



Location Restriction Demonstration

R.M. Heskett Station Coal Ash Landfill

Prepared for
Montana-Dakota Utilities Company

October 2018

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Certification

I hereby certify that I, or my agent, have examined the facility and, being familiar with the provisions of 40 CFR 257 Subpart D, attest that the following demonstration for this Coal Combustion Residuals landfill is in accordance with good engineering practice, including consideration of applicable industry standards. I certify that the following demonstration meets the requirements of 40 CFR 257.64 for this facility.



Seth W. Hueckman
Barr Engineering Co.
ND Registration Number PE-10057

Dated this 11th day of October, 2018

1.0 Introduction

Montana-Dakota Utilities Co. (MDU) operates the R.M. Heskett Station (Heskett), in Mandan, North Dakota. MDU operates two coal-fired boilers at Heskett, resulting in production of coal combustion residuals (CCR). CCR management is subject to Federal Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments per 40 CFR 257 Subpart D (CCR Rule). MDU currently hauls dry CCR material from the Heskett plant to the on-site landfill. The landfill currently operates under North Dakota Department of Health (NDDH) solid waste management facility Permit SP-087.

The CCR location restriction demonstration in this report has been developed to satisfy the requirements of 40 CFR §257.64, as they apply to MDU's Heskett landfill.

2.0 §257.64 Unstable Areas

As stated in 40 CFR §257.64:

An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

- (1) On-site or local soil conditions that may result in significant differential settling;*
- (2) On-site or local geologic or geomorphologic features; and*
- (3) On-site or local human-made features or events (both surface and subsurface).*

2.1 Demonstration

- (1) On-site or local soil conditions that may result in significant differential settling*

A review of lithologic logs (Terracon, 2015) from five monitoring wells, installed in 2015 and surrounding the Heskett landfill, revealed fairly homogeneous soil conditions throughout the Site. Soils were predominately sandy lean clays and sand with gravel underlain by fat clays. The 2015 logs depict subsurface conditions like those found in the historic lithologic logs assembled by North Central Consultants, Ltd. for the 1989 facility permitting (Montana-Dakota Utilities Co., 1989).

The predominant soils on site, consisting of sandy lean clays, which tend to be moderately compressible when compacted, include occasional zones of what are characterized as fat clays, which can be moderately to highly compressible, depending on past geologic conditions. The historic reports site evidence of past glaciation above the fat clays, which tend to diminish the compressibility of the fat clay layer. Due to the homogenous distribution of the soils throughout the landfill area, evidence of past glaciation, the methods used for facility construction including compaction of soils during construction, and due to the relatively slow rate of ash placement and overall grade change, the local soil conditions are not expected to result in significant differential settling, and such settling has not been observed. Final cover segments placed to date do not show evidence of significant differential settlement or associated cracking of cover soils.

The perimeter landfill embankments were constructed from material removed from on-site excavations made during the grading of the base of each slot. The controlled fill utilized for embankment construction was placed in thin lifts and compacted. Soils containing highly compressive organic materials were not used as controlled fill. As such, the perimeter embankment fill is not expected to result in significant differential settling and significant settling has not occurred.

(2) On-site or local geologic or geomorphologic features

The landfill is located within the Cannonball Formation (North Dakota Geological Survey, 2001). No known features that would contribute to the area being geologically unstable is associated with the formation. Some areas in North Dakota are at risk for landslides due to local geologic conditions; however, this risk is not generally associated with the Cannonball Formation. A review of a 1979 United States Geological Survey (USGS) Circular (Trimble, 1979) verified that the landfill is not located in a landslide risk area. A USGS map of known Karst in the United States (Weary and Doctor, 2014) was also reviewed and this indicated that no known Karst features are located near the Site.

Based on a review of the geologic formations in the landfill area as well as available public documents, no local geologic or geomorphologic features that would contribute to instability are located in the landfill area.

(3) On-site or local human-made features or events (both surface and subsurface)

Slope stability calculations were completed as part of a 2011 Application for Permit Renewal for NDDH solid waste management facility Permit SP-087 (Barr, 2011). The calculations indicated a factor of safety for the final build-out slopes of 2.4, above a generally acceptable limit of 1.5. This indicates that the final landfill slopes should be stable.

Surface water runoff around the facility is well controlled. Natural and human-made swales and ditches, grassed areas, and natural wooded areas effectively temper and control surface water runoff. Uncontrolled runoff and erosion that could result are therefore absent at this facility.

A subsurface leachate collection system consisting of 8-inch diameter perforated piping that gravity feed to a nearby evaporation pond exists beneath the landfill. The pipes were installed in a coarse aggregate drainage trench which prevents settling and crushing of the piping over time. The leachate collection system is of small diameter and was constructed in a manner that it will not create unstable conditions within the landfill. No other on-site or local human-made features or events are known to exist in the area.

Based on a review of on-site soil conditions, local geologic or geomorphologic feature, and on-site human-made features or events, the landfill is not located in an unstable area and meets the requirements of 40 CFR §257.64.

3.0 References

- Barr, 2011, Montana-Dakota Utilities Co. Heskett Station Special Waste Landfill Application for Permit Renewal Permit No. SP-087: Appendix D-Geotechnical Calculations. Mandan, North Dakota. Prepared by Barr Engineering Co. for Montana Dakota Utilities Co., July 23, 2010 w/Revisions through May 23, 2011.
- Montana-Dakota Utilities Co., 1989, R.M. Heskett Station Special Use Disposal Site Permit Application. Prepared by Montana-Dakota Utilities Co., March 1, 1989.
- North Dakota Geological Survey, 2001, Geologic Bedrock Map of North Dakota based on Bluemle, John P., 1983, Geologic and Topographic Bedrock Map of North Dakota, NDGS Miscellaneous Map 25, 1:670,000 scale.
- Terracon, 2015, Monitoring Well Reports, MDU-Heskett Station. Mandan, North Dakota. Prepared by Terracon Consultants, Inc. for Montana Dakota Utilities Co., September 9, 2015.
- Trimble, 1979, Unstable Ground in Western North Dakota Geological Survey Circular 798 by Donald E. Trimble, 1979.
- Weary and Doctor, 2014, Karst in the United States: A digital map compilation and database: U.S. Geological Survey Open-File Report 2014-1156, 23 p., <http://dx.doi.org/10.3133/ofr20141156>.