
Revised 3/88 By BJS
Drawn By MRS .

FOTH & VAN DYKE

Client: Cooperative Power
Project: Coal Creek Station
Prepared by: AMC
Checked by: PAD

Scope I.D.: 89C16
Page: 1 of 2
Date: 8-30-89
Date: 9-1-89

REPORT - LOG OF TEST BORING

Start Date: 7-17-89
Completion Date: 7-17-89
Logged by: GKM

Test Boring No.: MW-72
Location: N 36783.6, E 44025.9
Boring Depth: 24.0
Surface Elevation: 1882.4

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1882.4	--0	0.0 - 1.5	ss	1	18	0.5	Dk. brn SILT w/sand, gravel & clay, dense, rooted, organic, dry, (topsoil)	ML		6-8-10
1880.9	--1.5	1.5 - 3.0	ss	2	24	1.0	Grades down to gry brn to blk silty lean CLAY, tr. fn.-crs. sand, sli moist, dense	CL		10-11-13
1879.4	--3.0	3.0 - 4.5	ss	3	18	1.4	As above to 4.2'; yel-brn gravelly f-cg SAND w/silt & clay, limonite stain, med dense, sli moist	CL SW		5-8-10
1877.9	--4.5	4.5 - 6.0	ss	4	15	1.5	Mottled lt. tan & med gry silty lean CLAY w/med. sand; w/0.2' lt. gry brn clayey SAND lens; @ 5.4' olive gry clayey SILT w/tr. sand & grvl, m dense,stiff, sli moist	CL SC MH		4-5-10
1876.4	--6.0	6.0 - 7.5	ss	5	15	1.1	As above ranges to silty fat CLAY w/lt. gry mottling & tr. lignite frags, stiff, plastic, sli moist	MH CH		4-6-9
1874.9	--7.5	7.5 - 9.0	ss	6	13	1.0	As above	CH		3-6-7
1873.4	--9.0	9.0-10.5	ss	7	16	1.2	As above w/more sand & fn. gravel abundant iron staining, no mottling, sli moist to moist	CH		3-6-10
1871.9	--10.5	10.5-12.0	ss	8	20	1.5	As above w/some lt. gry mottling, very stiff, dense, plastic	CH		5-7-13
1870.4	--12.0	12.0-13.5	ss	9	16	1.5	As above, med. dense	CH		4-7-9
1868.9	--13.5	13.5-15.0	ss	10	14	1.5	As above	CH		3-6-8
1867.4	--15.0	15.0-16.5	ss	11	12	1.5	As above except moist & softer	CH		3-5-7
1865.9	--16.5									

DRILLING METHOD: HSA, I.D.= 3 3/4",O.D.= 7"
DRILLING CONTRACTOR: Braun

DEPTH TO WATER -
AT COMPLETION: 11.5'
LATER TIME/DEPTH: 7.5'

FOTH & VAN DYKE

Client: Cooperative Power
Project: Coal Creek Station
Prepared by: AMC
Checked by: PAD

Scope I.D.: 89C16
Page: 2 of 2
Date: 8-30-89
Date: 9-1-89

REPORT - LOG OF TEST BORING

Test Boring No.: MW-72
Location: N 36783.6, E 44025.9
Boring Depth: 24.0
Surface Elevation: 1882.4

Start Date: 7-17-89
Completion Date: 7-17-89
Logged by: GKM

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1865.9	--16.5	16.5-18.0	ss	12	12	0	NSR (s.a.a., based on drilling character)	CH		3-5-7 Water @ 17.0', ss wet
1864.4	--18.0	18.0-19.5	ss	13	18	0	NSR (s.a.a., based on drilling character) med dense, water	CH		3-7-11 Add catcher @ 19.5'
1862.9	--19.5	19.5-21.0	ss	14	24	1.5	Gry brn f-mg SAND w/silt & tr. clay, noncohesive, water bearing to 20.3' yel gry brn f-m SAND, w/silt & clay, cohesive, dense	SP		4-9-15
1861.4	--21.0	21.0-22.5	ss	15	22	1.3	As above	SP		5-9-13
1859.9	--22.5	22.5-24.0	ss	16	46		Very dense, water bearing	SP		10-16-30
1858.4	--24.0						EOB @ 24.0'			
1856.9	--25.5									
1855.4	--27.0									
1853.9	--28.5									
1852.4	--30.0									
1850.9	--31.5									
1849.4	--33.0									

DRILLING METHOD: HSA, I.D.= 3 3/4", O.D.= 7"
DRILLING CONTRACTOR: Braun

DEPTH TO WATER -
AT COMPLETION: 11.5'
LATER TIME/DEPTH: 7.5'

