



CCR Groundwater Monitoring System



Omaha Public Power District

North Omaha Station

North Omaha Ash Landfill Disposal Area

Omaha, Nebraska

January 24, 2020



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Professional Engineer Certificate

"I hereby certify that the groundwater monitoring system described in this report for the CCR landfill known as the NOS Ash Disposal Area at the North Omaha Generating Station, owned and operated by the Omaha Public Power District, has been designed and constructed to meet the requirements of the Coal Combustion Residual Rule 40 CFR 257.91. I am a duly licensed Professional Engineer under the laws of the State of Nebraska."

Print Name: Megan B. Seymour

Signature: *Megan B. Seymour*

Date: 1/24/2020

License #: E-15931



My license renewal date is December 31, 2020.

1 Introduction

On April 17, 2015 the U.S. Environmental Protection Agency (EPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA). The Federal CCR Rule – effective on October 19, 2015 – applies to Omaha Public Power District’s (OPPD’s) North Omaha Generating Station (Station). The Station, located north of Omaha, Nebraska has five coal-fired combustion units.

The CCR Rule, 40 CFR Subpart D-Standards for the Disposal of CCRs, Section §257.91 requires a groundwater monitoring system that consists of sufficient number of wells at appropriate locations and depths based on site-specific technical information, to yield groundwater samples from the uppermost aquifer that:

- Accurately represent the quality of both background groundwater, and groundwater passing the boundary of the CCR unit
- Monitor potential contaminant pathways

The groundwater monitoring system at the North Omaha Ash Disposal Area was established in 2016 to meet the requirements of the Federal CCR Rule. The groundwater monitoring network has been updated, as part of this January 2020 revision, to include additional downgradient monitoring wells (MW-5, MW-6, and MW-8). This report includes the following sections in support of the certification.

- Section 1.0 Introduction
- Section 2.0 Facility Background
- Section 3.0 Site Hydrogeology Summary
- Section 4.0 Groundwater Monitoring System

2 Facility Background

OPPD has a five-unit, 663-megawatt (MW) fossil fuel-fired generating plant at the North Omaha Station (Station) in Omaha, Nebraska. Recently Units 1-3 were retired; Units 4 and 5 were retrofitted with air pollution control equipment and are still operating. The Station is located east of Pershing Drive and Craig Street, approximately 3.5 miles northwest of Eppley Airfield, along the west bank of the Missouri River at river mile 625.2. The first generating unit was placed in service in July 1954, and the fifth unit was placed in operation in 1968. Beneficial use and disposal of the fossil fuel combustion ash has occurred on the Station site since the 1950s.

The North Omaha Ash Landfill is an unlined CCR landfill of approximately 18 acres that has historically received CCR for disposal and is permitted with the State of Nebraska. The North Omaha Ash Landfill is an active, existing CCR landfill as defined by the CCR rule.

According to the Locational Criteria Report and Hydrogeologic Investigations Report (SCS Engineers, 1995) completed for the Nebraska Department of Environment and Energy’s (NDEE) Title 132 permit, the majority of the Station site is underlain by approximately 15 feet of fill consisting of low-to-medium plasticity clayey soils and a mixture of fly ash and bottom ash beneficially used as fill.

3 Site Hydrogeology Summary

Site geology and hydrogeology are described in a previous report entitled 'Hydrogeologic Investigations Report North Omaha Power Station Solid Waste Landfill Omaha Public Power District' (SCS Engineers, 1995). The site is composed of two primary types of geologic materials: 1) Quaternary age unconsolidated fill and alluvium, and 2) Pennsylvanian age limestone and shale bedrock. The majority of the site is underlain by approximately 15 to 18 feet of clayey and silty soils and a mixture of fly ash and bottom ash beneficially used as fill material. The ash fill texture ranges generally from silt to silty sand. Near the southeastern boundary of the site, deposits of fine sand are found, with thicknesses generally between 0.5 and 1.5 feet, occurring at depths of 6.5 to 14 feet. Directly underlying the fill material unconsolidated alluvium occurs, comprised of laterally and vertically discontinuous fine-grained, cohesive clayey sands and sandy clays, and non-cohesive silts and fine sands. In general, grain size increases with depth, and coarse sand and gravel are typically found in the lowermost portions of the alluvium. Coarser grained soils are generally found below elevations of approximately 970 and 980 feet above National Geodetic Vertical Datum (NGVD), and are comprised primarily of medium to coarse sand with minor gravel.

The Quaternary age Missouri River alluvium unconformably overlies the Pennsylvanian age limestone bedrock. The bedrock consists primarily of alternating layers of limestone and shale, which are collectively part of the Kansas City Group. The limestone unit at the site is identified as the Hertha Formation. The depth to bedrock ranges from approximately 35 feet, elevation 963 feet above NGVD, to approximately 77 feet, elevation 961 feet above NGVD. This is consistent with the elevation of the bedrock reported for the nearest NDNR test hole, located approximately 2.8 miles north of the study site. A production well located at the southeast corner of the site (off-site) has a depth to bedrock of approximately 103 feet. This is consistent with the general deepening of the bedrock near the center of the Valley across the River into Iowa.

One primary aquifer underlies the site, comprised of coarse-grained Missouri River alluvium. Thickness and permeability of this aquifer vary greatly by location because of the transient nature of the Missouri River flows during deposition of the sediments. Geologic materials described in the available well records do not support the existence of a continuous low-permeability confining layer within the alluvium that would separate upper from lower aquifers. Although, paired monitoring wells indicate that water levels are almost always higher in shallower monitoring wells than deeper monitoring wells. This is thought to be attributed to the screened interval of shallow wells being within the upper 15 to 18 feet of clays, silts, and silty sands of the fill and alluvium overlying the aquifer. Flows generally have a strong vertical component in materials of lower permeability.

Between December, 2001 and April, 2015, 14 monitoring wells were measured for water table depth twice annually. Depth to groundwater ranged across the site from approximately 2 to 37 feet below ground surface (bgs). The typical water level fluctuations recorded at the site ranged from approximately 5.3 to 12.9 feet. In June, 2013 the depth to water at MW-6 was 20.7 feet bgs which was larger than the typical range of 4 feet bgs to 12 feet bgs.

Groundwater flow direction in 1995 was reportedly to the easterly and northeasterly direction primarily toward the Missouri River, which forms the eastern boundary of the site. Generally groundwater flow direction is primarily easterly and northeasterly north of MW-15, located in the center of the site, and easterly and southeasterly south of MW-15. Semi-annual groundwater monitoring reports which documents ground water flow direction are on file with the NDEQ.

According to analysis by SCS Engineers (1995), groundwater velocities calculated with hydraulic gradients from the four 1995 sampling dates ranged from 5.6 feet per day, to approximately 0.0001 feet per day. These velocities have a large range, of more than five orders of magnitude, primarily because of the large range of hydraulic conductivities determined at the site from slug tests. Hydraulic conductivity determined from slug tests were reportedly measured at MW-3 as 1.3×10^{-6} cm/sec and at MW-5 as 1.0×10^{-2} cm/sec. At MW-4, SCS Engineers (1995) determined a hydraulic conductivity of 1.5×10^{-5} cm/sec. The wide range of hydraulic conductivity may be due to the different lithologies the wells were screened in. MW-3 was screened in silty sand and in silt of high plasticity, MW-4 was screened in silty sand and in well-graded sand and fine to coarse sand, and MW-5 was screened in silty sand and in clay of high plasticity.

Groundwater flow velocity at North Omaha Station has been calculated based on hydraulic conductivity range of 1.3×10^{-6} cm/sec to 9.98×10^{-3} cm/sec as reported by SCS 1995 and an estimated porosity of 0.3. Based on monitoring reports since 2011, the gradient ranged from 0.01 ft/ft to 0.024 ft/ft with a velocity range of 0.1 to 835 ft/year.

From slug test data performed by Terracon (2016) on recently installed wells MW-18, MW-19 and MW-20, hydraulic conductivity ranged from 1.92×10^{-5} cm/sec to 1.33×10^{-3} cm/sec. This is within the range of previously recorded data.

4 Groundwater Monitoring System

Based on the site-specific specific hydrogeologic information and location of the existing CCR landfill, the groundwater monitoring system for the North Omaha Ash Landfill for detection monitoring program consists of three (3) upgradient/background wells and seven (7) downgradient wells. The number of monitoring wells exceeds the minimum number of monitoring wells required by 40 CFR 257.91(c) (i.e. one upgradient and three downgradient). Six (6) additional wells are included for water level measurements only. The groundwater monitoring system network for the North Omaha Ash Landfill is summarized below in **Table 1**.

The groundwater contour at the site is typically mapped utilizing a shallow water table zone. The monitoring well locations are shown in **Figure 1** (attached). The groundwater monitoring wells were constructed of 2-inch-diameter, schedule 40 PVC, flush threaded riser pipe, and machine slotted 10-slot (0.010 inch) screen. The filter pack consisted of #16-30 silica sand with hydrated bentonite chips to create the seal and cement grout to fill the annulus. The surface completion for each well consists of a steel protective casing, concrete apron, and three bollards/posts. Monitoring well construction logs and registrations for the groundwater monitoring wells are contained in **Appendix A** of this report.

Table 1: OPPD North Omaha Ash Disposal Area, Groundwater Monitoring Well System

Monitoring Well	Date Installed	Well Depth (feet bgs) ¹	Well Depth (feet from TOC) ²	Location with Respect to Landfill	Monitoring Program Use
Assessment Monitoring Program					
MW-2	3/6/95	30	32.98	Downgradient	Assessment
MW-5	3/2/95	30	32.73	Downgradient	Assessment
MW-6	3/8/95	31	34.01	Downgradient	Assessment
MW-8	3/7/95	30	32.94	Downgradient	Assessment
MW-9	5/4/96	63	61.72	Background/Upgradient	Assessment
MW-13	4/12/01	30	32.89	Downgradient	Assessment
MW-15	4/12/01	15	17.59	Downgradient	Assessment
MW-17	5/10/07	30	32.94	Downgradient	Assessment
MW-18	12/1/15	71	70.70	Background/Upgradient	Assessment
MW-19	1/20/16	76.5	76.30	Background/Upgradient	Assessment
Water Level Measurements Only					
MW-4	3/6/95	33	36.45	Downgradient	Water Level Only
MW-7	3/8/95	30	33.04	Downgradient	Water Level Only
MW-10	4/11/01	15	17.35	Downgradient	Water Level Only
MW-11	4/11/01	15	17.50	Downgradient	Water Level Only
MW-12	4/11/01	15	17.43	Downgradient	Water Level Only
MW-20	11/9/15	35	37.57	Downgradient	Water Level Only
Abandoned Wells³					
MW-1	3/6/95 (Abandoned 4/17/01)	29	32.07	NA	NA
MW-3	3/3/95 (Abandoned 4/15/03)	52	55.19	NA	NA
MW-14	4/12/01 (Abandoned 9/9/02)	33	35.59	NA	NA
MW-16	9/9/02 (Abandoned 08/04/17))	35	37.14	Downgradient	NA

Notes:

1. Depth from ground surface to bottom of installed well. Actual boring depth may be deeper.
2. Depth from top of casing to bottom of installed well.
3. Abandoned in accordance with State of Nebraska regulations.

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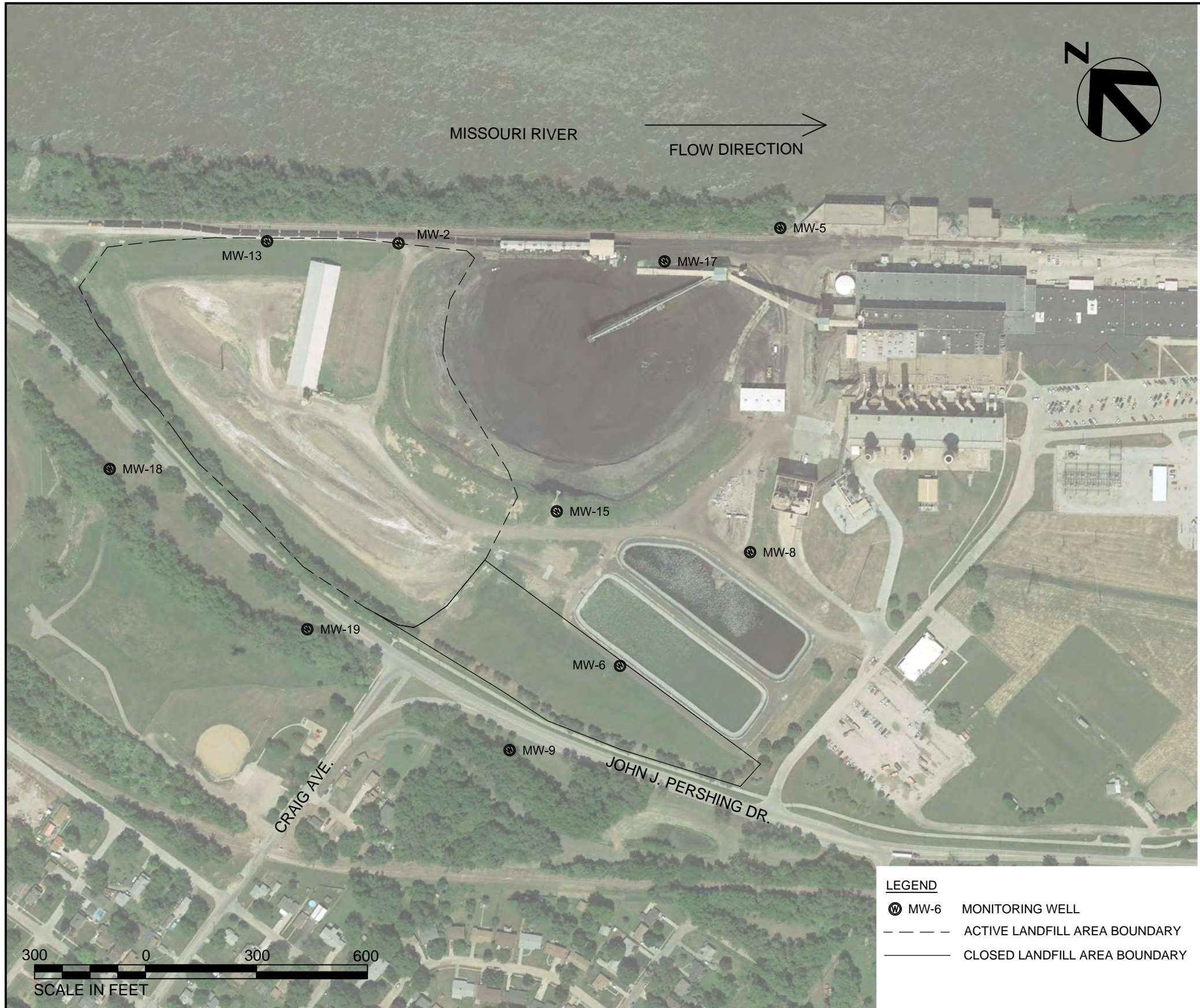


