CCR GROUNDWATER MONITORING SYSTEM CERTIFICATION

BOTTOM ASH POND 2

Sherburne County (Sherco) Generating Plant
Becker, Minnesota
Carlson McCain Project No.: 3404-19

Prepared for:

Northern States Power Company, a Minnesota Corporation

September 21, 2020
CCR GROUNDWATER MONITORING SYSTEM CERTIFICATION
Sherco Bottom Ash Pond 2
Becker, Minnesota

I hereby certify that this plan, specification, or report was prepared by or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Additionally, I certify that the groundwater monitoring system identified in this report has been designed and constructed to meet the requirements of § 257.91, Groundwater monitoring systems, as included in 40 CFR Part 257, Subpart D, Disposal of Coal Combustion Residuals from Electric Utilities.

Signature of Preparer:

Nicholas Bonow, P.E., P.G. #47510
Carlson McCain, Inc.

Date: September 21, 2020
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1. INTRODUCTION

This report presents documentation and certification of the groundwater monitoring system for Bottom Ash Pond 2 (BAP2) at the Sherburne County Generating Plant (Sherco) located in Becker, Minnesota. The Sherco plant is owned and operated by Northern States Power Company, a Minnesota Corporation (NSPM). The BAP2 location is shown on Figure 1 and an aerial photograph and site layout map for the BAP are shown on Figure 2.

The BAP2 is a new coal combustion residuals (CCR) surface impoundment and is required to comply with provisions of the U.S. Code of Federal Regulations (CFR), Title 40, Parts 257 and 261 relating to disposal of coal combustion residuals from electric utilities. In particular, this report addresses the requirements of 40 CFR §257.91, Groundwater Monitoring Systems.

As shown in Figure 2, BAP2 is situated amidst four other surface impoundments, including Scrubber Solids Ponds 1, 2, and 3 adjacent to the south of the BAP2, and Bottom Ash Pond #1 (BAP1) adjacent to the west of the BAP2. Ponds 1 and 2 ceased receiving CCR prior to October 19, 2015 and therefore not subject to regulation under 40 CFR §257. Pond 1 was closed in 1995 and Pond 2 was closed in 2014. Pond 3 and BAP1 are currently receiving CCR and have groundwater monitoring systems meeting the requirements of 40 CFR Section §257.91, as described in the CCR Groundwater Monitoring System Certification reports for the ponds (Carlson McCain 2017a, 2017b). The areas adjacent to the north and east of Pond 3 have been evaluated for potential development of future Scrubber Solids Ponds 4 and 5. To date, no construction has taken place and these ponds remain in the planning phase.

1.1 Groundwater Monitoring System §257.91(a)

According to §257.91(a), CCR units must comply with the following 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:

(i) Hydrogeologic conditions do not allow the owner or operator of the CCR unit to determine what wells are hydraulically upgradient; or

(ii) Sampling at other wells will provide an indication of background groundwater quality that is as representative or more representative than that provided by the upgradient wells; and

Carlson McCain, Inc.
(2) Accurately represent the quality of groundwater passing the waste boundary of the CCR unit. The down-gradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer. All potential contaminant pathways must be monitored.”

Additionally, §257.91 includes specific requirements in subparts (b) through (g) relating to the development and implementation of the groundwater monitoring system, which must be satisfied in order to demonstrate compliance with the performance standard listed in subpart (a).

NSPM has installed a groundwater monitoring system at the BAP2 as described in Table 1 and shown in Figure 6 that complies with the standard set forth in §257.91(a). The system includes nine monitoring wells that monitor up-gradient and down-gradient locations.

The following sections describe the system in further detail, and address the requirements of subparts (b) through (g).
2. SITE CHARACTERIZATION

The hydrogeologic setting of the BAP2 has been characterized in accordance with §257.91(b) which states “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, groundwater flow direction including 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 aquifer, including, but not limited to, thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.”