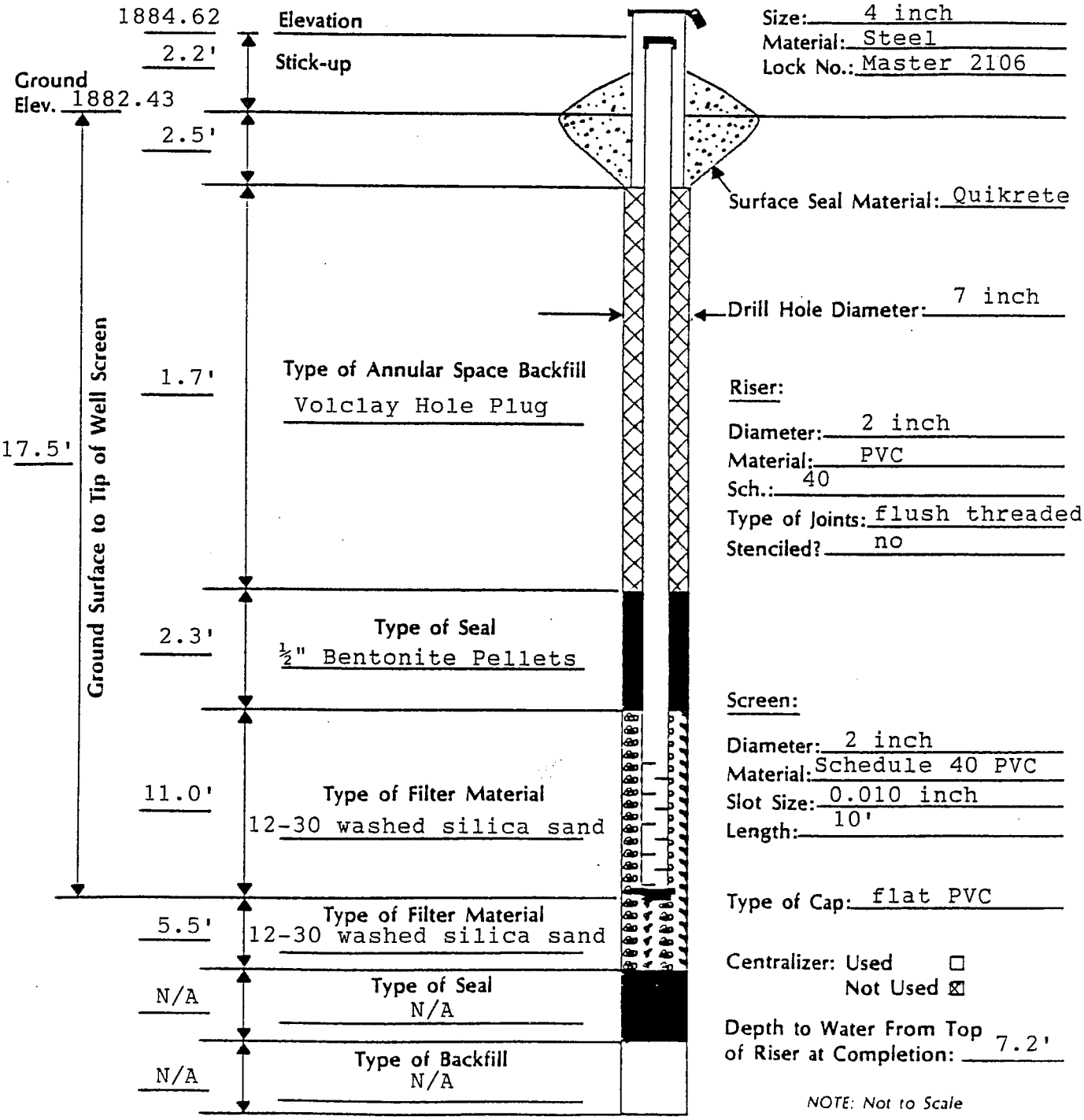
Foth & Van Dyke

Client: Cooperative Power — Scope I.D.: 89C16
Project: Coal Creek Station — Page: 1
Prepared by: GKM — Date: 7-18-89
Checked by: PAD — Date: 9-1-89

MONITORING WELL CONSTRUCTION DIAGRAM

Driller: Braun
Drilling Method: Hollow Stem Auger, I.D.=3 3/4", O.D.=7"
Coordinates: N 36783.6, E 44025.9

Well No: MW-72
Date Installed: 7-18-89



Protector Pipe:
Size: 4 inch
Material: Steel
Lock No.: Master 2106

Surface Seal Material: Quikrete

Drill Hole Diameter: 7 inch

Riser:
Diameter: 2 inch
Material: PVC
Sch.: 40
Type of Joints: flush threaded
Stenciled? no

Screen:
Diameter: 2 inch
Material: Schedule 40 PVC
Slot Size: 0.010 inch
Length: 10'

Type of Cap: flat PVC

Centralizer: Used ☐
Not Used ☒

Depth to Water From Top of Riser at Completion: 7.2'

NOTE: Not to Scale

* N/A = not applicable

FOTH & VAN DYKE	Client: Cooperative Power	Scope I.D.: 89C16
	Project: Coal Creek Station	Page: 1 of 3
	Prepared by: AMC	Date: 8-30-89
	Checked by: PAD	Date: 9-1-89

REPORT - LOG OF TEST BORING

Test Boring No.: MW-75
Start Date: 7-19-89 — Location: N 36290.0, E 39715.8
Completion Date: 7-19-89 — Boring Depth: 42.0
Logged by: GKM — Surface Elevation: 1938.9

