Unstable Areas Determination

Lewis & Clark Station

Prepared for
Montana-Dakota Utilities Co.

October 2018

4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
952.832.2600
www.barr.com

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Contents

1.0 Introduction 1

2.0 Demonstration 2

2.1 Response to Criteria 2

3.0 References 4

List of Figures

Figure 1 Surficial Geology

Certifications

I hereby certify that this Unstable Areas Determination report for the Lewis & Clark Station meets the requirements of the Coal Combustion Residuals Rule 40 CFR 257 Subpart D, and the requirements of 40 CFR §257.64.

Paul T. Swenson
Barr Engineering Co.
MT Registration Number 12805PE

Dated this 15th day of October 2018

1.0 Introduction

Montana-Dakota Utilities Co. (MDU) operates the Lewis & Clark Station (Lewis & Clark), a coal-fired steam-electric generating plant, near Sidney, Montana, to produce electrical energy. Coal combustion residuals (CCR) is a by-product of plant operation. Management of CCR produced by electric utilities is subject to the requirements of 40 CFR 257 Subpart D, Disposal of Coal Combustion Residuals From Electric Utilities (CCR Rule).

The Scrubber Ponds, a single, multi-unit CCR unit, at Lewis & Clark, is an existing CCR surface impoundment (40 CFR §257.53) that receives sluiced flue-gas desulfurization sludge and fly ash material. This CCR unstable areas determination report has been developed to satisfy the requirements of 40 CFR §257.64 as they apply to the Scrubber Ponds.

2.0 Demonstration

As required by 40 CFR §257.64, existing CCR surface impoundments must not be located in an unstable area unless the owner or operator demonstrates 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 the following three 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 Response to Criteria

This section provides a response to each of the criteria established in the CCR Rule.

1. On-site or local soil conditions that may result in significant differential settling

As shown on Figure 1, surficial geological materials identified by the Montana Bureau of Mines and Geology (MBMG) in the vicinity of the Scrubber Ponds include Quaternary (most recent geological period) deposited alluvium and gravel. Figure 1 also shows the Yellowstone River is bounded locally by the Fort Union Formation in the northwest and southeast.

The *Lewis & Clark Station Groundwater Characterization and Monitoring* (Barr, 2015) memorandum provides a comprehensive review of the geology in the vicinity of the Scrubber Ponds. Soil samples collected at depth from a pilot boring drilled within about 50 feet of the Scrubber Ponds identified alluvium and coarse deposits overlying the Fort Union Formation (Barr, 2015). The local surficial geology shown on Figure 1 is consistent with the on-site geological units encountered.

The local soil conditions at the Scrubber Ponds exhibit characteristics of stable soils with little risk of significant differential settling.

2. On-site or local geologic or geomorphologic features

As mentioned above, a pilot boring drilled within about 50 feet of the Scrubber Ponds identified alluvium and coarse deposits overlying the Fort Union Formation (Barr, 2015), which exhibit stable, firm soil characteristics. No known features that would contribute to the area being geologically unstable is associated with the geological media. A review of Landslide Overview Map of the Conterminous United States (USGS, 1920) identified that areas of moderate and high incidence of landslides in Eastern Montana are confined mostly to the valley walls of rivers and tributaries and when slopes are steepened by man or nature. The Scrubber Ponds are more than 325 feet from the Yellowstone River. Steepened topographic features were not identified along the riverbank.

A USGS map of known karst in the United States (Weary and Doctor, 2014) was reviewed and this indicated that no known karst features are located at the Scrubber Ponds.

Based on a review of the geologic formations in the landfill area as well as available public documents, the local geologic and geomorphologic features exhibit stable characteristics that would not result in instability at the Scrubber Ponds.

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

Berms and other features around the Scrubber Ponds were designed to provide stable conditions. Erosion control rock is present on the outer slopes of the Scrubber Ponds berms. Interior slopes are protected by coarse buffer materials placed to protect the liner of the ponds.

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 buffer of approximately 150 feet exists between the Scrubber Ponds and other plant operations, so plant operations will not affect stability of the Scrubber Ponds.

No other on-site or local human-made features or events are known to exist in the area.

In summary, the three factors listed above that may contribute to unstable areas were not identified at the Scrubber Ponds. Based on this review, the location of the existing CCR surface impoundment conforms to the location restriction of §257.64.