Figure 1

North Omaha Ash Disposal
Area

Groundwater Monitoring
Network

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COMPLIANCE AND BACKGROUND MONITORING WELLS						
WELL ID	NORTHING	EASTING	SURFACE EL	TOP OF CASING (TOC) EL	INSTALL DATE	COMMENTS
MW-2	572580	2753258	998.30	1001.41	3/6/1995	DOWNGRAIENT
MW-5	571959.9	2754084	998.10	1000.96	3/2/1995	DOWNGRAIENT
MW-6	571316.1	2753000	999.60	1002.65	3/8/1995	DOWNGRAIENT
MW-8	571331.8	2753467	1000.30	1003.59	3/7/1995	DOWNGRAIENT
MW-9	571328	2752624	1027.10	1026.47	5/4/1996	BACKGROUND
MW-13	572808.9	2752986	999.02	1001.91	4/12/2001	DOWNGRAIENT
MW-15	571747.9	2753132	1002.80	1005.39	4/12/2001	DOWNGRAIENT
MW-17	572087.4	2753785	999.60	1002.54	5/10/2007	DOWNGRAIENT
MW-18	572600.9	2752267	1037.10	1037.00	12/1/2015	BACKGROUND
MW-19*	571927.2	2752407	1037.30	1037.10	1/20/2016	BACKGROUND

* FLUSH MOUNT WELL

- LEGEND**
- Ⓜ MW-6 MONITORING WELL
 - - - - - ACTIVE LANDFILL AREA BOUNDARY
 - CLOSED LANDFILL AREA BOUNDARY



**OMAHA PUBLIC POWER DISTRICT
NORTH OMAHA STATION - ASH LANDFILL**

GROUNDWATER MONITORING NETWORK

DATE
JANUARY 2020

FIGURE
1

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A decorative graphic on the left side of the page consists of four overlapping rectangular blocks. From top to bottom, they are: a dark grey block, an orange block, a light grey block, and a black block. The text is positioned to the right of the orange and light grey blocks.

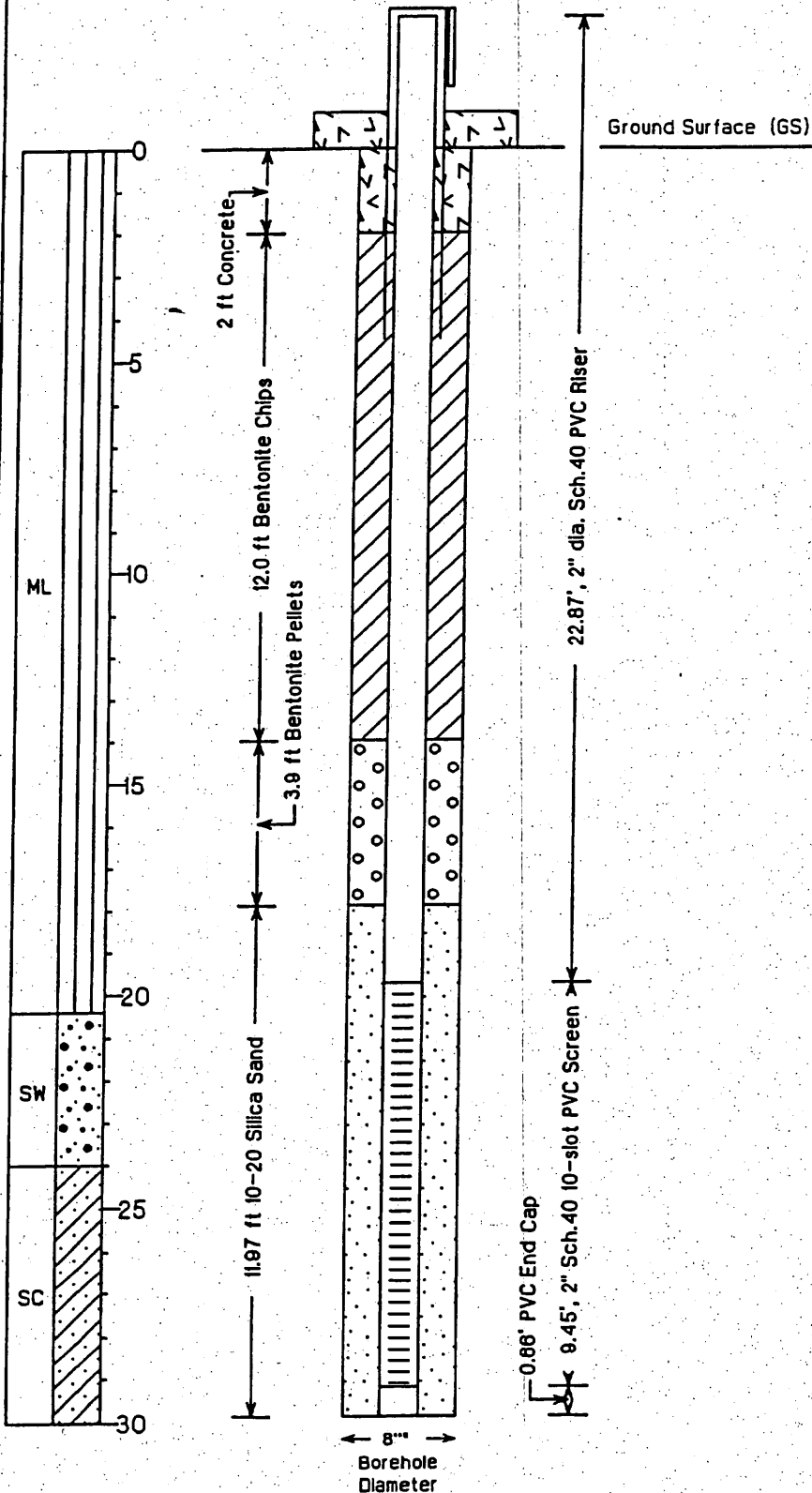
Appendix A

Monitoring Well Documentation

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MONITORING WELL CONSTRUCTION RECORD

Project Name Omaha Public Power District – North Omaha, Nebraska		Project Number 08 94037.02	Well Number MW-2
Location Description NW of coal pile, NW corner of access rd intersec.		Location NE1/4, SW1/4, NE1/4, NE1/4, Sec 28, T75N, R13E	Total Depth (TOC) 32.98 feet
Ground Surface Elevation 998.3 ft above NGVD	Marker In Concrete Well Pad EL	Boring Location Coordinates 572361.1 North 2752199.2 East	Date Installed 03/06/95



Elevation Top of Well Casing:	1001.41 ft above NGVD
Elevation Top of Well Screen:	978.54 ft above NGVD
Elevation Bot. of Well Screen:	969.09 ft above NGVD
Total Depth of Boring:	30.0 ft below GS
Total Depth of Well:	29.87 ft below GS
Well Casing Above GS:	3.11 feet

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DRILLING LOG

Project Name Omaha Public Power District - North Omaha, Nebraska				Project Number 08 94037.02		Boring Number MW-2	
Boring Location Description NW of coal pile, NW corner of access rd intersec.			Boring Location NE1/4, SW1/4, NE1/4, NE1/4, Sec 28, T75N, R13E			Page 1 of 2	
Ground Surface Elevation 998.3 ft above NGVD (surv.)		Top of Well Casing Elevation 1001.41 ft above NGVD (surv.)		Boring Location Coordinates 572361.1 North 2752199.2 East		Total Footage 30.0 ft.	
Drilling Method (s) 6 1/4" ID HSA		Borehole Size 8"	Overburden Footage 29.0 feet	Bedrock Footage 0 feet	No. Of Samples None	No. Core Boxes None	Depth to Water See Remarks
Drilling Co. Layne, Inc, Omaha, Nebraska				Driller (s) Lyle Porter, Rick Keith			
Drilling Rig Acker Soilmax 80 Truck Mounted				Type of Sampler Split-Spoon			
Date Started 03/06/95		Date Completed 03/06/95		Field Observer (s) Carmelo Blazekovic			

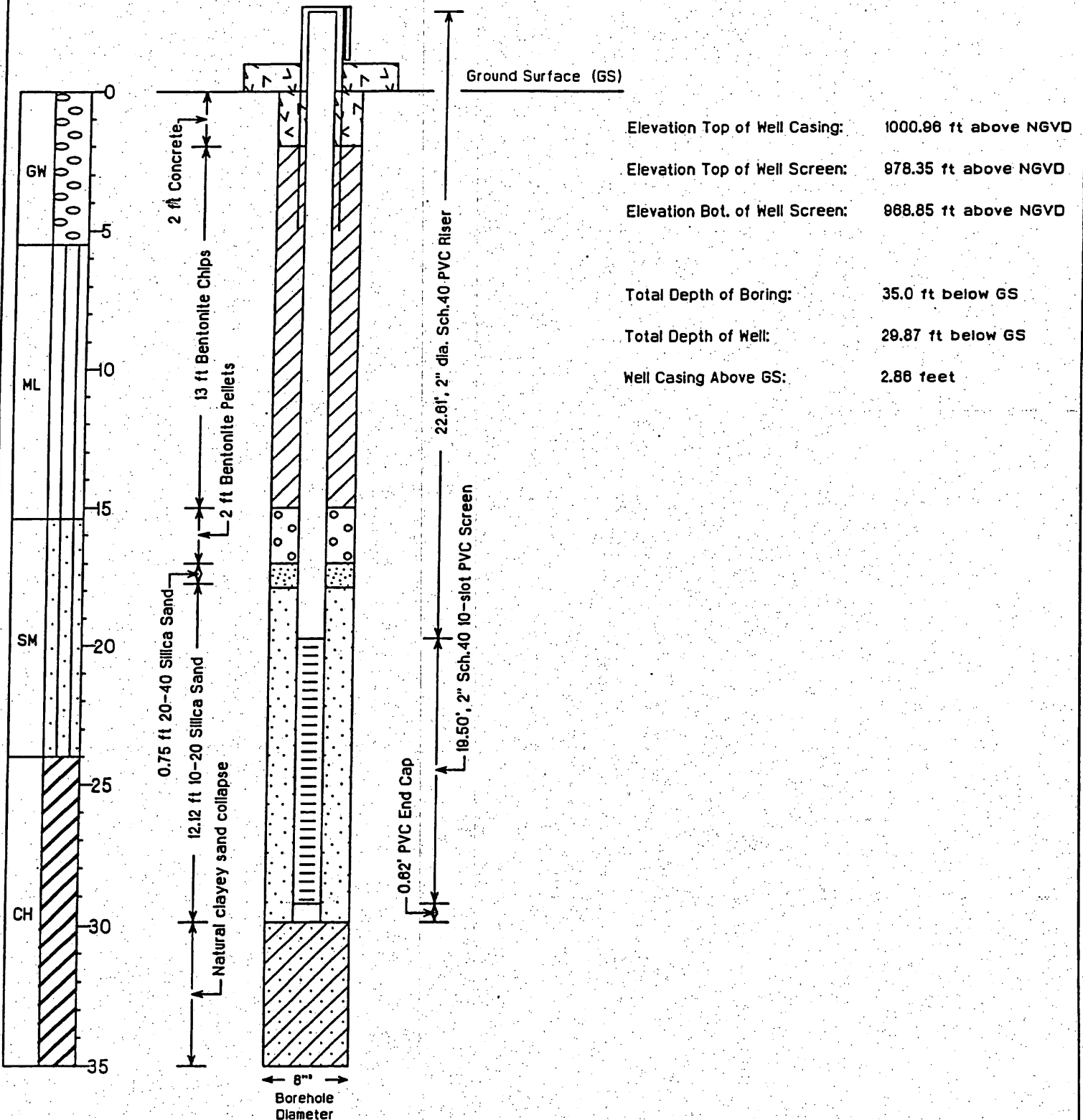
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1	SILT, medium brown, soft, moist, nonplastic, with minor clay and gravel (fill).				1			Start at 3:00 pm. HSA = Hollow Stem Augers NGVD = National Geodetic Vertical Datum
2								
3								
4								
5								
6	SILT, blueish gray, soft, nonplastic, moist, with minor sand and some silt size coal grains (fill).	ML	3/19/14/4	1.4'/2.0'	6	SS-1		Spoon penetrated a weathered limestone cobble.
7								
8								
9								
10								
11								
12								
13								
14								
14								

Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska				Project No. 08 94037.02		Boring Number MW-2		
Boring Location Description NW of coal pile, NW corner of access rd intersec.			Boring Location NE1/4, SW1/4, NE1/4, NE1/4, Sec 28, T75N, R13E			Page 2 of 2		
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SILT, blueish gray, soft, nonplastic, moist, with minor sand and some silt size coal grains (fill).	ML			15			
16	CLAYEY SILT, yellowish brown, soft, very moist, low plasticity, with minor fine sand.		2/3/4/5	1.6'/2.0'	16	SS-3		
17					17			
18					18			
19					19			
20					20			
21	SAND, medium gray, medium to fine grained, well graded, dense, very moist, with minor silt, mostly quartz and black rock grains.	SW	1/5/19/20	1.7'/2.0'	21	SS-4		
22					22			
23					23			
24	CLAYEY SAND, medium gray, fine grained, well graded, loose, wet, mostly quartz with rock grains in clay.	SC			24			
25					25			
26			1/3/5/3	2.0'/2.0'	26	SS-5		
27					27			Advanced augers to 30.0'
28					28			Quit drilling at 5:20 pm.
29					29			Monitoring Well installed at 6:00 PM.
30	TOTAL DEPTH = 30.0 Feet				30			
31					31			

MONITORING WELL CONSTRUCTION RECORD

Project Name Omaha Public Power District - North Omaha, Nebraska		Project Number 08 94037.02	Well Number MW-5
Location Description E part of the site, next to Missouri River		Location NW1/4, NW1/4, SW1/4, NW1/4, Sec 27, T75N, R13E	Total Depth (TOC) 32.73 feet
Ground Surface Elevation 998.1 ft above NGVD	Marker In Concrete Well Pad EL	Boring Location Coordinates 571740.3 North 2753024.9 East	Date Installed 03/02/95



DRILLING LOG

Project Name Omaha Public Power District - North Omaha, Nebraska				Project Number 08 94037.02		Boring Number MW-5	
Boring Location Description E part of the site, next to Missouri River			Boring Location NW1/4, NW1/4, SW1/4, NW1/4, Sec 27, T75N, R13E			Page 1 of 3	
Ground Surface Elevation 998.1 ft above NGVD (surv.)		Top of Well Casing Elevation 1000.96 ft above NGVD (surv.)		Boring Location Coordinates 571740.3 North 2753024.9 East		Total Footage 35.0 ft.	
Drilling Method (s) 6 1/4" ID HSA		Borehole Size 8"	Overburden Footage 35.0 feet	Bedrock Footage 0 feet	No. Of Samples None	No. Core Boxes None	Depth to Water See Remarks
Drilling Co. Layne, Inc, Omaha, Nebraska				Driller (s) Lyle Porter, Rick Keith			
Drilling Rig Acker Soilmax 80 Truck Mounted				Type of Sampler Split-spoon (standard penetration test)			
Date Started 03/02/95		Date Completed 03/02/95		Field Observer (s) Carmelo Blazekovic			

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1	GRAVEL, COBBLES, SAND, AND SILT (fill).	GW			1			Start at 11:20 AM HSA = Hollow Stem Augers NGVD = National Geodetic Vertical Datum
2					2			
3					3			
4					4			
5					5			
6	CLAYEY SILT, yellowish brown, medium density, very moist, with up to 1/4" oval shaped light blueish grey silt mottles (fill).	ML			6			
7					7			
8					8			
9					9			
10					10			
11				5/11/14/15	1.5'/2.0'	11	SS-1	
12						12		
13						13		
14						14		

Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska					Project No. 08 94037.02		Boring Number MW-5	
Boring Location Description E part of the site, next to Missouri River				Boring Location NW1/4, NW1/4, SW1/4, NW1/4, Sec 27, T75N, R13E			Page 2 of 3	
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	CLAYEY SILT, yellowish brown, medium density, very moist, with up to 1/4" oval shaped light blueish grey silt mottles (fill).	ML			15			
16	SILTY SAND, blueish grey, fine grained, medium density, well graded, very moist, minor clay and trace wood and coal particles.		10/7/8/12	2.0'/2.0'	16	SS-2		
17					17			
18					18			
19					19			
20		SM			20			
21			2/2/5/2	1.8'/2.0'	21	SS-3		
22					22			
23					23			
24	SANDY CLAY, light grey, high plasticity, soft, very moist.				24			
25						25		
26			3/4/5/6	2.0'/2.0'	26	SS-4		
27					27			
28		CH			28			
29					29			
30					30			
31			1/2/2/3	2.0'/2.0'	31	SS-5		

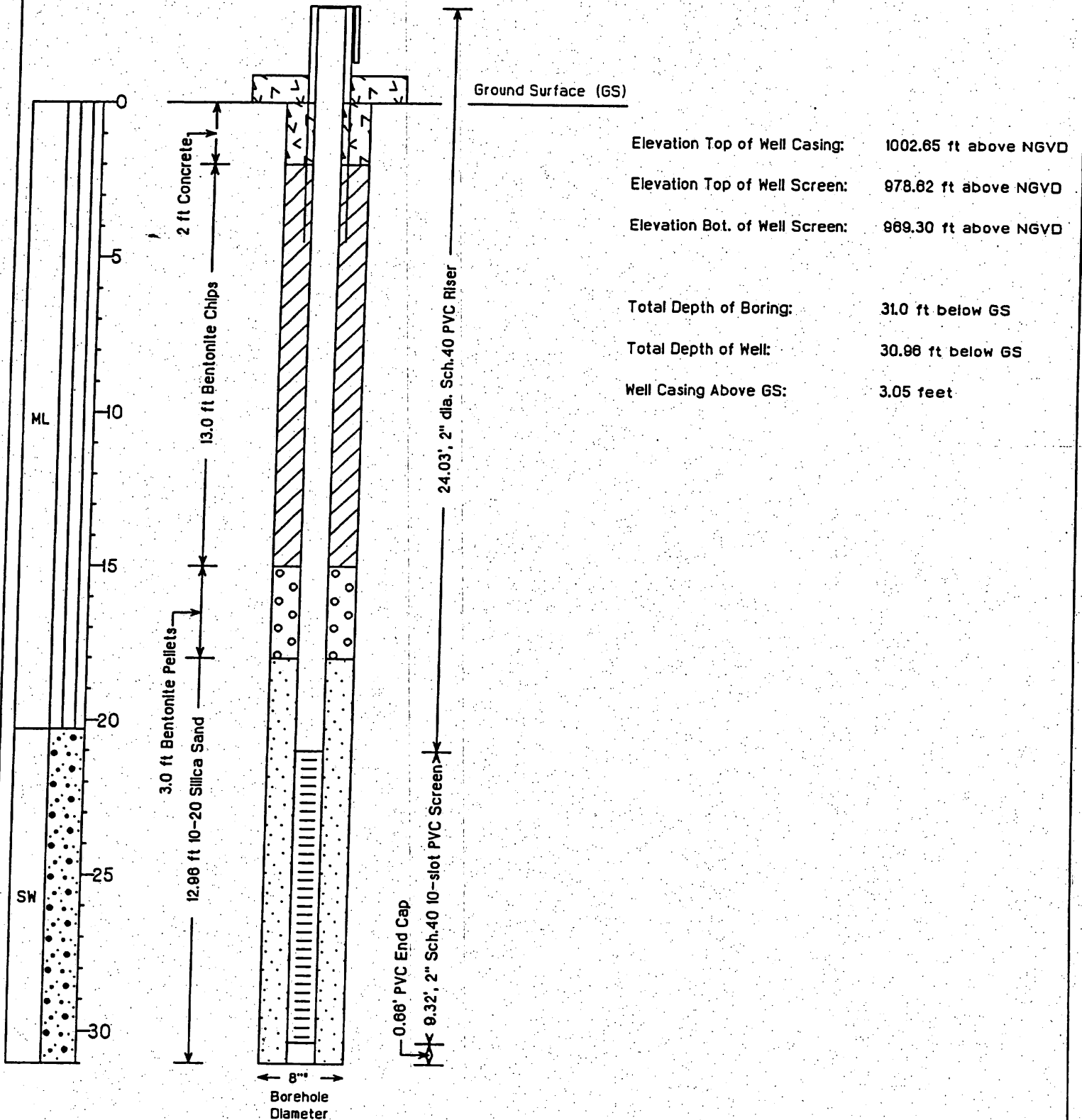
Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska	Project No. 08 94037.02	Boring Number MW-5
Boring Location Description E part of the site, next to Missouri River	Boring Location NW1/4, NW1/4, SW1/4, NW1/4, Sec 27, T75N, R13E	Page 3 of 3

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
32	SANDY CLAY, light grey, high plasticity, soft, very moist.	CH	1/2/2/3	2.0'/2.0'	32	SS-5		Advanced augers to 35. Pulled Augers. Borehole open to 34.5'. Backfilled borehole with sand to 30'. Well installed 3:00 PM.
33			33	34	34	35	35	
35	TOTAL DEPTH = 35.0 Feet				36			
36					37			
37					38			
38					39			
39					40			
40					41			
41					42			
42					43			
43					44			
44					45			
45					46			
46					47			
47					48			
48					48			

MONITORING WELL CONSTRUCTION RECORD

Project Name Omaha Public Power District - North Omaha, Nebraska		Project Number 08 94037.02	Well Number MW-6
Location Description NW of Western Bottom Ash Pond		Location NW1/4, SW1/4, SE1/4, NE1/4, Sec. 28, T75N, R13E	Total Depth (TOC) 34.01 feet
Ground Surface Elevation 999.6 ft above NGVD	Marker in Concrete Well Pad EL	Boring Location Coordinates 571097.1 North 2751940.2 East	Date Installed 03/08/95



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DRILLING LOG

Project Name Omaha Public Power District - North Omaha, Nebraska				Project Number 08 94037.02		Boring Number MW-6	
Boring Location Description NW of Western Bottom Ash Pond			Boring Location NW1/4, SW1/4, SE1/4, NE1/4, Sec. 28, T75N, R13E			Page 1 of 2	
Ground Surface Elevation 999.6 ft above NGVD (surv.)		Top of Well Casing Elevation 1002.65 ft above NGVD (surv.)		Boring Location Coordinates 571097.1 North 2751940.2 East		Total Footage 31.0 ft.	
Drilling Method (s) 6 1/4" ID HSA		Borehole Size 8"	Overburden Footage 31.0 feet	Bedrock Footage 0 feet	No. Of Samples None	No. Core Boxes None	Depth to Water See Remarks
Drilling Co. Layne, Inc, Omaha, Nebraska				Driller (s) Lyle Porter, Rick Keith			
Drilling Rig Acker Soilmax 80 Truck Mounted				Type of Sampler Split- spoon (standard penetration test)			
Date Started 03/08/95		Date Completed 03/08/95		Field Observer (s) Carmelo Blazekovic			