Soil borings and monitoring wells have been constructed in and around the BAP2 footprint as a part of the Phase II Hydrogeologic Investigation completed in 2019 for purposes of permitting and compliance with Minnesota Pollution Control Agency (MPCA) rules. In addition, several other hydrogeologic investigations have been conducted in the vicinity of the BAP2 for Pond 3, future Ponds 4 and 5, and the Unit 3 Dry Ash Landfill. The soil borings/well installations and investigations have assisted in characterizing the hydrogeology beneath the BAP2 and the information gathered from previous work is included the following reports:


- Carlson McCain, 2016a. SHERCO Generating Plant, Scrubber Pond 4, Supplemental Phase II Hydrogeologic Investigation Report, prepared for Xcel Energy, March 9, 2016; and


Carlson McCain has reviewed these reports in detail, as well as additional unpublished boring and well logs from the BAP vicinity, and the data and information contained in the reports and boring logs has been adapted for use in this report.

# 2.1 Compliance with §257.91(b)(2)

## General notes:

1) The requirements in §257.91(b)(2) will be discussed prior to §257.91(b)(1) in Sections 2.1 and 2.2 respectively since the geology and stratigraphy requirements in §257.91(b)(2) are generally the basis for the hydrogeologic requirements in §257.91(b)(1).

2) Of the reports listed in the previous section, the hydrogeologic investigation reports for the BAP2 (Carlson McCain, 2019), the BAP (Carlson McCain, 2016b), Pond 3 (Xcel, 2002) and Ponds 4 and 5 (Carlson McCain, 2014, 2016a) in particular discuss the geology and stratigraphy at and near the BAP2. The reports generally agree on the distinctive textural classifications of the stratigraphic units beneath the BAP, however, Carlson McCain (2014) refined the depositional interpretations of the stratigraphic units described in the vicinity of Pond 3; and has been confirmed in more recent investigations (Carlson McCain 2016a, 2016b, 2019a, 2019b).

### Site Geology

Previous investigations indicate that a succession of unconsolidated, Quaternary-age, glacially-derived sediments overlies bedrock beneath the BAP. The unconsolidated deposits range from approximately 76 to 140 feet thick at the site and can be further divided into distinct stratigraphic members of outwash alluvium (sand, silt and clay) and glacial till. The distinct stratigraphic members are described below in Sections 2.1.1 to 2.1.4.

#### 2.1.1 Shallow Alluvium

The uppermost stratigraphic unit in the vicinity of the BAP2 is comprised of sandy deposits of Mississippi River terrace alluvium and undifferentiated glacial outwash alluvium associated with the Grantsburg sublobe and/or the Superior lobe of the Wisconsin glaciation (Carlson McCain, 2019a).

**Description/Classification**
The shallow alluvium consists primarily of fine to medium grained, non-cohesive poorly graded sand. Soils are typically classified as SP or SP-SM under the United Soil Classification System (USCS). The sand color was typically reported as brown, with reference to the Munsell color chart, hue was reported as YR. The texture and color of the material is fairly consistent across the Site.

**Spatial Distribution**
The shallow alluvium unit is present and laterally continuous across the BAP2 area. It includes both a thin layer of sandy topsoil ranging from 0.5 to 5 feet thick and the underlying sand deposits, the base of which typically occurs at an elevation ranging from 930 to 945 feet. This results in thickness ranging from 5 to 31 feet, depending on the ground surface elevation.

**Permeability**
Permeability testing of the deep alluvium unit was not conducted during the BAP2 investigation. Data from previous investigations indicates hydraulic conductivity on the order of 100 feet per day (Carlson McCain, 2014).

### 2.1.2 Superior Till

The next stratigraphically lower geologic unit identified at the Site is glacial till, which is interpreted to be the Superior till of Superior Lobe provenance.

**Description/Classification**
Superior till typically consists primarily of fine grained, medium-dense to very-dense silty sand with a little gravel (SM). Gravel clasts typically consist of sandstone, basalt and fine- to coarse-crystalline granite. Color is typically described as brown or reddish brown. Occasional, thin lenses of fine to coarse grained sand, USCS symbol SP, occur within the till but are not laterally continuous within the unit.