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1938.9	--0	0.0 - 1.5	ss	1	14	1.4	Dk brn sandy SILT, organic, roots w/occ. thin 1/4" to 1/2" lean lt. yel gry CLAY laminae, dry, med. dense, (topsoil)	ML		4-5-9
1937.4	--1.5	1.5 - 3.0	ss	2	18	1.2	Grades to dk. brn lean CLAY w/ silt, organic, rooted, sli moist med. dense, stiff, sli plastic	CL		6-8-10
1935.9	--3.0	3.0 - 4.5	ss	3	23	1.4	As above; boulder @ 3.5'- hard drilling	CL		3-15-8
1934.4	--4.5	4.5 - 6.0	ss	4	22	1.4	Yel-gry brn silty CLAY (4.5' - 5.0'); yel brn gravelly f-c SAND, w/silt & tr clay (5.0-5.4), dry, mottled yel gry brn silty CLAY w/fn. sand, sli moist, med. dense	CL SW CL		10-9-13
1932.9	--6.0	6.0 - 7.5	ss	5	23	1.2	Bright yel brn lean silty CLAY, tr. sand, limonite stain, med. dense, sli moist, sli plastic	CL		5-9-14
1931.4	--7.5	7.5 - 9.0	ss	6	23	1.5	As above w/increasing sand to 8.5'; olive gry to dk gry fat CLAY, stiff, plastic, waxy feel, sli moist, med. dense	CL CH		6-12-11
1929.9	--9.0	9.0-10.5	ss	7	20	1.2	As above w/ irregular lenses of yel brn clayey SILT, w/tr. sand, sli moist, med. dense	CH ML		6-8-12
1928.4	--10.5	10.5-12.0	ss	8	29	1.4	Dk gry interbedded clayey SILT & silty fat CLAY (shale) sli moist, stiff, plastic, iron stained partings	CH-MH		5-11-18
1926.9	--12.0	12.0-13.5	ss	9	27	1.5	As above - mostly silty fat CLAY (shale), sli moist	CH		7-11-16
1925.4	--13.5	13.5-15.0	ss	10	11	0.9	As above to 14.5'; @ 14.5'- blk LIGNITE, punky, soft, moist w/few hard frags.	COAL		3-5-6
1923.9	--15.0	15.0-16.5	ss	11	22	1.5	As above to 15.5'; @ 15.5'- brn-gry fat CLAY (shale) w/limonite clay stringers grades downward to dk. gry clayey SILT, med. dense, sli moist, stiff	CH MH		5-6-16
1922.4	--16.5									

DRILLING METHOD: HSA, I.D.= 3 3/4", O.D.= 7"
DRILLING CONTRACTOR: Braun

DEPTH TO WATER -
AT COMPLETION: 36.3'
LATER TIME/DEPTH: 22.3' 14 hrs later

FOTH & VAN DYKE

Client: Cooperative Power
Project: Coal Creek Station
Prepared by: AMC
Checked by: PAD

Scope I.D.: 89C16
Page: 2 of 3
Date: 8-30-89
Date: 9-1-89

REPORT - LOG OF TEST BORING

Start Date: 7-19-89
Completion Date: 7-19-89
Logged by: GKM

Test Boring No.: MW-75
Location: N 36290.0, E 39715.8
Boring Depth: 42.0
Surface Elevation: 1938.9

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1922.4	--16.5	16.5-18.0	ss	12	37	1.5	As above except more silty fat CLAY (shale) content, v. stiff, plastic, sli moist, dense, massive, conchoidal partings, minor Fe stain	CH		12-16-21
1920.9	--18.0	18.0-19.5	ss	13	29	1.5	As above w/ tr. disseminated lignite	CH		8-13-16
1919.4	--19.5	19.5-21.0	ss	14	33	1.5	As above w/0.1' layer gry SILT w/limonite stain, w/minor clay thinly laminated, w/tr. fn. sand, cohesive, stiff, v. sli plastic, dense, sli moist	ML		8-12-21
1917.9	--21.0	21.0-22.5	ss	15	28	1.5	SILT as above to 21.7'except wet; @ 21.7'- dk. gry fat CLAY (shale) w/silt, moist, med. dense, massive, v. stiff	ML CH		8-11-17
1916.4	--22.5	22.5-24.0	ss	16	48	1.5	As above to 23.0'; @ 23.0'- lt. gry to yel gry SILT w/tr. clay, dense, cohesive, wet	CH ML		9-18-30
1914.9	--24.0	24.0-25.5	ss	17	29	1.5	Silt as above to 24.5', moist; @ 24.5'-dk. gry fat CLAY (shale), sli moist	ML CH		8-12-17
1913.4	--25.5	25.5-27.0	ss	18	34	1.5	Interbedded silty CLAY & clayey SILT, moist to sli moist	ML CH ML CH		8-13-21
1911.9	--27.0	27.0-28.5	ss	19	36	1.5	As above, interbedded silty CLAY & clayey SILT, clay is leaner than above, moist	ML CH ML CH		8-16-20
1910.4	--28.5	28.5-30.0	ss	20	22	1.5	As above 2-1" wet clayey SILT layers, uniform dk. gry color	ML CH ML CH		3-8-14
1908.9	--30.0	30.0-31.5	ss	21	42	1.5	As above to 30.7'; @ 30.7'-dk.gry fn silty SAND, w/soft clay, cohesive,wet, med dense, uniform, massive, well sorted (consolidated graywacke)	ML CH SM		13-17-25
1907.4	--31.5	31.5-33.0	ss	22	62	1.5	SAND as above, wet, dense	SM		11-17-45
1905.9	--33.0									

DRILLING METHOD: HSA, I.D.= 3 3/4", O.D.= 7"
DRILLING CONTRACTOR: Braun

DEPTH TO WATER -
AT COMPLETION: 36.3'
LATER TIME/DEPTH: 22.3' 14 hrs later

FOTH & VAN DYKE	Client: Cooperative Power Project: Coal Creek Station Prepared by: AMC Checked by: PAD	Scope I.D.: 89C16 Page: 3 of 3 Date: 8-30-89 Date: 9-1-89

REPORT - LOG OF TEST BORING

Start Date: 7-19-89
Completion Date: 7-19-89
Logged by: GKM

Test Boring No.: MW-75
Location: N 36290.0, E 39715.8
Boring Depth: 42.0
Surface Elevation: 1938.9