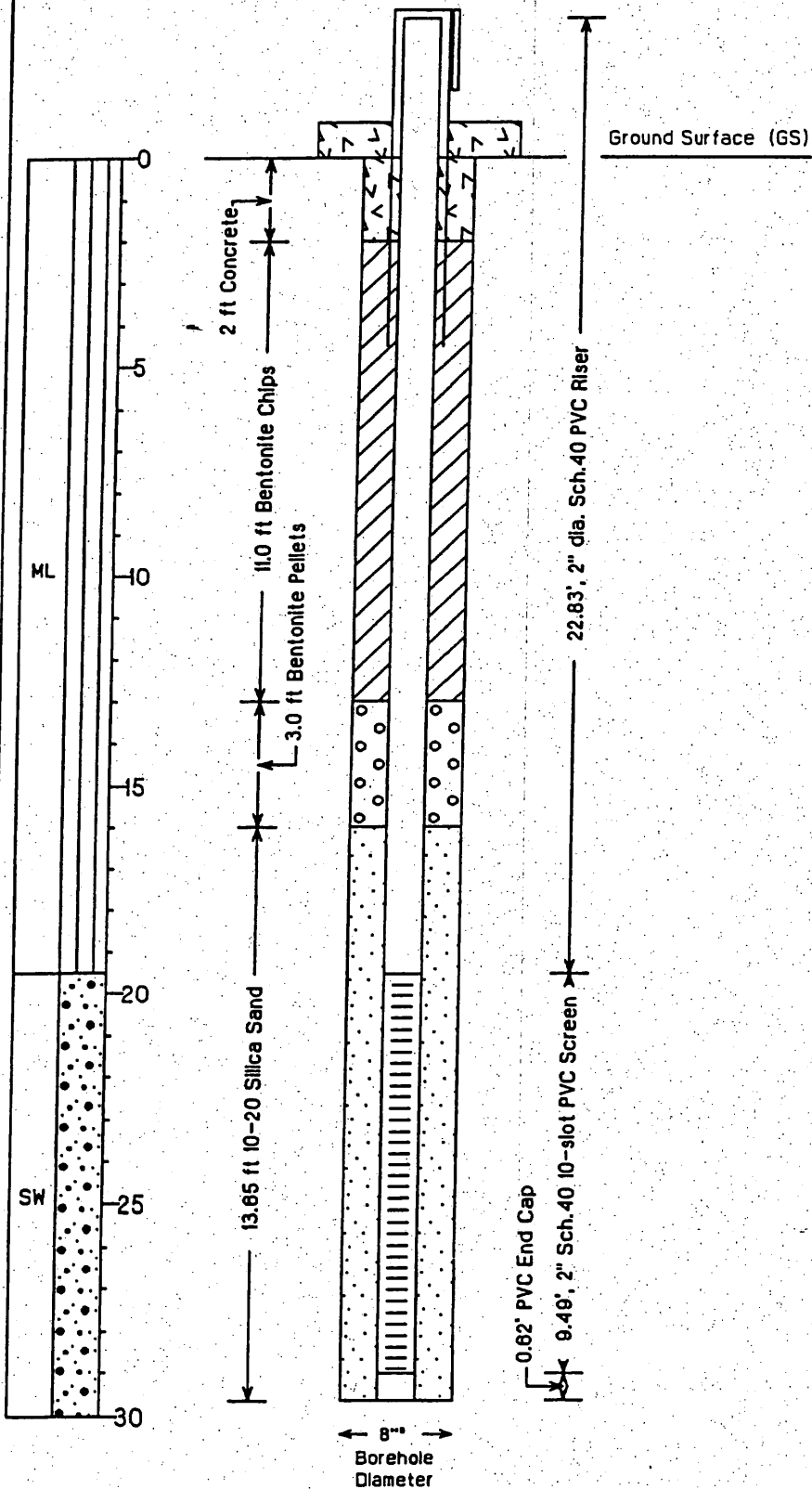
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1	SILT, medium brown, medium to loose, moist, non-plastic, with minor clay (fill).	ML			1			Start at 10:00 HSA = Hollow Stem Augers NGVD = National Geodetic Vertical Datum
2					2			
3					3			
4					4			
5	SILT, medium brown, loose, wet, non-plastic with minor clay and trace fine sand (fill).	ML			5			
6					6			
7					7			
8					8			
9					9			
10					10			
11					11	SS-2		
12					12			
13					13			
14					14			

Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska				Project No. 08 94037.02		Boring Number MW-6		
Boring Location Description NW of Western Bottom Ash Pond			Boring Location NW1/4, SW1/4, SE1/4, NE1/4, Sec. 28, T75N, R13E			Page 2 of 2		
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SILT, medium brown, loose, wet, non-plastic with minor clay and trace fine sand (fill).				15			
16			2/1/4/10	1.9'/2.0'	16	SS-3		
17	CLAYEY SILT, brown, medium consistency, very moist, medium to low plasticity with minor fine sand.	ML			17			
18					18			
19					19			
20					20			
21	SAND, yellowish brown, fine grained, loose, wet, well graded, with minor silt, mostly quartz with rock grains.		2/2/5/6	2.0'/2.0'	21	SS-4		
22					22			
23					23			
24					24			
25					25			
26	SAND, bluish grey, fine grained, loose, wet, well graded, with silt and minor clay, mostly quartz and rock grains.	SW	2/2/1/2	2.0'/2.0'	26	SS-5		
27					27			
28					28			
29					29			Installed monitoring well 12:00 pm.
30					30			
31	TOTAL DEPTH = 31.0 Feet				31			

MONITORING WELL CONSTRUCTION RECORD

Project Name Omaha Public Power District - North Omaha, Nebraska		Project Number 08 94037.02	Well Number MW-8
Location Description East of Eastern Bottom Ash Pond		Location NW1/4,SE1/4,SE1/4,NE1/4,Sec.28,T75N,R13E	Total Depth (TOC) 32.94 feet
Ground Surface Elevation 1000.3 ft above NGVD	Marker in Concrete Well Pad EL	Boring Location Coordinates 571112.4 North 2752406.5 East	Date Installed 03/07/95



Elevation Top of Well Casing:	1003.59 ft above NGVD
Elevation Top of Well Screen:	980.78 ft above NGVD
Elevation Bot. of Well Screen:	971.27 ft above NGVD
Total Depth of Boring:	30.0 ft below GS
Total Depth of Well:	29.65 ft below GS
Well Casing Above GS:	3.29 feet

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DRILLING LOG

Project Name Omaha Public Power District - North Omaha, Nebraska				Project Number 08 94037.02		Boring Number MW-8	
Boring Location Description East of Eastern Bottom Ash Pond			Boring Location NW1/4,SE1/4,SE1/4,NE1/4,Sec.28,T75N,R13E			Page 1 of 2	
Ground Surface Elevation 1000.3 ft above NGVD (surv.)		Top of Well Casing Elevation 1003.59 ft above NGVD (surv.)		Boring Location Coordinates 571112.4 North 2752406.5 East		Total Footage 30.0 ft.	
Drilling Method (s) 6 1/4" ID HSA		Borehole Size 8"	Overburden Footage 30.0 feet	Bedrock Footage 0 feet	No. Of Samples None	No. Core Boxes None	Depth to Water See Remarks
Drilling Co. Layne, Inc, Omaha, Nebraska				Driller (s) Lyle Porter, Rick Keith			
Drilling Rig Acker Soilmax 80 Truck Mounted				Type of Sampler Split-spoon (standard penetration test)			
Date Started 03/07/95		Date Completed 03/07/95		Field Observer (s) Carmelo Blazekovic			

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1	SANDY SILT, dark grey, loose, moist, with minor clay, mostly cinders and coal particles with silt (fill).	ML			1			Start at 12:45 p.m.
2								
3								
4								
5								
6	SANDY SILT, dark grey, loose, wet, with minor clay, mostly cinders and coal particles with silt (fill).	ML	2/20/30	1.0'/1.3'	6	SS-1		Hammer bouncing at 6.3'
7					7			
8	SILT, brownish grey, loose, wet, with some clay and minor coarse sand (fill).	ML			8			
9								
10								
11								
11	SILT, brownish grey, loose, wet, with some clay and minor coarse sand (fill).	ML		1/4/2/2	2.0'/2.0'	11	SS-2	
12						12		
13						13		
14					14			

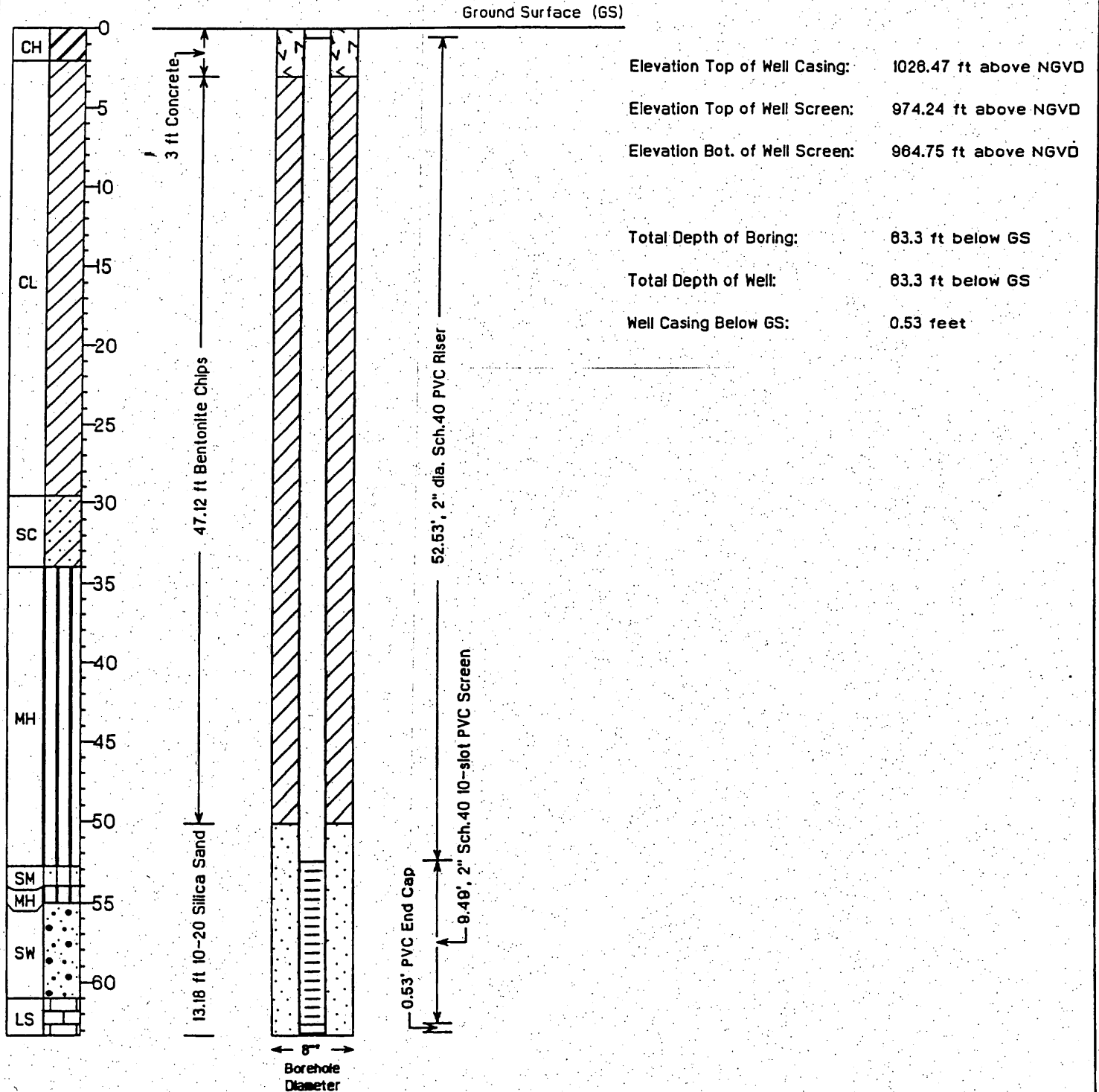
Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska				Project No. 08 94037.02		Boring Number MW-8		
Boring Location Description East of Eastern Bottom Ash Pond			Boring Location NW1/4,SE1/4,SE1/4,NE1/4,Sec.28,T75N,R13E			Page 2 of 2		
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SILT, brownish grey, loose, wet, with some clay and minor coarse sand (fill).	ML			15			
16	CLAYEY SILT (alluvium), dark grey, soft, moist, trace plasticity, with some fine sand.		1/2/5/2	1.7'/2.0'	16	SS-3		
17					17			
18					18			
19					19			
20	SAND, yellowish brown, fine grained, well graded, wet, mostly quartz with some rock grains, trace silt.	SW			20			
21			2/3/2/8	1.2'/2.0'	21	SS-4		
22					22			
23					23			
24					24			
25					25			
26			1/1/2/3	2.0'/2.0'	26	SS-5		
27					27			Installed monitoring well at 1:45 pm
28					28			
29					29			
30					30			
31	TOTAL DEPTH = 30.0 Feet				31			

SCS ENGINEERS
Kansas City, Missouri

MONITORING WELL CONSTRUCTION RECORD

Project Name Omaha Public Power District - North Omaha, Nebraska		Project Number 08 94037.02	Well Number MW-9
Location Description W of fly ash disp. area, 40'W of Pershing Drive		Location SW1/4, NW1/4, SE1/4, NE1/4, Sec 28, T75N, R13E	Total Depth (TOC) 62.55 feet
Ground Surface Elevation 1027.1 ft above NGVD	Marker in Concrete Well Pad El.	Boring Location Coordinates 571109.4 North 2751564.3 East	Date Installed 05/04/96



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DRILLING LOG

Project Name Omaha Public Power District - North Omaha, Nebraska				Project Number 08 94037.02		Boring Number MW-9	
Boring Location Description W of fly ash disp. area, 40'W of Pershing Drive			Boring Location SW1/4, NW1/4, SE1/4, NE1/4, Sec 28, T75N, R13E			Page 1 of 4	
Ground Surface Elevation 1027.1 ft above NGVD (surv.)		Top of Well Casing Elevation 1026.47 ft above NGVD (surv.)		Boring Location Coordinates 571109.4 North 2751564.3 East		Total Footage 63.3 ft.	
Drilling Method (s) 6 1/4" ID HSA		Borehole Size 8"	Overburden Footage 61.0 feet	Bedrock Footage 2.3 feet	No. Of Samples None	No. Core Boxes None	Depth to Water See Remarks
Drilling Co. Layne, Inc, Omaha, Nebraska				Driller (s) Rick Keith			
Drilling Rig Acker Soilmax 80 Truck Mounted				Type of Sampler Continuous Soil Sampler (CSS)			
Date Started 05/03/96		Date Completed 05/04/96		Field Observer (s) Carmelo Blazekovic			

