Groundwater Monitoring System Certification

R.M. Heskett Station

Prepared for
Montana-Dakota Utilities Co.

October 2017

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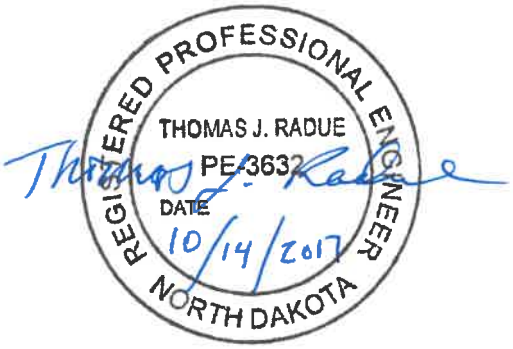
Certifications

I hereby certify that I have examined the facility and, being familiar with the provisions of 40 CFR 257 Subpart D, attest that the CCR Groundwater Monitoring Network has been designed in accordance with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR §257.91(f). I certify that the plan is adequate for this facility and that procedures for recordkeeping and reporting have been established. I further certify that I am a duly Licensed Professional Engineer under the laws of the state of North Dakota.

Thomas J. Radue, P.E.
PE #: 3632



Revision	Date	Summary of Revisions
0	October 14, 2017	Initial Issue for Groundwater Monitoring System Certification

1.0 Introduction

This report was prepared by Barr Engineering Co. (Barr) for Montana-Dakota Utilities Co. (MDU) to certify the groundwater monitoring network at R.M. Heskett Station (Site) located in Mandan, North Dakota. The purpose of the groundwater monitoring network is to comply with the federal Coal Combustion Residuals (CCR) Rule (40 CFR Part 257), which went into effect on October 19, 2015.

Section 257.91 of the CCR Rule outlines the requirements of the groundwater monitoring system, including performance standards. This Certification is intended to support that the groundwater monitoring system installed at the Site is in compliance with the Rule.

1.1 System Certification Requirement Summary

The table below is a detailed discussion of the system certification requirements outlined in §257.91 of the CCR Rule and this Site's compliance with the rule.

Table 1. CCR Rule Requirements and Compliance

CCR Rule Requirements (§257.91)	Compliance with CCR Rule
(a) Performance Standard: 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 uppermost aquifer" that: (1) Accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where: a. Hydrogeologic conditions do not allow the owner or operator of the CCR Unit to determine what wells are hydraulically upgradient; or b. Sampling at other wells will provide an indication of background groundwater quality that is representative or more representative than that provided by the upgradient wells; and (2) Accurately represent the quality of groundwater passing the waste boundary of the CCR unit. The downgradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer. All potential contamination must be monitored.	Yes, see Section 3.0 (Monitoring Wells) of this Certification.
(b) Well Spacing and Site Specific Information: The number, spacing, and depths of monitoring systems shall be determined based upon site-specific technical information that must include thorough characterization of: (1) Aquifer thickness, groundwater flow rate, seasonal and temporal fluctuations in groundwater flow; and (2) Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost	Yes, see Section 2.0 (Site Setting) and Section 3.0 (Monitoring Wells) of this Certification.

CCR Rule Requirements (§257.91)	Compliance with CCR Rule
aquifer, including, but not limited to, thickness, stratigraphy, lithology, hydraulic conductivities, porosities, and effective porosities.	
(c) Number of Monitoring Wells: The groundwater monitoring system must include the minimum number of monitoring wells necessary to meet the performance standards specified in paragraph (a) of this section, based on the site-specific information specified in paragraph (b) of this section. The groundwater monitoring system must contain: (1) A minimum of one upgradient and three downgradient monitoring wells; and (2) Additional monitoring wells are necessary to accurately represent the quality of background groundwater that has not been affected by leakage from the CCR unit and the quality of groundwater passing the waste boundary of the CCR unit.	Yes, see Section 3.0 (Monitoring Wells) of this Certification.
(d) Multiunit Groundwater Systems: The owner or operator of multiple CCR units may install a multiunit groundwater monitoring system instead of separate groundwater monitoring systems for each CCR unit.	This Site does not contain multiple CCR units and therefore the system does not need to meet the requirements of this paragraph.
(e) Monitoring Well Construction: Monitoring wells must be cased in a manner that maintains the integrity of the monitoring well borehole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of groundwater samples. The annular space (i.e. the space between the borehole and well casing) above the sampling depth must be sealed to prevent contaminating of samples and the groundwater. (1) The owner or operator of the CCR unit must document and include in the operating record the design, installation, development, and decommissioning of any monitoring wells, piezometers, and other measurements, sampling, and analytical devices. The qualified professional engineer must be given access to this documentation when completing the groundwater monitoring system certification required under paragraph (f) of this section. (2) The monitoring wells, piezometers, and other measurements, sampling, and analytical devices must be operated and maintained so that they perform to the design specifications throughout the life of the monitoring program.	Yes, see Section 3.0 (Monitoring Wells) of this Certification. Supporting documentation in Section 3.0 of the Groundwater Monitoring System Documentation (Barr, 2017).
(f) Certification: The owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section. If the groundwater monitoring system includes the minimum number of monitoring wells specified in paragraph (c)(1) of this section, the certification must document the basis supporting this determination.	Yes, see Section 4.0 (System Certification) and Certifications page.