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1905.9	--33.0	33.0-34.5	ss	23	38	1.5	As above, wet (appears just under saturation, but may be saturated)	SM		12-17-21
1904.4	--34.5									
1902.9	--36.0	36.0-37.5	ss	24	47	1.5	As above	SM		13-20-27
1901.4	--37.5	37.5-39.0	ss	25	47	1.5	As above	SM		11-20-27
1899.9	--39.0	39.0-40.5	ss	26	47	1.5	As above	SM		17-20-27
1898.4	--40.5	40.5-42.0	ss	27	60	1.5	As above - very dense	SM		17-23-37 Pulled augers up 5' let sit 1 hr., water level @ 37.0
1896.9	--42.0						EOB @ 42.0'			
1895.4	--43.5									
1893.9	--45.0									
1892.4	--46.5									
1890.9	--48.0									
1889.4	--49.5									

DRILLING METHOD: HSA, I.D.= 3 3/4", O.D.= 7"
DRILLING CONTRACTOR: Braun

DEPTH TO WATER -
AT COMPLETION: 36.3'
LATER TIME/DEPTH: 22.3' 14 hrs later

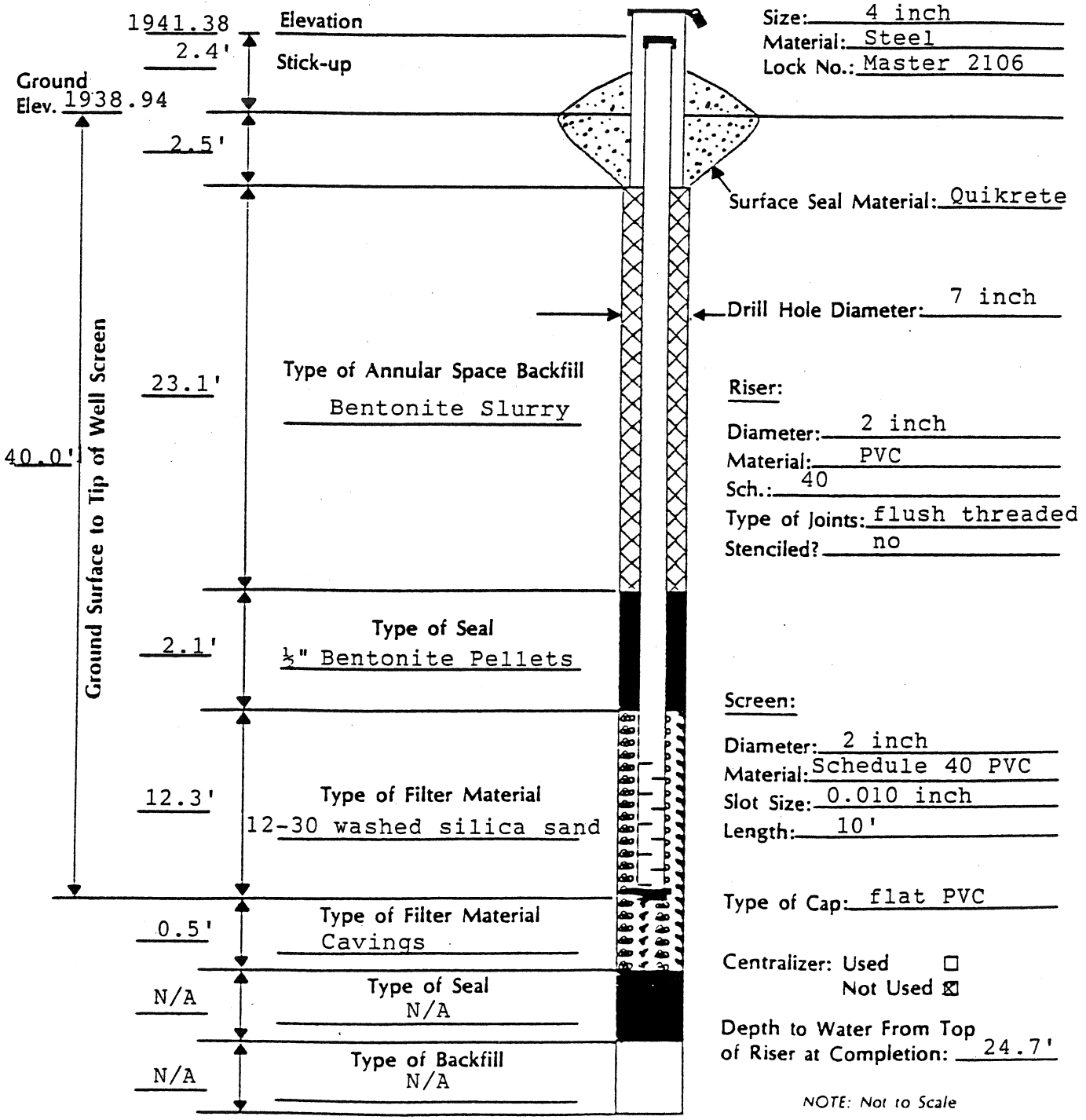
Foth & Van Dyke

Client: Cooperative Power — Scope I.D.: 89C16
Project: Coal Creek Station — Page: 1
Prepared by: GKM — Date: 7-19-89
Checked by: PAD — Date: 9-1-89

MONITORING WELL CONSTRUCTION DIAGRAM

Driller: Braun
Drilling Method: Hollow Stem Auger, I.D.=3 3/4", O.D.=7"
Coordinates: N 36290.0, E 39715.8

Well No: MW-75
Date Installed: 7-19-89 & 7-20-89



Protector Pipe:
Size: 4 inch
Material: Steel
Lock No.: Master 2106

Surface Seal Material: Quikrete

Drill Hole Diameter: 7 inch

Riser:
Diameter: 2 inch
Material: PVC
Sch.: 40
Type of Joints: flush threaded
Stenciled? no

Screen:
Diameter: 2 inch
Material: Schedule 40 PVC
Slot Size: 0.010 inch
Length: 10'

Type of Cap: flat PVC

Centralizer: Used ☐ Not Used ☒

Depth to Water From Top of Riser at Completion: 24.7'

NOTE: Not to Scale

* N/A = not applicable

BORING LOG NO. MW-91-1

PROJECT: Monitoring Well Installations

CLIENT: Golder Associates, Inc.
Lakewood, CO

SITE: GRE Coal Creek Station
McLean County, ND

LOCATION: See Exhibit A-2

Northing: 138918 Easting: 1841128

Surface Elev.: 1901.3 (Ft.)