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1	SILTY CLAY, dark gray, soft, moist, high plasticity, some roots.	CH			1			Start at 2:00 PM HSA = Hollow Stem Augers. NGVD = National Geodetic Vertical Datum
2	CLAYEY SILT, orange brown, soft, moist, low plasticity.				4.2'/5.0'		CSS-1	
3					3			
4					4			
5					5			
6					6			
7					7			
8	CLAYEY SILT, grayish brown, damp, soft, low plasticity, some roots.	CL			3.6'/5.0'		CSS-2	
9						8		
10					10			
11					11			
12					12		CSS-3	
13					13			
14					14			

Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska		Project No. 08 94037.02	Boring Number MW-9
Boring Location Description W of fly ash disp. area, 40'W of Pershing Drive		Boring Location SW1/4, NW1/4, SE1/4, NE1/4, Sec 28, T75N, R13E	Page 2 of 4

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	CLAYEY SILT, grayish brown, damp, soft, low plasticity, some roots.	CL		5.0'/5.0'	15			
16								
17					17			
18	SILT, reddish brown, soft, very moist, low plasticity.	CL		3.0'/5.0'	18	CSS-4		
19							19	CSS-3
20					20			
21					21			
22					22			
23					23			
24					24			
25	SILT, brownish gray, soft, very moist, low plasticity.	CL		4.0'/5.0'	25	CSS-5		
26							26	
27					27			
28					28			
29					29			
30	CLAYEY SAND, reddish brown, medium grained sand and clay mixture, loose, very moist, poorly graded.	SC		5.0'/5.0'	30	CSS-6		
31							31	CSS-7

Drilling Log, continued

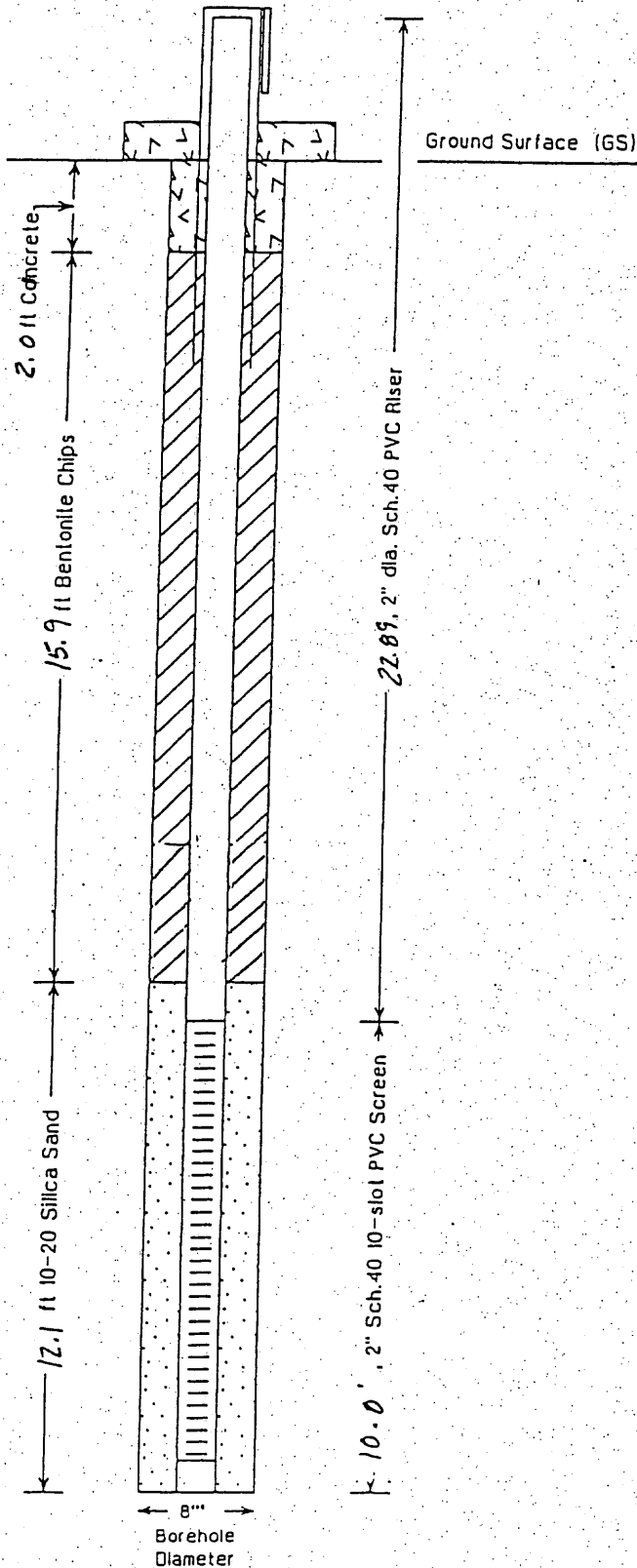
Project Name Omaha Public Power District - North Omaha, Nebraska						Project No. 08 94037.02		Boring Number MW-9		
Boring Location Description W of fly ash disp. area, 40'W of Pershing Drive				Boring Location SW1/4, NW1/4, SE1/4, NE1/4, Sec 28, T75N, R13E			Page 3 of 4			
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks		
32	CLAYEY SAND, reddish brown, medium grained sand and clay mixture, loose, very moist, poorly graded.	SC			32					
33					33					CSS-7
34	SANDY CLAY, brownish gray, very moist, soft, high plasticity, fine and medium grained sand and clay mixture.	MH			34					
35					35					
36					36					
37					37					
38	SANDY CLAY, blueish gray with reddish black laminae, soft, very moist, high plasticity, fine to very fine sand and clay mixture, some rootlets, foul odor.	MH			38					
39					39					
40		MH			40					
41					41					
42					42					
43					43					
44		MH			44					
45					45					
46		MH			46					
47					47					
48		MH			48					

Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska				Project No. 08 94037.02		Boring Number MW-9		
Boring Location Description W of fly ash disp. area, 40'W of Pershing Drive				Boring Location SW1/4, NW1/4, SE1/4, NE1/4, Sec 28, T75N, R13E		Page 4 of 4		
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
49	SANDY CLAY, blueish gray with reddish black laminae, soft, very moist, high plasticity, fine to very fine sand and clay mixture, some rootlets, foul odor.	MH		5.0'/5.0'	49	CSS-10		
50								
51								
52	SAND, gray, fine grained, loose, wet, poorly graded.	SM		5.0'/5.0'	52	CSS-11		
53								
54	SANDY CLAY, gray, soft, wet, high plasticity.	MH			54			
55	SAND, gray, medium grained, wet, loose, well graded.	SW		5.0'/5.0'	55			
56	SAND, blueish gray, fine grained, loose, wet, well graded.				56			
57					57			
58	SAND, dark gray, medium grained, loose, wet, well graded.				58	CSS-12		Quit drilling at 6:40 pm. Will install well tomorrow.
59					59			05/04/96 Start @ 8:30 am.
60					60			Well installed 11:00 am.
61	LIMESTONE, light grey, weathered, weak.	LS			61			
62					62			
63					63			
64	TOTAL DEPTH = 63.3 Feet				64			
65					65			

MONITORING WELL CONSTRUCTION RECORD

Project Name Omaha Public Power District - North Omaha, Nebraska		Project Number 08 94037.02	Well Number MW-13
Location Description NW of Ash Storage Building		Location NE 1/4 SW 1/4, NE 1/4, NE 1/4 SEC 28, T75N R13E	Total Depth (TOC) 30.0 feet
Ground Surface Elevation 999.02 ft above NGVD	Marker In Concrete Well Pad El. NA	Boring Location Coordinates 572809, 32N 2752986.38 E	Date Installed 04/12/01



Elevation Top of Well Casing:	1001.91 ft above NGVD
Elevation Top of Well Screen:	984.02 ft above NGVD
Elevation Bot. of Well Screen:	969.02 ft above NGVD
Total Depth of Boring:	30.0 ft below GS
Total Depth of Well:	30.0 ft below GS
Well Casing Above GS:	2.89 feet

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DRILLING LOG

Project Name City of Omaha Public Power District - North Omaha, Nebraska				Project Number 08 94037.02		Boring Number MW-13	
Boring Location Description North of Ash Storage Building			Boring Location NE 1/4, SW 1/4, NE 1/4, NE 1/4 SEC 28, T75N, R13E			Page 1 of 2	
Ground Surface Elevation 79.02 ft above NGVD (surv.)		Top of Well Casing Elevation 1001.91 ft above NGVD (surv.)		Boring Location Coordinates 572809.32 N, 2752986.38 E		Total Footage 30.0 ft	
Drilling Method (s) 6 1/4" ID HSA		Borehole Size 8"	Overburden Footage 30.0 ft	Bedrock Footage 0 ft	No. Of Samples None	No. Core Boxes None	Depth to Water See Remarks
Drilling Co. Layne, Inc, Omaha, Nebraska				Driller (s) Lyle Porter			
Drilling Rig. Acker Soilmax 80 Truck Mounted				Type of Sampler Split-spoon			
Work Started 04/12/01		Date Completed 04/12/01		Field Observer (s) Carmelo Blazekovic			

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1	SILT, medium brown, soft, moist, nonplastic, with minor clay and gravel (fill)	ML			1			
2					2			
3					3			
4					4			
5	SILT, blueish gray, soft, nonplastic, moist, with minor sand and some silt (fill)	ML			5			
6					6			
7					7			
8					8			
9	SILT, greenish gray, soft, nonplastic, moist, with minor sand and silt (fill)	ML			9			
10					10			
11					11			
12					12			
13					13			
14					14			

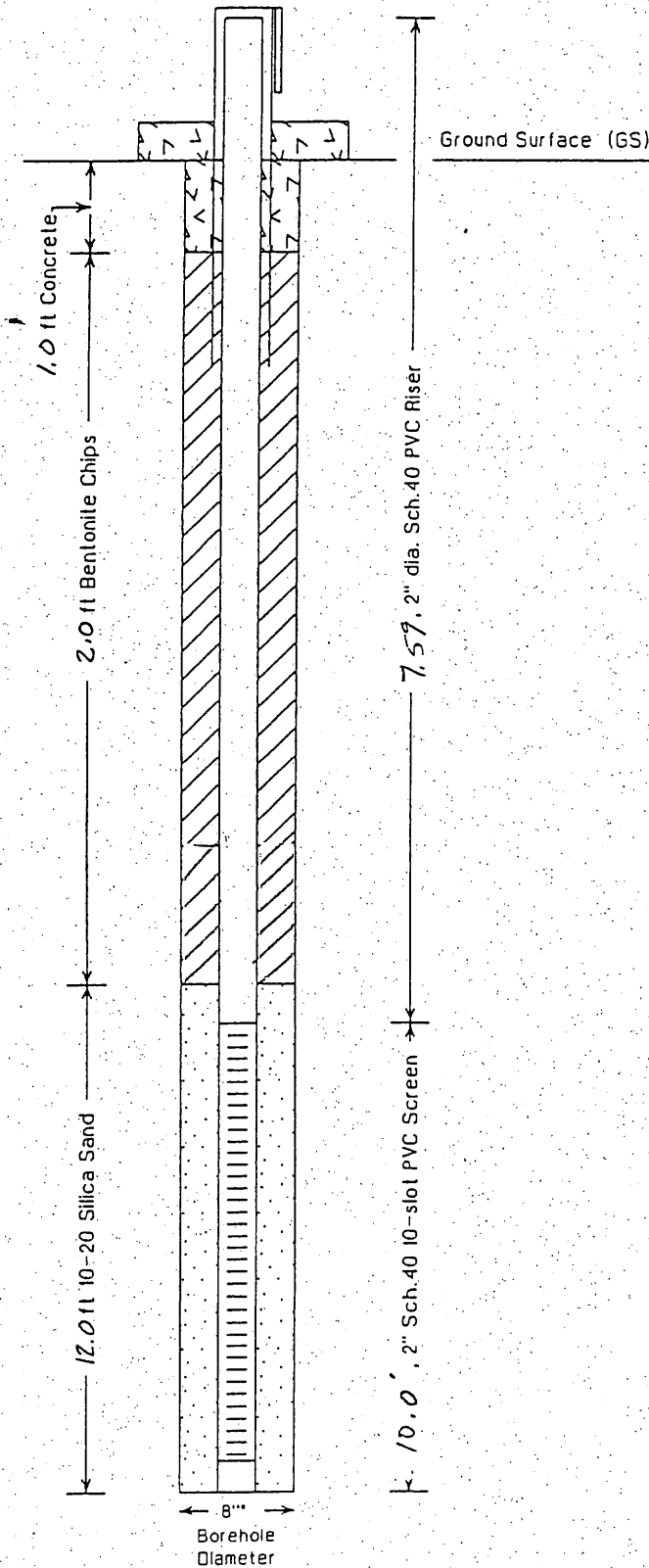
Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska	Project No. 08 94037.02	Boring Number MW-13
Boring Location Description N of Ash Storage Building	Boring Location NE 1/4, SW 1/4, NE 1/4, NE 1/4 SEC 28 T 7 S R 13 E	Page 2 of 2