2.0 Site Setting

R.M. Heskett Station is a 100-megawatt coal-fired electric generating station with an 88-megawatt gas-fired turbine, both located along the west bank of the Missouri River in Mandan, North Dakota. The Site features a landfill that is considered an "existing CCR landfill" as defined by 40 CFR 257.53.

2.1 Site Geology

Lithologic logs for the Site completed as part of the permitting process indicated that the uppermost 100 feet of the subsurface materials lie within the Cannonball Formation (MDU, 1989). The dominant lithology observed at the Site is unconsolidated silt in a clay matrix with interspersed fine to medium-grained sand. Thin sand lenses with limited extent have also been observed. Small gypsum crystals occur throughout approximately the upper 30 feet of the surface soils which have been presumed to be the result of diagenetic processes which occur above the water table during alternating wetting and drying cycles (Groenewold et al, 1983).

2.2 Site Hydrogeology

Groundwater is generally found at 10.5 to 40 feet below ground surface (bgs) depending on surface elevation, with estimated groundwater elevations ranging from 1,665 to 1,695 feet above mean sea level (MSL) within the Cannonball Formation. Groundwater flow is generally from southwest to northeast toward the Missouri River. Groundwater enters the flow system from infiltration in upland areas to the west and/or from Rock Haven Creek and flows under the Site and discharges to Rock Haven Creek, downgradient of the Site, which ultimately discharges into the Missouri River. Additionally, the lack of saturated thickness in the Cannonball Formation indicates there is no demonstrated need for monitoring deeper portions of the unit.

3.0 Monitoring Wells

The previous monitoring network, as required by the state of North Dakota and in accordance with MDUs Waste Disposal Permit SP-087, included wells screened in the uppermost saturated unit below the base of the landfill which is the target of detection monitoring at the Site. Five additional monitoring wells (MW-101 through MW-105) were installed with screens in the uppermost aquifer (Cannonball Formation). They were strategically placed to improve upon the already existing monitoring network as well as reduce the spacing between the wells to approximately 500 feet or less, which is established industry practice in North Dakota and suggested in the EPA CCR Rule preamble.

3.1 Monitoring System

The monitoring well system around the CCR unit consists of six upgradient wells (MW-13, MW-33, MW-70, MW-101, MW-102, and MW-103), one cross-gradient well (MW-44R), and five downgradient wells (MW-80R, MW-2-90, MW-3-90, MW-104, and MW-105). The upgradient monitoring wells are hydraulically upgradient of the CCR unit and accurately represent background groundwater quality. The downgradient monitoring wells are located hydraulically downgradient of the CCR unit and are along the waste boundary. All monitoring wells are spaced approximately 500 feet (or less) apart.

The number, spacing, and hydraulic positions of the monitoring wells comply with requirements outlined in §257.91 (a)-(c) of the CCR Rule.

3.2 Monitoring Well Construction and Performance

Based on our understanding of the Site geology, all of the monitoring wells at the Site are screened within the uppermost aquifer. Additionally, they were constructed in a manner which complies with CCR Rule §257.91 (e). All the monitoring wells on the Site were developed (new) or redeveloped (old) to improve clarity of the water and reduce suspended solids prior to initial baseline sampling. Supporting documentation is provided in Section 3.0 of the Groundwater Monitoring System Documentation (Barr, 2017).

4.0 System Certification

The improved network is adequate and conforms to the system certification requirements outlined in §257.91 of the CCR Rule. A professionally licensed engineer has certified this network (see Certification page).

5.0 References

Barr Engineering Co., 2017, Groundwater Monitoring System Documentation, Prepared for Montana-Dakota Utilities Co., October 2017.

Groenewold, G.H., Koob, G.J., McCarthy, B.W., and Peterson, W.M., 1983, Geologic and Geochemical Controls on the Chemical Evolution of Subsurface Water in Undisturbed and Surface-Mined Landscapes on Western North Dakota, North Dakota Geological Survey Report of Investigation 79, 151 p.

Montana-Dakota Utilities Co., 1989, R.M Heskett Station, Special Use Disposal Site, Permit Application, dated March 1.