DEPTH		ELEVATION (Ft.)
0.3	**FILL - TOPSOIL**, dark brown	1901
1.5	**FILL - CLAYEY SAND**, brown	1900
	SANDY LEAN CLAY, brown	
7.0		1894.5
	SANDY LEAN CLAY (CL), trace gravel, brown, medium stiff	
10.5		1891
	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), fine to coarse grained, brown, loose to medium dense	
25.0		1876.5
26.0	**FAT CLAY (CH)**, brownish-gray, very stiff, silt laminations	1875.5
	Boring Terminated at 26 Feet	

INSTALLATION DETAILS: PVC Cap; PVC Riser; Bentonite; Silica Sand; PVC Screen; PVC End Cap

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
		7-10-10 N=20
5		5-7-9 N=16
		2-3-3 N=6
10		3-4-4 N=8
		3-5-4 N=9
15		4-5-5 N=10
20		4-7-6 N=13
25		5-7-9 N=16

WATER LEVEL OBSERVATIONS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" ID Hollow Stem Auger 0-24½'

Abandonment Method:
Boring converted to monitoring well upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:
Northing, easting and elevation provided by Golder Associates, Inc.

WATER LEVEL OBSERVATIONS

None encountered

Terracon
1805 Hancock Dr PO Box 2084
Bismarck, ND

Boring Started: 11-06-2017 | Boring Completed: 11-06-2017

Drill Rig: D-90 | Driller: E. Mayer

Project No.: M2175093 | Exhibit: A-4

BORING LOG NO. MW-91-2

PROJECT: Monitoring Well Installations

CLIENT: Golder Associates, Inc.
Lakewood, CO

SITE: GRE Coal Creek Station
McLean County, ND

LOCATION: See Exhibit A-2

Northing: 137705 Easting: 1839142

Surface Elev.: 1939.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
1.5	1937.5	**FILL - POORLY GRADED SAND WITH SILT AND GRAVEL**, dark brown
4.5	1934.5	**FILL - SANDY LEAN CLAY**, trace gravel, brown
5.5	1933.5	**ORIGINAL TOPSOIL (CL)**, dark brown, stiff
10.5	1928.5	**FAT CLAY (CH)**, brownish gray, stiff
15.5	1923.5	**COAL**, black waterbearing at 15'
18.0	1921	**FAT CLAY (CH)**, grayish-brown, stiff, silt laminations
29.0	1910	**FAT CLAY (CH)**, gray, hard, silt laminations
31.0	1908	**COAL**, black, waterbearing
		Boring Terminated at 31 Feet

INSTALLATION DETAILS: PVC Cap; Bentonite; PVC Riser; Silica Sand; PVC Screen; PVC End Cap

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
		3-4-6 N=10
5		3-4-5 N=9
		4-5-6 N=11
10		3-3-6 N=9
		3-3-3 N=6
15		3-4-4 N=8
20		15-22-21 N=43
25		8-13-19 N=32
30		32-51-49 N=100

WATER LEVEL OBSERVATIONS: ▽ While drilling

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" ID Hollow Stem Auger 0-29½'

Abandonment Method:
Boring converted to monitoring well upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:
Northing, easting and elevation provided by Golder Associates, Inc.

Terracon
1805 Hancock Dr PO Box 2084
Bismarck, ND

Boring Started: 11-06-2017	Boring Completed: 11-06-2017
Drill Rig: D-90	Driller: E. Mayer
Project No.: M2175093	Exhibit: A-5

BORING LOG NO. MW-DP1

PROJECT: Piezometers/Well Installations

CLIENT: Golder Associates Lakewood, Colorado

SITE: GRE - Coal Creek Station McLean County, North Dakota

LOCATION: See Exhibit A-2

Northing: 139810 Easting: 1839680

Surface Elev.: 1914 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0	1914	**FILL - LEAN CLAY WITH SAND (CL)**, brown
13.5	1900.5	**LEAN CLAY WITH SAND (CL)**, dark brown to brown, very stiff to stiff
24.0	1890	**SILT WITH SAND (ML)**, light brown
25.5	1888.5	

INSTALLATION DETAILS: Steel Casing; PVC Riser; Concrete; Bentonite; Silica sand

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
0		2-2-2 N=4			
		3-3-5 N=8			
5		5-7-11 N=18			
		5-7-9 N=16			
10		3-4-6 N=10			
		3-6-12 N=18			
15		5-6-10 N=16			
20		4-5-8 N=13			
25		3-4-5 N=9			

WATER LEVEL OBSERVATIONS: ▽ Initially Encountered

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: 3¼" ID HSA 0-44½'

Abandonment Method: Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Midwest Testing Laboratory, Inc. A Terracon Company
1805 Hancock Drive
Bismarck, North Dakota