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks	
15	CLAYEY SILT, light brown, soft, very moist low plasticity, trace fine sand	ML			15				
16					16				
17					17				
18					18				
19					19				
20	SAND, fine-medium, grey black, well graded, wet, with minor silt	SW			20			WET AT 20 ft.	
21					21				
22					22				
23					23				
24					24				
25					25				
26					26				
27					27				
28					28				
29	SILTY CLAY, grey, stiff, moist	ML			29				
30	TOTAL DEPTH 30.0 ft.				30				
31					31				

MONITORING WELL CONSTRUCTION RECORD

Project Name Omaha Public Power District - North Omaha, Nebraska		Project Number 08 94037.02	Well Number MW-15
Location Description SW of Coal Pile, W of Drainage		Location NE 1/4, NW 1/4, SE 1/4, NE 1/4 SEC 28, T75N R13E	Total Depth (TOC) 15.0 feet
Ground Surface Elevation 1002.80 ft above NGVD	Marker in Concrete Well Pad El. NA	Boring Location Coordinates 571747.86 N 2753131.91 E	Date Installed 04/16/01



Elevation Top of Well Casing: 1005.39 ft above NGVD

Elevation Top of Well Screen: 997.8 ft above NGVD

Elevation Bot. of Well Screen: 987.8 ft above NGVD

Total Depth of Boring: 15.0 ft below GS

Total Depth of Well: 15.0 ft below GS

Well Casing Above GS: 2.59 feet

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DRILLING LOG

Project Name Omaha Public Power District - North Omaha, Nebraska				Project Number 08 94037.02		Boring Number MW-15	
Boring Location Description J of coal pile, w of drainage				Boring Location NE 1/4, NW 1/4, SE 1/4, NE 1/4 SEC 28, T15N, R13E		Page 1 of 2	
Ground Surface Elevation 1002.80 ft above NGVD (surv.)		Top of Well Casing Elevation 1005.39 ft above NGVD (surv.)		Boring Location Coordinates 571747.86 N 2753131.91 E		Total Footage 15.0 ft.	
Drilling Method (s)	Borehole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water	
6 1/4" ID HSA	8"	15.0 ft	0 ft	None	None	See Remarks	
Drilling Co. Layne, Inc, Omaha, Nebraska				Driller (s) Lyle Porter			
Drilling Rig Acker Soilmax 80 Truck Mounted				Type of Sampler Split-spoon			
Date Started 04/16/01		Date Completed 04/16/01		Field Observer (s) Carmelo Blazekovic			


Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
	GRAVEL	GP						
1	SANDY SILT, light grey, loose, moist, ash with cinders and a few grains of coal (fill)	ML			1			
2					2			
3					3			
4					4			
5	SANDY SILT, light grey, wet, ash with cinders and a few grains of coal (fill)	ML			5			Wet at 5 ft.
6					6			
7					7			
8					8			
9					9			
10					10			
11					11			
12					12			
13					13			
14					14			

Drilling Log, continued

Project Name Omaha Public Power District - North Omaha, Nebraska				Project No. 08 94037.02		Boring Number MW-15		
Boring Location Description SW of coal pile, w of drainage			Boring Location NE ¹ / ₄ , NW ¹ / ₄ , SE ¹ / ₄ , NE ¹ / ₄ SEC 28, T75N, R13E			Page 2 of 2		
Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SANDY SILT, light grey, loose, wet, ash with cinders and a few grains of coal (fill)	ML			15			
16	TOTAL DEPTH 15.0 ft				16			
17					17			
18					18			
19					19			
20					20			
21					21			
22					22			
23					23			
24					24			
25					25			
26					26			
27					27			
28					28			
29					29			
30					30			
31					31			

LOG OF WELL NO. MW-17

CLIENT OPPD	Project Manager Mike Reif
SITE North Omaha Station Omaha, Nebraska	PROJECT North Omaha Station

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
					NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	FIELD VAPOR TEST (PPM)*	SAMPLE SENT TO LAB	
	BOREHOLE DIA.: 8.25 in WELL DIA.: 2 in CASING AND SCREEN: PVC (sch. 40); 0.01 slotted screen TOP OF CASING: 1002.54 ft GROUND SURFACE ELEV.: 999.6 ft											
3.7	Coal dust at surface <u>LEAN CLAY</u> , trace sand Light brown	996				1	SS	22	6		ND	
	<u>LEAN CLAY</u> Brown 2 inches of sandy lean clay at 4.5 feet		5				HS					
	Light brown-light gray, very soft, mottled, wet with ferrous stains from 7 to 13.5 feet					2	SS	16	1		ND	
	Light brown, moist with ferrous stains 13.5 to 14.5 feet					3	SS	20	7		ND	
14.5	3 inches of light brown fine clayey sand at 14.5 feet <u>LEAN CLAY</u> with very fine sand Brown-gray Moist	985					HS					

Continued Next Page

The stratification lines represent the approximate boundaries between soil and rock types: in-situ, the transition may be gradual.

* ND indicates a reading of less than the field detection limit of one (1) part per million (ppm) isobutylene equivalents.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 18	WD	▽
WL	▽		▽
WL			



BORING STARTED	5-10-07 10:20
BORING COMPLETED	5-10-07 14:30
RIG	CME 75
DRILLER	BC
LOGGED	KAC
JOB #	05027041

WELL 05027041 NORTH OMAHA LOGS.GPJ TERRACON.GDT 5/17/07

LOG OF WELL NO. MW-17

CLIENT OPPD	Project Manager Mike Reif
SITE North Omaha Station Omaha, Nebraska	PROJECT North Omaha Station

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS		
					NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	FIELD VAPOR TEST (PPM)*
18	▽ 981.5									
	SILTY VERY FINE SAND , trace clay Light gray Soft, wet, ferrous stains, and trace roots				4	SS	18	3		ND
20.75	979					HS				
	LEAN CLAY Dark gray-brown Moist with organics and ferrous stains									
23.25	976.5					5	SS	18	1	ND
	SILTY VERY FINE SAND with clay Light gray-light brown Wet, ferrous stains									
25	974.5					HS				
	SANDY LEAN CLAY Light gray Wet, trace roots, trace magnesium staining									
30	969.5					6	SS	24	1	ND
	BOTTOM OF BORING Note: Soil classifications were based on visual observations made by the field crew.									

The stratification lines represent the approximate boundaries between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit of one (1) part per million (ppm) isobutylene equivalents

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 18	WD	▽
WL	▽		▽
WL			



BORING STARTED		5-10-07 10:20	
BORING COMPLETED		5-10-07 14:30	
RIG	CME 75	DRILLER	BC
LOGGED	KAC	JOB #	05027041

WELL 05027041 NORTH OMAHA LOGS.GPJ TERRACON.GDT 5/17/07

Mail to
Department of Natural Resources
PO Box 94676
Lincoln, NE 68509-4676
Phone (402)471-2363

July 2006
DNR Form 145

STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
WATER WELL REGISTRATION

FOR DEPARTMENT USE ONLY

Date Filed 01/25/07 Owner Code No. 40226 Registration No. B-145159
010252007-189056-WWRF(S) R21879 PMK NRD

1. a. Well Owner's First Name _____ Last Name _____

OR Company Name Omaha Public Power District

b. Attention Name Jim Krajicek

c. Address 444 South 16th Street Mall

City Omaha

State NE

Zip 68102

Telephone 402-636-2309

2. a. Contractor's License No. 39325 Contractor's Name _____

Contractor's Email Address lebazer@terracon.com

b. Drilling Firm Name Terracon Consultants, Inc.

Address 2211 South 156th Circle

City Omaha

State NE

Zip 68130-2506

Telephone 402-330-2202

Drilling Firm's Email Address lebazer@terracon.com

3. a. Well location NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 28, Township 16 North, Range 13 E W , Douglas County.

b. Natural Resources District Papio-Missouri River Natural Resource District

c. The well is ~1,380 feet from the (N S) section line and ~70 feet from the (E W) section line

OR Latitude Degree _____ Minute _____ Second _____

Longitude Degree _____ Minute _____ Second _____

d. Street address and subdivision, if applicable 7475 Pershing Drive, Omaha, NE

Block _____ Lot _____

e. Location of water use (give legal descriptions) _____

f. If for irrigation, the land to be irrigated is _____ acres.

g. Well reference letter(s), if applicable MW-17 HHSS PWSID _____

4. Permits
Management Area Permit Number _____ Surface Water Permit Number _____
Geothermal Permit Number _____ Industrial Permit Number _____
Municipal Permit Number _____ Transfer Out-Of-State Permit Number _____
Well Spacing Permit Number _____ Conduct Permit Number _____
HHSS _____ Other Permit Number _____
NDEQ _____

5. Purpose of well (indicate one) Aquaculture Commercial/Industrial Dewatering (over 90 days)
 Domestic Ground Heat Exchanger Groundwater Source Heat Pump Irrigation Injection
 Livestock Monitoring Observation Public Water Supply (with spacing (46-638))
 Public Water Supply (without spacing) Recovery Other _____
(indicate use)

6. Wells in a Series.
a. Is this well a part of a series? Yes go to part b of this section No go to part 7 of this application
b. If one or more of the wells in the series is currently registered, give all well registration numbers _____
c. How many wells in the series are you registering at this time? _____

6-145159

11. Grout and Gravel Pack

Placement Depth in Feet		Grout or Gravel Pack	Material Description
From	To		
0	0.75	Cement	Cement
0.75	15	Grout	Bentonite Grout
15	18	Grout	Bentonite Chips
18	30	Gravel Pack	Gravel Pack (20-40)

12. Geologic Materials Logged

Depth in Feet		Description
From	To	
		SEE ATTACHED BORING LOG

Depth in Feet		Description
From	To	

(Additional sheets may be submitted)

13. I hereby certify that the information provided on this registration is true and accurate to the best of my knowledge.

Daniel M. Surgen 6/18/07
Water Well Contractor's Signature Date

Well Owner's Signature
if Contractor is unknown or Deceased

Date

Please note this document contains three pages.

6-145159

LOG OF WELL NO. MW-17

CLIENT OPPD	Project Manager Mike Reif
SITE North Omaha Station Omaha, Nebraska	PROJECT North Omaha Station

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
					NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	FIELD VAPOR TEST (PPM)*	SAMPLE SENT TO LAB	
	BOREHOLE DIA.: 8.25 in WELL DIA.: 2 in CASING AND SCREEN: PVC (sch. 40); 0.01 slotted screen TOP OF CASING: 1002.54 ft GROUND SURFACE ELEV.: 999.6 ft											
	Coal dust at surface <u>LEAN CLAY</u> , trace sand Light brown											
	3.7	996										
	<u>LEAN CLAY</u> Brown 2 inches of sandy lean clay at 4.5 feet		5									
	Light brown-light gray, very soft, mottled, wet with ferrous stains from 7 to 13.5 feet											
	2											
	Light brown, moist with ferrous stains 13.5 to 14.5 feet		10									
	3											
	14.5	985										
	3 inches of light brown fine clayey sand at 14.5 feet <u>LEAN CLAY</u> with very fine sand Brown-gray Moist		15									

Continued Next Page

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JUN 25 2007
DEPARTMENT OF NATURAL RESOURCES

The stratification lines represent the approximate boundaries between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit of one (1) part per million (ppm) isobutylene equivalents.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 18	WD	▽
WL	▽		▽
WL			



BORING STARTED	5-10-07 10:20
BORING COMPLETED	5-10-07 14:30
RIG	CME 75
DRILLER	BC
LOGGED	KAC
JOB #	05027041

WELL 05027041 NORTH OMAHA LOGS.GPJ TERRACON.GDT 5/17/07

6-145159

LOG OF WELL NO. MW-17

CLIENT: OPPD Project Manager: Mike Reif

SITE: North Omaha Station, Omaha, Nebraska PROJECT: North Omaha Station

GRAPHIC LOG	DESCRIPTION	WELL DETAIL	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS			
					NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	FIELD VAPOR TEST (PPM)*	SAMPLE SENT TO LAB
18	SILTY VERY FINE SAND , trace clay Light gray Soft, wet, ferrous stains, and trace roots	▽ 981.5			4	SS	18	3		ND	
20.75	LEAN CLAY Dark gray-brown Moist with organics and ferrous stains	979	20			HS					
23.25	SILTY VERY FINE SAND with clay Light gray-light brown Wet, ferrous stains	976.5			5	SS	18	1		ND	
25	SANDY LEAN CLAY Light gray Wet, trace roots, trace magnesium staining	974.5	25			HS					
30	BOTTOM OF BORING Note: Soil classifications were based on visual observations made by the field crew.	969.5	30		6	SS	24	1		ND	

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DEPARTMENT OF
NATURAL RESOURCES

The stratification lines represent the approximate boundaries between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit of one (1) part per million (ppm) isobutylene equivalents.