**Spatial Distribution**
The Superior till is present immediately beneath the shallow alluvium over a portion of the BAP2 area. Where present, the till has an undulating surface and thickness ranged from 2 to 10 feet thick in soil borings which encountered the unit. The discontinuous nature of the till has been observed during hydrogeologic investigations completed for Pond 3 and Ponds 4 and 5 in addition to the BAP2 investigation.

**Permeability**
Data from Pond 3 indicates that the average permeability for the Superior till ranges from approximately 0.001 feet per day.

### 2.1.3 Deep Alluvium

Deep alluvium is present below the glacial till, and exhibits similar characteristics to the shallow alluvium.
Description/Classification
The deep alluvium typically consists of fine to very coarse-grained, non-cohesive, poorly graded sand. Occasional gravelly or siltier zones were also observed within the unit. Soils were primarily classified as SP under USCS. Color was typically reported as brown, light brown, or light yellowish-brown. The texture and color of the material is fairly consistent across the Sherco plant site.

Spatial Distribution
The deep alluvium occurs immediately beneath the Superior till, and was identified in all borings at the BAP2 deep enough to penetrate the unit. It generally extends from the bottom of the till down to the bedrock surface. Average thickness of the deep alluvium in the vicinity of the BAP2 is approximately 52 feet.

Permeability
Slug testing conducted on piezometers installed during the Phase II Hydrogeologic Investigation Report Addendum indicated hydraulic conductivity values ranging from 3 to 44 feet per day (Carlson McCain, 2019b). The average of all the results is approximately 17 feet per day. This is similar to the values reported for the upper portion (i.e. water table) of the deep alluvium during the Pond 4 hydrogeologic investigation (Carlson McCain, 2014).

2.1.4 Bedrock
Middle Precambrian granitic bedrock underlies the unconsolidated sediments beneath the BAP2. The bedrock surface generally occurs at an elevation above 875 feet, with the exception of the southeast corner of the BAP2 area. The upper portion of the bedrock is weathered to various degrees. Beneath the weathered veneer, bedrock is considered impermeable.

2.2 Compliance with §257.91(b)(1)

2.2.1 Aquifer Thickness
The water table beneath the BAP2 typically occurs below the Superior till identified in Section 2.1.2. As such, the uppermost aquifer at the BAP2 is the deep alluvium discussed in Section 2.1.3, which averages 52 feet thick.

2.2.2 Groundwater Elevation and Flow Direction
Figure 3 shows a hydrograph of monitoring wells and piezometers in the vicinity of the BAP2. The water levels illustrate that the water table elevation fluctuates between one and three feet on an annual basis and by as much as five feet from a wet year to a dry year. The hydrograph also indicates that, from 2010 to the present, groundwater elevations at the BAP2 have ranged from approximately 925 to 929 feet MSL and are typically at or below the glacial till described in Section 2.1.2.
Groundwater elevations and flow direction at the BAP2 during February, 2017 and July, 2020 are shown on the water table contour elevation maps in Figures 4 and 5, respectively. The contours in Figure 4 were derived from a Sherco site-wide water level gathering effort and the contours in Figure 5 were derived from the wells included in the groundwater monitoring system described in Section 3.2. For both of the events, the flow direction was generally to the west-southwest. This flow direction is consistent with historical data from over 20 years of monitoring at the Sherco facility and is also consistent with the regional groundwater flow direction towards the Mississippi river.

Because of the relatively low permeability of the till, the potential exists for some localized perched conditions on top of the till and/or lateral flow along the water table/till contact. However, perched groundwater has not been identified beneath the BAP2 or in areas adjacent to the BAP2; and based on the relatively uniform groundwater elevation contours it does not appear that the presence of the till significantly impacts the groundwater flow direction or gradient on a large (pond-size) scale.

### 2.2.3 Groundwater Flow Gradients

Based on the groundwater elevation contours shown in Figure 5, the average horizontal groundwater hydraulic gradient at the BAP2 was calculated at 0.0009 (units of vertical feet per horizontal foot). This is similar to the average gradient of 0.001 reported in the BAP2 Phase II Investigation Report (Carlson McCain, 2019a). Horizontal gradients are fairly consistent across the entire Sherco plant site due to the flat terrain and permeable nature of the water table aquifer.