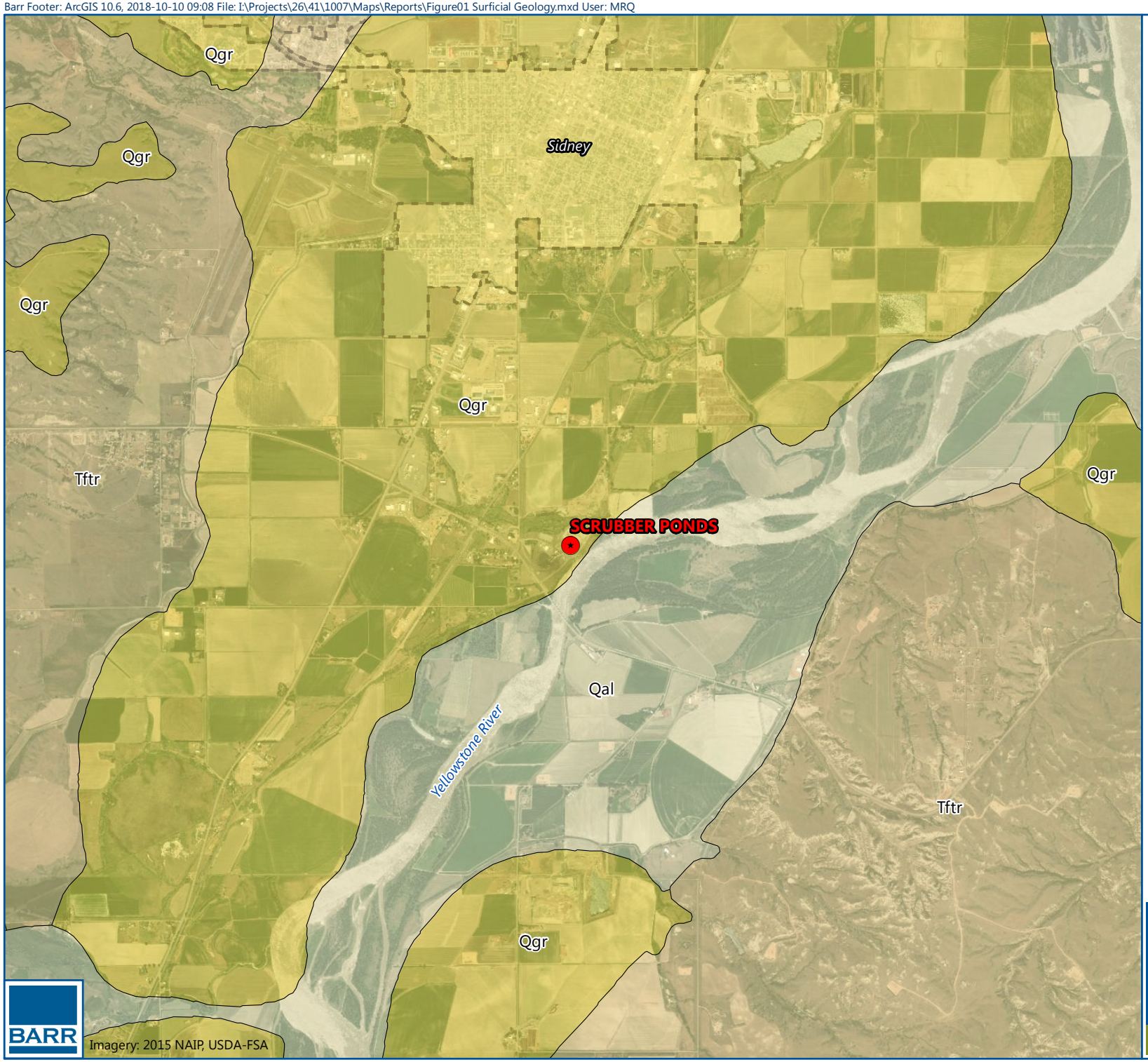
3.0 References

Barr, 2015. Lewis & Clark Station Groundwater Characterization and Monitoring: Task 2. Sidney, Montana. Prepared by Barr Engineering Co. for Montana Dakota Utilities Co., February 4, 2015.

USGS, 1920. Landslide Overview Map of the Conterminous United States. https://pubs.usgs.gov/pp/p1183/pp1183.html#upperm

Vuke, S.M., Porter, K.W., Lonn, J.D., and Lopez, D.A., 2007. Geologic Map of Montana (matte paper): Montana Bureau of Mines and Geology Geologic Map 62-B, 73 p., 2 sheets, scale 1:500,000.

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.



Scrubber Ponds

Geology Unit

Qal - Alluvium

Qgr - Gravel

Tftr - Tongue River Member of Fort Union Formation

Geology data received from Montana Bureau of Mines and Geology

Vuke, S.M., Porter, K.W., Lonn, J.D., and Lopez, D.A., 2007, Geologic Map of Montana (digital data) : Montana Bureau of Mines and Geology, scale 1:500,000

N

0 2,000 4,000 6,000

Feet

BARR

Imagery: 2015 NAIP, USDA-FSA

SURFICIAL GEOLOGY
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FIGURE 1