WATER LEVEL OBSERVATIONS, ft

WL	▽ 18	WD	▽
WL	▽		▽
WL			



BORING STARTED	5-10-07 10:20
BORING COMPLETED	5-10-07 14:30
RIG	CME 75
DRILLER	BC
LOGGED	KAC
JOB #	05027041

WELL 05027041 NORTH OMAHA LOGS.GPJ TERRACON.GDT 5/17/07

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WELL LOG NO. MW-18

PROJECT: OPPD North Omaha Station

CLIENT: Omaha Public Power District

**SITE: 7475 Pershing Drive
Omaha, Nebraska**

GRAPHIC LOG	LOCATION - Latitude: 41.3333153° Longitude: -95.9525745°	INSTALLATION DETAILS Top Casing Elev: 1037.00 Well Completion: Surface Mount	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	SPT N-VALUE
DEPTH	MATERIAL DESCRIPTION	Surface Elev.: 1037.1 (Ft.) ELEVATION (Ft.)					
2.5	LEAN CLAY (CL) , dark brown, moist, Grass at surface	1034.6				8	2-1-2-3 N=3
	LEAN CLAY (CL) , with fine sand, gray, moist with oxidized mottles		5			10	2-4-5-6 N=9
	becomes dry					12	2-2-4-4 N=6
	with trace black oxidized mottles					14	2-2-5-5 N=7
						18	2-3-5-5 N=8
13.5	LEAN CLAY (CL) , brown, dry, with iron mottles	1023.6				16	2-2-4-5 N=6
15.0	SILT (ML) , gray to brown, dry	1022.1				20	3-4-5-5 N=9
						16	2-4-4-6 N=8
19.0	LEAN CLAY (CL) , gray, dry, with orange mottles	1018.1				16	2-5-7-9 N=12
						16	2-6-6-8 N=12
23.0	LEAN CLAY (CL) , red to brown, with red mottles becomes moist	1014.1				18	3-4-7-7 N=11
						18	3-6-7-7 N=13
						16	2-2-3-4

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown. Hammer Type: Automatic

Advancement Method: Mud rotary / split spoon sample hole Hollow stem auger, 8.25-inch diameter borehole	See Appendices for explanation of symbols and abbreviations.	Notes: Soil descriptions are based on visual observations made by the field crew. Actual conditions may vary.
Abandonment Method: N/A-Well installed		

WATER LEVEL OBSERVATIONS ▽ 33 ft while drilling	15080 A Circle Omaha, Nebraska	Well Started: 12/1/2015 Well Completed: 12/1/2015 Drill Rig: 770 Driller: JM Project No.: 05157581 Exhibit: --1
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THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ENVIRONMENTAL SMART LOG 05157581 LOGS.GPJ TERRACON2012.GDT 2/4/16

WELL LOG NO. MW-18

PROJECT: OPPD North Omaha Station

CLIENT: Omaha Public Power District

**SITE: 7475 Pershing Drive
Omaha, Nebraska**

GRAPHIC LOG	LOCATION - Latitude: 41.3333153° Longitude: -95.9525745°	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	SPT N-VALUE
	Surface Elev.: 1037.1 (Ft.) ELEVATION (Ft.)					
	DEPTH MATERIAL DESCRIPTION					
	LEAN CLAY (CL) , red to brown, with red mottles (<i>continued</i>)				16	N=5
					18	4-6-5-6 N=11
	becomes gray	30			14	3-3-3-3 N=6
					14	1-1-2-4 N=3
	becomes wet		▽		16	2-2-4-5 N=6
	becomes oxidized	35			18	1-1-3-5 N=4
	becomes gray with black mottles				24	2-4-4-5 N=8
	becomes gray, trace black & orange mottles	40			24	3-4-4-6 N=8
					20	2-3-3-4 N=6
	becomes gray with black mottles				20	2-4-5-5 N=9
		45			18	3-4-6-7 N=10
					18	7-7-6-7 N=13
	48.0 LEAN CLAY (CL) , gray, wet, trace fine sand 989.1	50			20	2-4-4-5 N=8

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Hammer Type: Automatic

Advancement Method:
Mud rotary / split spoon sample hole
Hollow stem auger, 8.25-inch diameter borehole

Notes:

Abandonment Method:
N/A-Well installed

See Appendices for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS
▽ 33 ft while drilling



Well Started: 12/1/2015

Well Completed: 12/1/2015

Drill Rig: 770

Driller: JM

Project No.: 05157581

Exhibit: --1

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ENVIRONMENTAL SMART LOG 05157581 LOGS.GPJ TERRACON2012.GDT 2/4/16

WELL LOG NO. MW-18

PROJECT: OPPD North Omaha Station

CLIENT: Omaha Public Power District

**SITE: 7475 Pershing Drive
Omaha, Nebraska**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ENVIRONMENTAL SMART LOG 05157581 LOGS.GPJ TERRACON2012.GDT 2/4/16

GRAPHIC LOG	LOCATION -		DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	SPT N-VALUE
	Latitude: 41.3333153° Longitude: -95.9525745°	Surface Elev.: 1037.1 (Ft.)					
		ELEVATION (Ft.)					
DEPTH	MATERIAL DESCRIPTION						
52.0	LEAN CLAY (CL) , gray, wet, trace fine sand (<i>continued</i>)	985.1				20	3-4-4-6 N=8
57.0	SANDY LEAN CLAY (CL) , trace organics, brown, moist becomes gray at 54.5 becomes dark brown at 55.5	980.1	55			18	5-7-8-11 N=15
58.0	LEAN CLAY (CL) , trace sand, trace organics, dark gray	979.1				24	2-8-7-10 N=15
59.0	FAT CLAY (CH) , gray	978.1				14	5-8-11-11 N=19
60.0	LEAN CLAY (CL) , gray	977.1				16	4-5-6-5 N=11
70.1	LEAN CLAY (CL) , trace sand, gray	967				20	1-3-3-5 N=6
71.0	LIMESTONE*	966.1				14	4-5-5-6 N=10
						14	4-6-7-11 N=13
						12	3-6-7-8 N=13
						15	2-8-10-15 N=18
						0	25-50/0"
Boring Terminated at 71 Feet							

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Hammer Type: Automatic

Advancement Method:
Mud rotary / split spoon sample hole
Hollow stem auger, 8.25-inch diameter borehole

Abandonment Method:
N/A-Well installed

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
▽ 33 ft while drilling



Well Started: 12/1/2015

Well Completed: 12/1/2015

Drill Rig: 770

Driller: JM

Project No.: 05157581

Exhibit: --1

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Well Registration or Area Permit

Fee Paid: 0.00 HHSS Fee: 0.00
 DNR Cash Fund: 0.00 WWDF: 0.00
 Billing ID: 53643

Source:	<u>Nebraska On Line</u>	Import Status:	<u>Accepted</u>	Use:	<u>Monitoring (Ground Water Quality)</u>	Owner ID:	<u>49927</u>
Import ID:	<u>14550553852650</u>	Status:	<u>Active Registered Well</u>	Decommission Date:	<u>---</u>	Registration Number:	<u>G-178704B</u>
Well ID:	<u>241804</u>	NRD:	<u>Papio-Missouri River</u>	Registration Date:	<u>2/19/2016</u>	Last Change Date:	<u>2/19/2016</u>
Last Change User:	<u>hmcpherson</u>	Call Up Code:	<u>---</u>	Call Up Date:	<u>---</u>		

Owner:

ContactID	Type	SeqNum	Begin Date	End Date	Name
Display 49927	Owner	1	2/19/2016		Omaha Public Power District,

Contractor:

Certificate ID	FirstName	LastName
39570	Michael B	Reif

Drilling Firm:

EmployerID	Employer
159781	Terracon Consultants, Inc.

- A. Well Location: NW1/4NE1/4 of Section 28
 Township 16 North, Range 13 (East E/W), Douglas County
- B. Natural Resource District: Papio-Missouri River
 Latitude Longitude
 Well GPS Coordinates: 41° 19' 59.93" -095° 57' 09.27" GPS Required
 Lat/Long DD 41.33331 -95.95258
- C. The well is: --- feet from the --- Section line and --- feet from the --- section line.
- D. Street address or block, lot and subdivision: Addr/Sub Div 7475 Pershing Drive Block No --- Lot ---
- E. Location of water use, if applicable (give legal description): NWNE S28 T16 R13E
- G. Well reference letter(s) if applicable: MW-18

Well In A Series
 Well Part of a Series with Site Plan: Yes

Series	# of Wells Reg	Total # Wells	Acres	Acres Cert	NRD Appr	StartDate	EndDate	Comment	Series Reg Num (External Source)	Code	Description	Wells in the Series			
244878	3	4	No	No		12/1/2015			G-145159	DEQ	Part of a DEQ site plan for spill or underground storage	WellID	RegCD	StartDate	EndDate
												185656	G-	2/19/2016	
												241802	G-	1/20/2016	
												241804	G-	12/1/2015	
												241805		11/9/2015	

Permits

	Aprvd Date(s)	Aprvd Date(s)
Area Permit	<u>---</u>	<u>---</u>
GeoPermit	<u>---</u>	<u>---</u>
MWF	<u>---</u>	<u>---</u>
WSP	<u>---</u>	<u>---</u>
HHSS	<u>---</u>	<u>---</u>
HHSS PWS ID	<u>---</u>	<u>---</u>
NDEQ	<u>NE0054739</u>	

5. Purpose of Well Monitoring (Ground Water Quality)
 Other Use ---
 Notes ---

7. Replacement well information. Well Considered a replacement by NRD(WellID, RegCD)

- A. Is this well a Replacement well? No Repl No --- NRD Approval Date --- Well Replacement Reg CD ---
- B. Registration number of abandoned well: --- If not registered, date abandoned well was constructed ---
- C. Abandoned well last operated --- D. Replacement well is --- feet from abandoned well.
- E. Original well pump column size: --- inches.
- F. Original water well decommissioned ---
 I hereby certify that the original water well will be decommissioned within 180 days after such construction of the replacement water well.
 I hereby certify that the original water well will be modified and equipped to pump 50 gallons per minute or less within 180 days after such construction of the replacement water well.

- Livestock
- Monitoring
- Observation
- Nonconsumptive or de minimus use approved by the applicable natural resources district. ___
- Decommission/Modification certification form is submitted by landowner (Must be submitted before registering well)

G. Location of water use of original well: ___

Decommission Information

Decommission Date: ___ By

8. Pump Information.

- A. Is Pump installed at this time? No Pump present but Well Inactive: No
- Free Flowing Well: No Well active, no pump installed: Yes
- B. License No.
- C. Pumping Rate ___ gallons per minute. D. Pumping water level ___ feet.
- E. Drop pipe diameter ___ inches. F. Length of pipe ___ in feet.
- G. Pump equipment installed: ___ H. Pump Brand/Type ___
- I. Will this well be used to pump 50 gpm or less? Yes

9. Well Construction Information

- A. Total well depth: 70.8 feet. B. Static water level 33 feet.
- C. Well Construction began: 12/1/2015 D. Well Construction Completed: 12/1/2015
- E. Bore hole diameter in inches. Top 8.25 Bottom 8.25
- F. Casing and Screen Joints are: Threaded Other Joints description: ___
- H. Total Estimate Capacity of Well ___ gallons per minute. I. Pumping water level at capacity: ___ feet.

10. Well Construction (Casing & Screen) - c, d, e & f measurements should be in inches to three decimal places

Record Count = 2

WellID	FromDepth*	ToDepth*	Case/Screen	InsideDiam	OutsideDiam	CaseThickness	ScrnSlotSize	Material	ScreenName
241804	0	60.8	casing	2.07	2.38	0.154		PVC	EMI
241804	60.8	70.8	screen	2.07	2.38	0.154	0.01	PVC	EMI

* are in Feet, all else is in inches

11. Grout and Gravel Pack

Record Count = 6

WellID	FromDepth	ToDepth	Grout/Gravel	Material Description ¹	Quantity Gravel ²	Volume & Type Grout ³
241804	0	0.5	grout	Concrete and well vault		4.5 bags
241804	0.5	1.5	grout	Bentonite chips		0.5 bags
241804	1.5	52.8	grout	Bentonite cement grout		4 bent/8 portland
241804	52.8	54.8	gravel	#16-30 Silica sand	1 bag	
241804	54.8	59.8	grout	Bentonite pellets		2.5 buckets
241804	59.8	70.8	gravel	#16-30 Silica sand	7 bags	

* are in Feet, all else is in inches

¹Description of gravel pack, i.e. engineered gravel pack, or gravel pit description (1/4 down) or brand name (best sand) natural formation, drilling cuttings, soil backfill

²Quantity #cubic yards, #Tons, #Sacks - (for drilling cuttings and soil backfill estimate quantity) Calculation assistance available on web

³Volume & Type: #gallons of a slurry, #Barrels of a slurry, #sacks used in the slurry, #Bags of non-slurry bentonite (chip-pellet-granular)

12. Well Geologic Materials Logged

WellID	FromDepth*	ToDepth*	Type	Hardness	Color	Other/Drilling Action
241804	0	15	Other		Brown	Lean Clay
241804	15	19	Silt		Brown	
241804	19	52	Other		Brown	Lean Clay
241804	52	57	Other		Brown	Sandy Lean Clay
241804	57	58	Other		Brown	Lean Clay
241804	58	59	Other		Gray	Fat Clay
241804	59	70.1	Other		Gray	Lean Clay
241804	70.1	70.8	Limestone		Gray	

* are in Feet.