Boring Started: 6/10/2014 | Boring Completed: 6/10/2014

Drill Rig: D-50 | Driller: MR

Project No.: M2145058 | Exhibit: A-8

BORING LOG NO. MW-DP1

PROJECT: Piezometers/Well Installations

CLIENT: Golder Associates Lakewood, Colorado

SITE: GRE - Coal Creek Station McLean County, North Dakota

LOCATION: See Exhibit A-2

Northing: 139810 Easting: 1839680 Surface Elev.: 1914 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
			SILTY SAND (SM), light brown, dense, fine to medium-grained, waterbearing *(continued)*							
			Silica sand							
			PVC Screen	30			11-16-21 N=37			
				35			10-16-21 N=37			
	39.5	1874.5								
			SILTY SAND (SM), gray, dense, fine to medium-grained, waterbearing	40			12-16-31 N=47			
			Sluff	45			12-16-21 N=37			
	46.0	1868	***Boring Terminated at 46 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" ID HSA 0-44½'

Abandonment Method:
Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Initially Encountered*

Midwest Testing LABORATORY, INC. A Terracon COMPANY
1805 Hancock Drive
Bismarck, North Dakota

Boring Started: 6/10/2014 Boring Completed: 6/10/2014

Drill Rig: D-50 Driller: MR

Project No.: M2145058 Exhibit: A-8

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION **(Piezometer MW-DP1)**

Address (if in city) (see attached drawing)

County McLean

NW ¼ SE ¼ NE ¼ Sec. 17 Twp. 145 N. Rge. 82 W.

Lat. _____ Long: _____

Ground Elevation: 1914

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 8 inches Depth 46 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2 ft. to 25 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 25 feet to 45 feet

Sand packed from 21 feet to 45 feet

Depth grouted from 1 feet to 21 feet

Grouting Material

Bentonite x Other _____

If other explain:

One-foot thick concrete collar at the surface

Sluff: 45 feet to 46 feet

Well head completion:

24" above grade x Other _____

If other, specify 4" x 4" x 5' square steel protective cover

Was protective casing installed? ■ Yes □ No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level -- feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
CLAY	0	24
SILT WITH SAND	24	25.5
SILTY SAND	25.5	46

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

Water level monitoring only

9. DATE COMPLETED 6-10-14

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Monitoring Well Contractor Certificate No.

Midwest Testing Laboratory/Terracon 444

Address

PO Box 2084, Bismarck, ND 58502-2084

Signature Date

6/20/14

BORING LOG NO. MW-DP2

PROJECT: Piezometers/Well Installations

CLIENT: Golder Associates Inc
Lakewood, Colorado

SITE: GRE - Coal Creek Station
McLean County, North Dakota

LOCATION: See Exhibit A-2

Latitude: 47.380769° Longitude: -101.14442°
Northing: 139538 Easting: 1840462

Surface Elev.: 1895 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.2	1895	**FILL - TOPSOIL**, dark brown
		FILL - SANDY LEAN CLAY, trace gravel, grayish-brown, frost to 6'
6.5	1888.5	
		FILL - SANDY LEAN CLAY, trace gravel, dark brown
9.5	1885.5	
10.5	1884.5	**ORIGINAL TOPSOIL**, dark brown
12.0	1883	**SANDY LEAN CLAY (CL)**, trace gravel, brown, stiff, waterbearing sand seam at 11½'
13.5	1881.5	**CLAYEY SAND (SC)**, light gray, dense, fine to medium-grained, waterbearing
		CLAYEY SAND (SC), trace gravel, brown, medium dense, fine to coarse grained, waterbearing
18.0	1877	***Boring Terminated at 18 Feet***

INSTALLATION DETAILS: Steel Casing, PVC Riser, Grout, Bentonite, Silica Sand, PVC Screen, Sluff

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		3-5-6 N=11			
5		5-6-10 N=16			
		4-5-5 N=10			
10		3-4-6 N=10			
		3-11-23 N=34			
15		9-8-7 N=15			

WATER LEVEL OBSERVATIONS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" Inside Diameter, Hollow Stem Auger 0-18'

Abandonment Method:
Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:
Survey data provided by client.
Well developed on April 2. Pumped until water was clear.

WATER LEVEL OBSERVATIONS

▽ *Initially Encountered*

Terracon
1805 Hancock Drive
Bismarck, North Dakota

Boring Started: 4/1/2015 | Boring Completed: 4/1/2015

Drill Rig: D-90 | Driller: MR

Project No.: M2155021 | Exhibit: A-4

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION **(Well MW-DP2)**

Address (if in city) (see attached drawing)

County McLean

NE ¼ SE ¼ NE ¼ Sec. 17 Twp. 145 N. Rge. 82 W.

Lat: 47.380769 Long.: -101.144420

Ground Elevation: 1895

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6.25 inches Depth 18 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.75 ft. to 7 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 7 feet to 17 feet

Sand packed from 5 feet to 17 feet

Depth grouted from 1 foot to 5 feet

Grouting Material

Bentonite x Other _____

If other explain:

One foot thick concrete collar at the surface.

Sluff: 17 feet to 18 feet

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' square steel protective cover

Was protective casing installed? ■ Yes □ No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 15 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG

Formation	Depth (Ft.) From	To
SANDY LEAN CLAY (FILL)	0	9.5
TOPSOIL	9.5	10.5
SANDY LEAN CLAY	10.5	12
CLAYEY SAND	12	18

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

Water level monitoring only

9. DATE COMPLETED 4-3-15

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Terracon 444

Monitoring Well Contractor Certificate No.