To investigate vertical hydraulic gradients beneath the BAP2, three sets of nested piezometers were installed within the footprint of the BAP2 during February, 2020. The piezometer nests included one shallow piezometer screened across the water table and one deep piezometer screened near the bottom of the aquifer. The piezometers were designated B20-1S, B20-1D, B20-2S, B20-2D, B20-3S and B20-3D. The piezometer nests were located in the southeast corner, southwest corner, and north-central portion of the pond bottom. Locations are illustrated on Figure A-1 in Appendix A. Groundwater elevations were measured three times in each piezometer over a three-week period, and were used to compute vertical gradients. Static water elevations and vertical gradients are summarized in Appendix A. Results show an average gradient of approximately 0.001 upward at piezometer nest B20-1S/D, approximately .0004 upward at piezometer nest B20-2S/D, and approximately 0.002 downward at piezometer nest B20-3S/D. These small-magnitude, opposing-direction gradients are not indicative of significant vertical flow, which is consistent with observations from other nested wells during previous hydrogeologic investigations at the Sherco site. Piezometers were sealed in March, 2020. Well construction and sealing records are included in Appendix A.

### 2.2.4 Groundwater Flow Velocity

Average linear groundwater flow velocity for the BAP2 was calculated using Darcy’s equation:
\[ v = \frac{K_h \times i}{n_e} \]

where \( K_h \) = horizontal hydraulic conductivity (length/time)
\( i \) = horizontal gradient (dimensionless)
\( n_e \) = effective porosity

As discussed in Section 2.1.3, the calculated \( K_h \) values for the deep alluvium range from 3 to 44 feet per day. The value for \( n_e \) is estimated at 0.3, and Section 2.2.3 indicated the value for \( i \) is 0.001 (calculated).

The resulting calculated groundwater velocity at the BAP2 ranges from approximately 4 to 54 feet per year.
3. CONCEPTUAL MODEL AND MONITORING WELL LOCATIONS

§257.91(c) states that “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 (discussed in Section 1.1 of this report), based on the site-specific information specified in paragraph (b) of this section (discussed in Section 2.0 of this report).”

Section 3.1 below integrates the existing data into a geologic and hydrogeologic framework, or conceptual model, for the BAP2 area. The conceptual model offers a simplified representation of the geologic media and serves as the basis for identifying the primary monitoring units.

The conceptual model also facilitates a description of the fate and transport of a hypothetical release from the BAP2. It provides a rationale for predicting the most likely flow paths that a release might follow and provides the basis for an effective monitoring network that can intercept the likely release.

Sections 3.2 and 3.3 below discuss the selection of monitoring well locations based on the rule requirements and the conceptual model for the BAP2.

3.1 Conceptual Model

The conceptual model for the release of a constituent of concern (COC) from the BAP2 focuses on groundwater as the transport mechanism. As discussed above, the water table beneath the BAP2 typically occurs below the Superior till identified in Section 2.1.2. Exfiltration from BAP2 area is anticipated to move vertically downward from the base until it reaches the water table and/or till contact. If the exfiltration first contacts the till, it may flow through the till in the downgradient direction, but may also flow locally along the till contact to a zone of higher permeability within the till or a discontinuity of the till until it reaches the water table. Upon reaching the water table, the COC will likely travel mainly horizontally toward the south and/or southwest and to the Mississippi River.

Based on this conceptual model, the groundwater monitoring network should target the water table as the primary monitoring zone; and down-gradient wells should be located on the south and/or west sides of the pond in order to detect a potential release.

3.2 Groundwater Monitoring System

As discussed in Section 1.1, NSPM has installed a groundwater monitoring system at the BAP that complies with the standard set forth in §257.91(a). The system includes nine water table monitoring wells that include up-gradient and down-gradient wells as follows:
Well locations relative to the BAP2 are shown in Figure 6; and well construction data, including unique well number and installation date, are summarized in Table 1.

### 3.2.1 Compliance with §257.91(c)(1)

As described above in Section 3.2, five monitoring wells are located up-gradient and four monitoring wells are located down-gradient of the BAP2. This exceeds the minimums of one up-gradient and three down-gradient monitoring wells required in §257.91(c)(1).