WELL LOG NO. MW-19

PROJECT: OPPD North Omaha Station

CLIENT: Omaha Public Power District

**SITE: 7475 Pershing Drive
Omaha, Nebraska**

GRAPHIC LOG	LOCATION - Latitude: 41.3314505° Longitude: -95.9521803°	INSTALLATION DETAILS Top Casing Elev: 1037.10 Well Completion: Surface Mount	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	SPT N-VALUE
DEPTH	MATERIAL DESCRIPTION	Surface Elev.: 1037.3 (Ft.) ELEVATION (Ft.)					
2.0	LEAN CLAY (CL) , brown, Grass at surface	1035.3				10	6-4-4-3 N=8
4.0	LEAN CLAY (CL) , light brown	1033.3				6	2-3-2-3 N=5
	LEAN CLAY (CL) , light brown, oxidized		5			17	2-3-4-5 N=7
			10			18	2-3-5-7 N=8
			15			15	4-7-9-9 N=16
			20			16	2-3-6-7 N=9
			20			20	4-6-7-6 N=13
			20			21	3-3-5-5 N=8
			20			22	2-3-4-4 N=7
			20			19	2-4-4-5 N=8
	no oxides		25			24	2-3-4-4

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Hammer Type: Automatic

Advancement Method:
Mud rotary / split spoon sample hole
Hollow stem auger, 8.25-inch diameter borehole

Abandonment Method:
N/A-Well installed

See Appendices for explanation of symbols and abbreviations.

Notes:
Soil descriptions are based on visual observations made by the field crew. Actual conditions may vary.

WATER LEVEL OBSERVATIONS
▽ 30 ft while drilling

15080 A Circle
Omaha, Nebraska

Well Started: 1/20/2016	Well Completed: 1/20/2016
Drill Rig: 770	Driller: JM
Project No.: 05157581	Exhibit: --2

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ENVIRONMENTAL SMART LOG 05157581 LOGS.GPJ TERRACON2012.GDT 2/4/16

WELL LOG NO. MW-19

PROJECT: OPPD North Omaha Station

CLIENT: Omaha Public Power District

**SITE: 7475 Pershing Drive
Omaha, Nebraska**

GRAPHIC LOG	LOCATION - Latitude: 41.3314505° Longitude: -95.9521803°	Surface Elev.: 1037.3 (Ft.) ELEVATION (Ft.)	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	SPT N-VALUE
DEPTH	MATERIAL DESCRIPTION						
41.0	LEAN CLAY (CL) , light brown, oxidized (continued) becomes moist	996.3	30	▽	X	24	N=7
			35		X	24	2-2-3-2 N=5
			40		X	24	1-1-2-3 N=3
			45		X	24	2-3-3-3 N=6
			50		X	24	1-3-3-3 N=6
					X	24	3-3-4-5 N=7
					X	24	2-3-3-3 N=6
					X	24	3-3-4-3 N=7
					X	18	2-3-2-3 N=5
					X	12	3-4-9-4 N=13
					X	12	3-9-5-4 N=14
					X	12	3-4-5-7 N=9

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Hammer Type: Automatic

Advancement Method:
Mud rotary / split spoon sample hole
Hollow stem auger, 8.25-inch diameter borehole

Notes:

Abandonment Method:
N/A-Well installed

See Appendices for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS
▽ 30 ft while drilling



Well Started: 1/20/2016

Well Completed: 1/20/2016

Drill Rig: 770

Driller: JM

Project No.: 05157581

Exhibit: --2

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ENVIRONMENTAL SMART LOG 05157581 LOGS.GPJ TERRACON2012.GDT 2/4/16

WELL LOG NO. MW-19

PROJECT: OPPD North Omaha Station

CLIENT: Omaha Public Power District

SITE: 7475 Pershing Drive
Omaha, Nebraska

GRAPHIC LOG	LOCATION - Latitude: 41.3314505° Longitude: -95.9521803°		DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	SPT N-VALUE
DEPTH	MATERIAL DESCRIPTION	Surface Elev.: 1037.3 (Ft.) ELEVATION (Ft.)					
54.0	LEAN CLAY (CL) , gray (continued)	983.3				18	3-5-5-7 N=10
						12	3-4-6-7 N=10
	LEAN CLAY (CL) , brown, iron staining		55			24	3-5-5-7 N=10
						18	4-4-7-8 N=11
60.0		977.3				24	4-4-6-7 N=10
	LEAN CLAY (CL) , gray		60			24	2-4-6-5 N=10
						24	3-4-5-5 N=9
64.0		973.3				24	3-6-5-6 N=11
	LEAN CLAY (CL) , brown		65			24	3-6-5-6 N=11
66.0		971.3				17	2-5-6-6 N=11
	LEAN CLAY (CL) , dark brown, trace shells					24	3-3-3-4 N=6
68.0		969.3					
	SILTY CLAY (CL) , gray		70				
71.0		966.3					
	SILTY CLAY (CL) , gray, and limestone gravel						3-14-26-24 N=40
73.0		964.3				18	18-26-6-7 N=32
	LEAN CLAY (CL) , trace sand, gray, (glacial till)		75			16	3-6-7-8

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Hammer Type: Automatic

Advancement Method:
Mud rotary / split spoon sample hole
Hollow stem auger, 8.25-inch diameter borehole

Abandonment Method:
N/A-Well installed

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ 30 ft while drilling



Well Started: 1/20/2016

Well Completed: 1/20/2016

Drill Rig: 770

Driller: JM

Project No.: 05157581

Exhibit: --2

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ENVIRONMENTAL SMART LOG 05157581 LOGS.GPJ TERRACON2012.GDT 2/4/16

WELL LOG NO. MW-19

PROJECT: OPPD North Omaha Station

CLIENT: Omaha Public Power District

**SITE: 7475 Pershing Drive
Omaha, Nebraska**

GRAPHIC LOG	LOCATION -		DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	SPT N-VALUE
	Latitude: 41.3314505° Longitude: -95.9521803°						
		Surface Elev.: 1037.3 (Ft.)					
		ELEVATION (Ft.)					
	LEAN CLAY (CL) , trace sand, gray, (glacial till) (<i>continued</i>)	slot			X	16	N=13
	76.0	961.3					
	FAT CLAY (CH) , with limestone, gray, (weathered limestone)				X		
	76.9	960.4					
	LIMESTONE*	960.3			X	12	6-10-30-38 N=40
	77.0	960.3					
	Boring Terminated at 77 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Hammer Type: Automatic

Advancement Method:
Mud rotary / split spoon sample hole
Hollow stem auger, 8.25-inch diameter borehole

Abandonment Method:
N/A-Well installed

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
▽ 30 ft while drilling



Well Started: 1/20/2016

Well Completed: 1/20/2016

Drill Rig: 770

Driller: JM

Project No.: 05157581

Exhibit: --2

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ENVIRONMENTAL SMART LOG 05157581 LOGS.GPJ TERRACON2012.GDT 2/4/16

Well Registration or Area Permit

Fee Paid: \$130.00 HHSS Fee: \$90.00
 DNR Cash Fund: \$18.50 WWDF: 21.50
 Billing ID: 53643

Source: <u>Nebraska On Line</u>	Import Status: <u>Accepted</u>	Use: <u>Monitoring (Ground Water Quality)</u>	Owner ID: <u>49927</u>
Import ID: <u>145505413029741</u>	Status: <u>Active Registered Well</u>	Decommission Date: <u>—</u>	Registration Number: <u>G-178704A</u>
Well ID: <u>241802</u>	NRD: <u>Papio-Missouri River</u>	Registration Date: <u>2/19/2016</u>	
Last Change User: <u>hmcpherson</u>	Call Up Code: <u>—</u>	Call Up Date: <u>—</u>	Last Change Date: <u>2/19/2016</u>

Owner:

Contact ID	Type	SeqNum	Begin Date	End Date	Name
Display 49927	Owner	1	2/19/2016		Omaha Public Power District,

Contractor:

Certificate ID	FirstName	LastName
39570	Michael B	Reif

Drilling Firm:

EmployerID	Employer
159781	Terracon Consultants, Inc.

- A. Well Location: SW1/4NE1/4 of Section 28
 Township 16 North, Range 13 (East E/W), Douglas County
- B. Natural Resource District: Papio-Missouri River
- Well GPS Coordinates: Latitude 41° 19' 53.22" Longitude -095° 57' 07.85"
 Lat/Long DD 41.33145 -95.95218 GPS Required
- C. The well is: — feet from the — Section line and — feet from the — section line.
- D. Street address or block, lot and subdivision: Addr/Sub Div 7475 Pershing Drive Block No — Lot —
- E. Location of water use, if applicable (give legal description): SWNE S28 T16 R13E
- G. Well reference letter(s) if applicable: MW-19

Well In A Series

Well Part of a Series with Site Plan: Yes

Series	# of Wells Reg	Total # Wells	Acres	Acres Cert	NRD Appr	StartDate	EndDate	Comment	Series Reg Num (External Source)	Code	Description	Wells in the Series			
244878	3	4	No	No		1/20/2016			G-145159	DEQ	Part of a DEQ site plan for spill or underground storage	WellID	RegCD	StartDate	EndDate
												185656	G-	2/19/2016	
												241802	G-	1/20/2016	
												178704A			
												241804		12/1/2015	
												241805		11/9/2015	

Permits

	Aprvd Date(s)	Aprvd Date(s)
Area Permit	— —	SWater App Code
GeoPermit	— —	Industrial
MWF	— —	Transfer
WSP	— —	Swater Conduct Code
HHSS	—	Other
HHSS PWS ID	—	ITN
NDEQ	<u>NE0054739</u>	

5. Purpose of Well Monitoring (Ground Water Quality)

Other Use —
 Notes —

7. Replacement well information.

Well Considered a replacement by NRD(WellID, RegCD)

- A. Is this well a Replacement well? No Repl No — NRD Approval Date — Well Replacement Reg CD —
- B. Registration number of abandoned well: — If not registered, date abandoned well was constructed —
- C. Abandoned well last operated — D. Replacement well is — feet from abandoned well.
- E. Original well pump column size: — inches.
- F. Original water well decommissioned —
 I hereby certify that the original water well will be decommissioned within 180 days after such construction of the replacement water well.
 I hereby certify that the original water well will be modified and equipped to pump 50 gallons per minute or less within 180 days after such construction of the replacement water well.
 Livestock

- Monitoring
- Observation
- Nonconsumptive or de minimus use approved by the applicable natural resources district. ___
- Decommission/Modification certification form is submitted by landowner (Must be submitted before registering well)

G. Location of water use of original well: ___

Decommission Information

Decommission Date: ___ By

8. Pump Information.

- A. Is Pump installed at this time? No Pump present but Well Inactive: No
- Free Flowing Well: No Well active, no pump installed: Yes
- B. License No.
- C. Pumping Rate ___ gallons per minute. D. Pumping water level ___ feet.
- E. Drop pipe diameter ___ inches. F. Length of pipe ___ in feet.
- G. Pump equipment installed: ___ H. Pump Brand/Type ___
- I. Will this well be used to pump 50 gpm or less? Yes

9. Well Construction Information

- A. Total well depth: 76.5 feet. B. Static water level 30 feet.
- C. Well Construction began: 1/20/2016 D. Well Construction Completed: 1/20/2016
- E. Bore hole diameter in inches. Top 8.25 Bottom 8.25
- F. Casing and Screen Joints are: Threaded Other Joints description: ___
- H. Total Estimate Capacity of Well ___ gallons per minute. I. Pumping water level at capacity: ___ feet.

10. Well Construction (Casing & Screen) - c, d, e & f measurements should be in inches to three decimal places

Record Count = 2

WellID	FromDepth*	ToDepth*	Case/Screen	InsideDiam	OutsideDiam	CaseThickness	ScrnSlotSize	Material	ScreenTname
241802	0	66.5	casing	2.07	2.38	0.154		PVC	EMI
241802	66.5	76.5	screen	2.07	2.38	0.154	0.01	PVC	EMI

* are in Feet, all else is in inches

11. Grout and Gravel Pack

Record Count = 5

WellID	FromDepth	ToDepth	Grout/Gravel	Material Description ¹	Quantity Gravel ²	Volume & Type Grout ³
241802	0	0.5	grout	Concrete and well vault		4.5 bags
241802	0.5	58.5	grout	Bentonite cement grout		6 bent/12port
241802	58.5	60.5	gravel	#16-30 Silica sand	1 bags	
241802	60.5	65.5	grout	Bentonite pellets		2.5 buckets
241802	65.5	76.5	gravel	#16-30 Silica sand	7 bag	

* are in Feet, all else is in inches

¹Description of gravel pack, i.e. engineered gravel pack, or gravel pit description (1/4 down) or brand name (best sand) natural formation, drilling cuttings, soil backfill

²Quantity #cubic yards, #Tons, #Sacks - (for drilling cuttings and soil backfill estimate quantity) Calculation assistance available on web

³Volume & Type: #gallons of a slurry, #Barrels of a slurry, #sacks used in the slurry, #Bags of non-slurry bentonite (chip-pellet-granular)

12. Well Geologic Materials Logged

WellID	FromDepth*	ToDepth*	Type	Hardness	Color	Other/Drilling Action
241802	0	68	Other		Gray	Lean Clay
241802	68	73	Other		Gray	Silty Clay
241802	73	76.5	Other		Gray	Fat Clay

* are in Feet.