PO Box 2084

Address

Bismarck, ND 58502-2084

Signature Date

4/13/15

BORING LOG NO. MW-DP2B

PROJECT: Monitoring Well Installation & Soil Testing

CLIENT: Golder Associates, Inc.
Lakewood, CO

SITE: Coal Creek Station
Underwood, ND

LOCATION See Exploration Plan
Latitude: 47.3806° Longitude: -101.1444°
Surface Elev.: 1895 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - SANDY LEAN CLAY, trace gravel, brown
		bulk sample obtained from 1 to 5'
		bulk sample obtained from 9 to 10'
9.5	1885.5	
10.5	1884.5	**ORIGINAL TOPSOIL**, dark brown
		SANDY LEAN CLAY (CL), trace gravel, brown, stiff
13.0	1882	bulk sample obtained from 11 to 12'
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), brown, medium dense, fine to coarse-grained
18.0	1877	
		SILTY SAND (SM), light brown, medium dense, fine-grained
25.0	1870	
		Boring Terminated at 25 Feet

INSTALLATION DETAILS: Pro Top, Concrete, PVC Riser, Bentonite, PVC Screen, Silica Sand, Sluff

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
5		7-8-12 N=20	42-16-26	62
10		3-6-9 N=15	39-17-22	59
15		11-14-8 N=22		
20		6-7-10 N=17		
25				

WATER LEVEL OBSERVATIONS: ▽ While drilling

Reversed Auger Out

WATER CONTENT (%) | DRY UNIT WEIGHT (pcf)

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" I D, Hollow Stem Auger 0-19½'

Abandonment Method:
Boring converted to monitoring well with Type A Surface Completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Elevations provided by Golder Associates.
Latitude and Longitude obtained with a handheld GPS unit.

Terracon
1805 Hancock Dr, PO Box 2084
Bismarck, ND

Boring Started: 11-20-2018 | Boring Completed: 11-20-2018
Drill Rig: D-90 | Driller: EM
Project No.: M2185118

BORING LOG NO. MW-DP3

PROJECT: Piezometers/Well Installations

CLIENT: Golder Associates Inc
Lakewood, Colorado

SITE: GRE - Coal Creek Station
McLean County, North Dakota

LOCATION: See Exhibit A-2

Latitude: 47.377698° Longitude: -101.149848°
Northing: 138647 Easting: 1839162

Surface Elev.: 1928 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.0	1928	**FILL - COAL**, black
5.0	1923	
6.0	1922	**FILL - FAT CLAY**, gray
		FILL - COAL, dark brown
		waterbearing at 10½'
12.0	1916	
		FAT CLAY (CH), brownish-gray, stiff
17.5	1910.5	
		COAL, black, waterbearing
21.0	1907	
		Boring Terminated at 21 Feet

INSTALLATION DETAILS: Steel Casing, PVC Riser, Grout, Bentonite, Silica Sand, PVC Screen, Sluff

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
0		
		5-7-8 N=15
5		5-6-10 N=16
		3-2-3 N=5
10		2-1-2 N=3
		3-5-7 N=12
15		4-5-9 N=14
20		5-7-9 N=16

WATER LEVEL OBSERVATIONS: Initially Encountered

WATER CONTENT (%)

ATTERBERG LIMITS: LL-PL-PI

PERCENT FINES

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" Inside Diameter, Hollow Stem Auger 0-19½'

Abandonment Method:
Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:
Survey data provided by client.
Well developed on April 2. Pumped until water was clear.

Terracon
1805 Hancock Drive
Bismarck, North Dakota

Boring Started: 4/1/2015 | Boring Completed: 4/1/2015
Drill Rig: D-90 | Driller: MR
Project No.: M2155021 | Exhibit: A-5

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name: Great River Energy

Address: 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION **(Well MW-DP3)**

Address (if in city): (see attached drawing)

County: McLean

NE ¼ NW ¼ SE ¼ Sec. 17 Twp. 145 N. Rge. 82 W.

Lat: 47.377698 Long.: -101.149848

Ground Elevation: 1928

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6.25 inches Depth 21 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.75 ft. to 9 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 9 feet to 19 feet

Sand packed from 6 feet to 19 feet

Depth grouted from 1 foot to 6 feet

Grouting Material

Bentonite x Other _____

If other explain:

One foot thick concrete collar at the surface.

Sluff: 19 feet to 21 feet

Well head completion:

24" above grade _____ Other x

If other, specify 4" x 4" x 5' square steel protective cover

Was protective casing installed? ■ Yes □ No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 17 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
COAL (FILL)	0	5
FAT CLAY (FILL)	5	6
COAL (FILL)	6	12
FAT CLAY	12	17.5
COAL	17.5	21

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

Water level monitoring only

9. DATE COMPLETED 4-3-15

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Terracon 444

Monitoring Well Contractor Certificate No.

