REPORT

COAL COMBUSTION RESIDUALS LANDFILL GROUNDWATER MONITORING SYSTEM CERTIFICATION

Gerald Gentleman Station

Sutherland, Nebraska

Submitted To: Nebraska Public Power District
Gerald Gentleman Station
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Golder Associates

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1.0 INTRODUCTION

Golder Associates Inc. (Golder) has prepared this report to certify that the groundwater monitoring system that has been designed and constructed for the active coal combustion residuals (CCR) landfill at Gerald Gentleman Station (GGS), which is owned and operated by Nebraska Public Power District (NPPD), meets the requirements of 40 CFR 257.91.

2.0 FACILITY INFORMATION

Gerald Gentleman Station is located approximately 5 miles south of Sutherland, Nebraska, and 1.2 miles south of Sutherland Reservoir. The ash pits at GGS are situated in the NW ¼, NE ½, Section 30 of Township 13N, Range 33W, in Lincoln County, Nebraska. Nebraska Public Power District began operating GGS in 1979 as a coal-fired electrical generation facility. Gerald Gentleman Station is both owned and operated by NPPD. The plant, which is capable of generating 1,365 MW of power, uses a low-sulfur coal from Wyoming's Powder River Basin. The active CCR landfill at the site contains fly ash and bottom ash.

2.1 Geology and Hydrogeology

Boreholes near the ash landfill indicate a geologic sequence from top to bottom as follows:

- 4 to 5 feet of topsoil and/or fill;
- 20 to 35 feet of eolian silty sands;
- 8 to 10 feet of silty clay paleosol at the top of the Ogallala Formation;
- 25 to 35 feet of Ogallala Formation silts; and
- Approximately 50 feet of Ogallala Formation sands or Ogallala Formation silts and clays (to the bottom of the boreholes).

The uppermost aquifer is contained in the lower Ogallala Formation. The groundwater flow direction in the vicinity of the CCR landfill is generally from north to south, as indicated by static water levels in the monitoring wells.

3.0 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring system for the active CCR landfill at GGS consists of 14 monitoring wells, as shown on Figure 1. The four upgradient monitoring wells are APMW-5, APMW-15, APMW-16, and APMW-17. The ten downgradient monitoring wells are APMW-4, APMW-6, APMW-8a, APMW-10, APMW-11, APMW-12, APMW-13, APMW-14, APMW-18, and APMW-19.

3.1 Information Reviewed

Golder reviewed information from the operating record documenting the design, installation, and development of the monitoring wells to help assess the adequacy of the groundwater monitoring system. The information reviewed included:

Golder, 2004. *Hydrogeologic Characterization Report for Gerald Gentleman Station*. Golder Associates Inc., October 15, 2004.

Golder, 2004a. *Locational Criteria Documentation for Gerald Gentleman Station*. Golder Associates Inc., October 15, 2004.

NDNR, 2017. *Well Registration Records*, Nebraska Department of Natural Resources. www.dnr.nebraska.gov. Accessed August, 2017.

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 groundwater monitoring well system must yield sufficient groundwater samples from the uppermost aquifer to accurately represent background water quality
- The groundwater monitoring system must yield sufficient groundwater samples from the uppermost aquifer to accurately represent the quality of groundwater passing the waste boundary
- The number, spacing, and depths of monitoring wells must be based on characterization of the uppermost aquifer and overlying materials
- The groundwater monitoring system must include at least one upgradient monitoring well and at least three downgradient monitoring wells

Four upgradient monitoring wells are included in the groundwater monitoring system to appropriately represent the background water quality, including potential variability. Ten downgradient wells were installed along the western, southern, and eastern boundaries of the active CCR landfill, based on the groundwater flow direction (generally from north to south), to enable detection of impacts to groundwater from the active CCR landfill and represent the quality of groundwater passing the waste boundary. The number and spacing of downgradient monitoring wells were selected based on the hydrogeologic conditions at the site, the aerial extent of the active CCR landfill, and possible minor easterly or westerly components to the groundwater flow direction, such that impacts to groundwater quality in the uppermost aquifer can be

detected along potential flow pathways if they occur. The depths of the monitoring wells were selected such that the monitoring wells are screened in the Ogallala Formation to yield groundwater samples that are representative of water quality in the uppermost aquifer.

3.3 Monitoring Well Casing

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

- Monitoring wells must be cased to maintain borehole integrity
- The casing must be screened or perforated and packed with sand or gravel to enable collection of groundwater samples
- The annular space above the sampling depth must be sealed to prevent impacts to groundwater

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

4.0 CERTIFICATION

Based upon the review described in this report, the undersigned Professional Engineer registered in Nebraska certifies that the groundwater monitoring system for the active CCR landfill at GGS has been designed and constructed to meet the requirements of 40 CFR 257.91.

FIGURE

Golder Associates

NEBRASKA PUBLIC POWER DISTRICT
GERALD GENTLEMAN STATION
GROUNDWATER MONITORING WELL NETWORK

FIGURE 1

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

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