### 3.2.2 Compliance with §257.91(c)(2)

Based on the rule requirements and the conceptual model for the Site, monitoring wells P-173, P-174, P-175, P-176, P-177 and P-178a were installed at the facility in 2019 as described in Carlson McCain (2020). These wells were installed to provide additional monitoring locations that are down-gradient and up-gradient of the BAP2. Wells P-173, P-174, P-175 and P-176 are evenly spaced along the downgradient edge of the BAP2 and are well-situated to detect a potential release from the BAP2. The remainder of the groundwater monitoring system wells have been located in up-gradient locations to accurately represent the background groundwater quality at the BAP2.
4. GROUNDWATER MONITORING SYSTEM PERFORMANCE

The BAP2 is not a multi-unit facility and, therefore, compliance with §257.91(d) is not required. Given that, Section 4.1 below discusses compliance with §257.91(e) which states that “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 contamination of samples and the groundwater.”

4.1 Compliance with §257.91(e)

Monitoring well completion information for each of the wells in the monitoring system indicates that the wells have casings that are screened and packed with sand to enable collection of groundwater samples. Additionally, monitoring well completion logs indicate that in eight of the nine wells the annular space above the sand pack in the monitoring wells has been sealed with grout or cement. The monitoring well completion log for well P-17 indicates that the annular space in this well is filled with coarse to fine sand backfill, as opposed to being sealed with grout or cement. Although this is inconsistent with the wording of §257.91(e) regarding sealing of the annular space, the well’s integrity and ability to provide representative groundwater samples are not compromised by this type of construction because of the highly permeable nature of the sand which comprises unsaturated zone. Due to the similarity of the annular backfill material to the surrounding formation, it is akin to allowing the borehole to naturally cave in around the well casing, and does not provide a preferential pathway from the surface to the well screen, as would be the case with a similarly constructed well in a lower-permeability formation. As such, well P-17 is acceptable for use in the monitoring system, and previous sampling at all of the monitoring system wells has proven that the wells are sampleable and provide acceptable and consistent results.

4.1.1 Compliance with §257.91(e)(1)

As required in §257.91(e)(1):

1. The design, installation, development and decommissioning of any monitoring wells, piezometers, and any other measurement, sampling and analytical devices that are part of groundwater monitoring system will be kept as part of the operating record;
2. The operating record for the facility consists of electronic reports found on the NSPM’s data network; and
3. Access to the operating record was provided for the completion of this groundwater monitoring system certification.

4.1.2 Compliance with §257.91(e)(2)

As required in §257.91(e)(2), monitoring wells, piezometers, and any other measurement, sampling and analytical devices that are part of the groundwater monitoring system will be operated and
maintained so that they perform to the design specifications throughout the life of the monitoring program.

4.1.3 **Groundwater Sampling and Analysis Plan**

A Groundwater Sampling and Analysis Plan (GW SAP) and Statistical Methods Certification have been completed for the wells in the CCR groundwater monitoring network for the BAP2 (NSPM, 2020). The GW SAP provides the methods and procedures that will be used to collect, ship, analyze, and report groundwater monitoring data from the facility is intended to comply the requirements of §257.93.
5.0 REFERENCES


Tables
**TABLE 1**

CCR GROUNDWATER MONITORING SYSTEM
Bottom Ash Pond 2

<table>
<thead>
<tr>
<th>Well ID</th>
<th>Minnesota Unique Well ID</th>
<th>Date Installed</th>
<th>Location Site Coordinates (ft)</th>
<th>Elevation Top of Riser Pipe</th>
<th>Screen Length (ft)</th>
<th>Elevation Top of Screen</th>
<th>Elevation Bottom of Screen</th>
<th>Monitoring Status</th>
<th>Hydrologic Location</th>
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<tr>
<td>P-17</td>
<td>NA</td>
<td>8/26/81</td>
<td>2030284 866284</td>
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<td>Routine Semi-annual</td>
<td>Up-Gradient</td>
</tr>
</tbody>
</table>