PO Box 2084

Address

Bismarck, ND 58502-2084

Signature [signature] Date 4/13/15

BORING LOG NO. MW-DP4

PROJECT: Piezometers/Well Installations

CLIENT: Golder Associates Inc
Lakewood, Colorado

SITE: GRE - Coal Creek Station
McLean County, North Dakota

LOCATION: See Exhibit A-2

Latitude: 47.381119° Longitude: -101.149657°
Northing: 134705 Easting: 1839196

Surface Elev.: 1914 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.2	1914	**FILL - TOPSOIL**, dark brown
		LEAN CLAY WITH SAND (CL), trace gravel, grayish-brown, frost
4.0	1910	
		SANDY LEAN CLAY (CL), trace gravel, brown, medium stiff to stiff
23.5	1890.5	
25.5	1888.5	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**, brown, medium dense, fine to coarse-grained, waterbearing
		FAT CLAY (CH), gray
29.0	1885	
31.0	1883	**CLAYEY SAND (SC)**, gray, dense, fine-grained, waterbearing
		Boring Terminated at 31 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
		5-7-6 N=13
5		3-3-4 N=7
		5-4-6 N=10
10		3-4-6 N=10
		4-5-8 N=13
15		4-5-6 N=11
20		3-4-5 N=9
25		4-5-6 N=11
30		12-17-20 N=37

INSTALLATION DETAILS: Steel Casing, PVC Riser, Grout, Bentonite, Silica Sand, PVC Screen, Sluff

WATER LEVEL OBSERVATIONS

WATER CONTENT (%)

ATTERBERG LIMITS: LL-PL-PI

PERCENT FINES

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" Inside Diameter, Hollow Stem Auger 0-29½'

Abandonment Method:
Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:
Survey data provided by client.
Well developed on April 2. Pumped until water was clear.

WATER LEVEL OBSERVATIONS

Initially Encountered

Terracon
1805 Hancock Drive
Bismarck, North Dakota

Boring Started: 4/1/2015 | Boring Completed: 4/1/2015

Drill Rig: D-90 | Driller: MR

Project No.: M2155021 | Exhibit: A-6

State of North Dakota

BOARD OF WATER WELL CONTRACTORS

900 E. BOULEVARD • BISMARCK, NORTH DAKOTA 58505

MONITORING WELL REPORT

State law requires that this report be filed with the State Board of Water Well Contractors within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Great River Energy

Address 2875 3rd St SW

Underwood, ND 58576-9659

2. WELL LOCATION **(Well MW-DP4)**

Address (if in city) (see attached drawing)

County McLean

NE ¼ SW ¼ NE ¼ Sec. 17 Twp. 145 N. Rge. 82 W.

Lat: 47.381119 Long.: -101.149657

Ground Elevation: 1914

3. METHOD DRILLED

■ Auger Other ____

4. WELL CONSTRUCTION

Diameter of Hole 6.25 inches Depth 31 feet

Riser: ■ PVC □ Other

■ Threaded □ Solvent □ Other

Riser rating SDR _____ Schedule 40

Diameter 2.0 inches

From +2.75 ft. to 19 ft.

Was a well screen installed? ■ Yes □ No

Material Schedule 40 PVC Diameter 2.0 inches

Slot Size #10 set from 19 feet to 29 feet

Sand packed from 17 feet to 29 feet

Depth grouted from surface to 14 feet

Grouting Material

Bentonite _____ Other Neat cement

If other explain:

Bentonite seal: 14 feet to 17 feet

Sluff: 29 feet to 31 feet

Well head completion:

24" above grade _____ Other _____ x _____

If other, specify 4" x 4" x 5' square steel protective cover

Was protective casing installed? ■ Yes □ No

Was well disinfected upon completion? □ Yes ■ No

5. WATER LEVEL

Static water level 19 feet below surface

If flowing: closed in pressure _____ psi or ft. above land surface

6. WELL LOG Depth (Ft.)

Formation	From	To
LEAN CLAY WITH SAND	0	4
SANDY LEAN CLAY	4	23.5
SAND WITH SILT AND GRAVEL	23.5	25.5
FAT CLAY	25.5	29
CLAYEY SAND	29	31

(Use separate sheet if necessary)

7. WAS THE HOLE PLUGGED OR ABANDONED?

□ Yes ■ No

If so, how? _____

8. REMARKS

Water level monitoring only

9. DATE COMPLETED 4-3-15

10. CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Terracon 444

Monitoring Well Contractor Certificate No.

PO Box 2084

Address

Bismarck, ND 58502-2084

Signature Date

4/13/15

BORING LOG NO. DP5

PROJECT: Monitoring Well Installation

CLIENT: Golder Associates, Inc.
Lakewood, Colorado

SITE: GRE - Coal Creek Station
McLean County, North Dakota

LOCATION: See Exhibit A-2

Latitude: 47.37992° Longitude: -101.15194°

Surface Elev.: 1935 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.0	1935	**FILL - SANDY LEAN CLAY**, brown and black, coal inclusions
5.0	1930	**FILL - SANDY LEAN CLAY**, trace gravel, brown to dark brown
11.0	1924	**SANDY LEAN CLAY (CL)**, trace gravel, brown to grayish-brown, very stiff to stiff, silt laminations
32.0	1903	**CLAYEY SAND (SC)**, brownish-gray, medium dense to dense, fine-grained
46.0	1889	***Boring Terminated at 46 Feet***

INSTALLATION DETAILS: Steel Casing, PVC Riser, Bentonite, Silica Sand, PVC Screen, Sluff

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
0		3-5-11 N=16
		7-8-8 N=16
5		5-7-8 N=15
		5-8-10 N=18
10		3-5-7 N=12
		3-6-7 N=13
15		5-7-9 N=16
20		3-5-6 N=11
25		3-5-6 N=11
30		5-5-8 N=13
35		5-8-10 N=18
40		10-16-23 N=39
45		11-17-27 N=44

WATER LEVEL OBSERVATIONS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3¼" ID HSA 0-44½'

Abandonment Method:
Boring converted to monitoring well installation.

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

- *While drilling*
- *On 11/18/2015*
- *On 11/19/2015*

Terracon
1805 Hancock Drive
Bismarck, North Dakota

Boring Started:

Boring Completed: 11/18/2015

Drill Rig: D-90

Driller: MR

Project No.: M2155090

Exhibit: A-4

golder.com