*Notes:*

Elevation is feet above mean sea level
Figures
FIGURE 1
SITE LOCATION MAP

CCR GROUNDWATER MONITORING
SYSTEM CERTIFICATION
Bottom Ash Pond 2
Sherburne County Generating Plant
Becker, Minnesota

Generating Plant
Dry Ash Landfill
Properties Boundary

Pond 1
Bottom Ash Pond
Bottom Ash Pond 2

Pond 2
Pond 3

Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed
FIGURE 2
SITE LAYOUT
Water Level Elevation (ft)

Analysis Result

May-2010 May-2013 May-2016 May-2019


923 924 925 926 927 928 929 930 931 932

P-01A-1
P-152a
P-156
P-158
P-17
P-173
P-175
P-22
P-23

Generated 8/11/2020 1:47 PM. Circled point indicates Non-Detect.

CRG GROUNDWATER MONITORING
SYSTEM CERTIFICATION
Bottom Ash Pond 2
Sherburne County Generating Plant
Becker, Minnesota

FIGURE 3
HYDROGRAPH
(2010 to Present)
FIGURE 4
WATER TABLE ELEVATION CONTOUR MAP (2/20-23/2017)
FIGURE 6
CCR GROUNDWATER MONITORING SYSTEM CERTIFICATION
Bottom Ash Pond 2
Sherburne County Generating Plant
Becker, Minnesota
Appendix A

Nested Piezometer Data
Bottom Ash Pond 2

**Figure A-1**

**Bottom Ash Pond 2 Piezometers**

- **B20-01S**
- **B20-01D**
- **B20-02S**
- **B20-02D**
- **B20-03S**
- **B20-03D**

**Piezometer Nest**

- Temporary Piezometer Nest

**Boundaries**

- Property Boundary
- Security Fence

**Ash Ponds**

- Active CCR Unit
- Closed Pre-CCR Rule
- Bottom Ash Pond 2

**Location**

Sherburne County Generating Plant
Becker, Minnesota

**Credits**

- Aerial Photograph Source: Sherburne County (2018)
- Document Path: P:\Projects\XCEL\0659 Ash Operations and Mgmt\Sherco\2020 BAP2 CCR EMS Cert\GIS\Figure A-1 - Piezometers.mxd
### Table A-1
SOIL BORING AND PIEZOMETER CONSTRUCTION INFORMATION
Sherco Bottom Ash Pond 2 Supplemental Investigation

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Piezometer Number</th>
<th>MDH Unique Well Number</th>
<th>Location - Site Coordinates (ft)</th>
<th>Northing</th>
<th>Easting</th>
<th>Ground Elevation (Ft above NAVD88)</th>
<th>TOR Elevation (Ft above NAVD88)</th>
<th>Well Diameter (inches)</th>
<th>Screen Length (ft)</th>
<th>Screen Type</th>
<th>Well Depth (feet bTOR)</th>
<th>Screen Elevation (ft above NAVD88)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B20-1 Shallow</td>
<td>B20-1S</td>
<td>B20-1D</td>
<td>847666</td>
<td>865657.34</td>
<td>2029911.90</td>
<td>942.7</td>
<td>944.70</td>
<td>2&quot;</td>
<td>5</td>
<td>PVC</td>
<td>20.56</td>
<td>929.14 - 924.14</td>
</tr>
<tr>
<td>B20-1 Deep</td>
<td>B20-1D</td>
<td>847665</td>
<td>865654.53</td>
<td>2029905.25</td>
<td>942.1</td>
<td>944.07</td>
<td>2&quot;</td>
<td>2</td>
<td>PVC</td>
<td>65.9</td>
<td>880.17 - 878.17</td>
<td></td>
</tr>
<tr>
<td>B20-2 Shallow</td>
<td>B20-2S</td>
<td>B20-2D</td>
<td>847662</td>
<td>865863.58</td>
<td>2029530.32</td>
<td>936.5</td>
<td>938.37</td>
<td>2&quot;</td>
<td>5</td>
<td>PVC</td>
<td>13.94</td>
<td>929.43 - 924.43</td>
</tr>
<tr>
<td>B20-2 Deep</td>
<td>B20-2D</td>
<td>847661</td>
<td>865859.19</td>
<td>2029522.56</td>
<td>936.7</td>
<td>938.70</td>
<td>2&quot;</td>
<td>2</td>
<td>PVC</td>
<td>52.51</td>
<td>888.19 - 886.19</td>
<td></td>
</tr>
<tr>
<td>B20-3 Shallow</td>
<td>B20-3S</td>
<td>B20-3D</td>
<td>847664</td>
<td>865637.96</td>
<td>2029253.47</td>
<td>942.8</td>
<td>944.97</td>
<td>2&quot;</td>
<td>5</td>
<td>PVC</td>
<td>18.61</td>
<td>931.36 - 926.36</td>
</tr>
<tr>
<td>B20-3 Deep</td>
<td>B20-3D</td>
<td>847663</td>
<td>865634.00</td>
<td>2029248.81</td>
<td>942.7</td>
<td>944.75</td>
<td>2&quot;</td>
<td>2</td>
<td>PVC</td>
<td>62.74</td>
<td>884.01 - 882.01</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Ft = feet
- bgs = below ground surface
- TOR = Top of innermost riser pipe
- PVC = Polyvinyl Chloride
- NAVD88 = North American Vertical Datum of 1988
### Table A-2
**PIEZOMETER VERTICAL HYDRAULIC GRADIENTS SUMMARY**

**Sherco Bottom Ash Pond 2 Supplemental Investigation**

#### B20-1S/B20-1D Well Nest

<table>
<thead>
<tr>
<th>Date</th>
<th>Static Water Elevations</th>
<th>Mid Point B20-1S Screen Elevation</th>
<th>Mid Point B20-1D Screen Elevation</th>
<th>B20-1S/1D Vertical Hydraulic Gradient</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/7/2020</td>
<td>928.56  928.63</td>
<td>926.35</td>
<td>879.17</td>
<td>0.0014</td>
</tr>
<tr>
<td>2/17/2020</td>
<td>928.44  928.50</td>
<td>926.29</td>
<td>879.17</td>
<td>0.0012</td>
</tr>
<tr>
<td>2/28/2020</td>
<td>928.35  928.42</td>
<td>926.24</td>
<td>879.17</td>
<td>0.0014</td>
</tr>
</tbody>
</table>

#### B20-2S/B20-2D Well Nest

<table>
<thead>
<tr>
<th>Date</th>
<th>Static Water Elevations</th>
<th>Mid Point B20-2S Screen Elevation</th>
<th>Mid Point B20-2D Screen Elevation</th>
<th>B20-2S/2D Vertical Hydraulic Gradient</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/7/2020</td>
<td>928.35  928.38</td>
<td>926.39</td>
<td>887.19</td>
<td>0.00077</td>
</tr>
<tr>
<td>2/17/2020</td>
<td>928.26  928.28</td>
<td>926.35</td>
<td>887.19</td>
<td>0.00054</td>
</tr>
<tr>
<td>2/28/2020</td>
<td>928.16  928.16</td>
<td>926.30</td>
<td>887.19</td>
<td>0.000026</td>
</tr>
</tbody>
</table>

#### B20-3S/B20-3D Well Nest

<table>
<thead>
<tr>
<th>Date</th>
<th>Static Water Elevations</th>
<th>Mid Point B20-3S Screen Elevation</th>
<th>Mid Point B20-3D Screen Elevation</th>
<th>B20-3S/3D Vertical Hydraulic Gradient</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/7/2020</td>
<td>928.13  927.99</td>
<td>927.24</td>
<td>883.01</td>
<td>-0.0032</td>
</tr>
<tr>
<td>2/17/2020</td>
<td>927.96  927.87</td>
<td>927.16</td>
<td>883.01</td>
<td>-0.0021</td>
</tr>
<tr>
<td>2/28/2020</td>
<td>927.80  927.75</td>
<td>927.08</td>
<td>883.01</td>
<td>-0.0012</td>
</tr>
</tbody>
</table>

**Notes:**

Positive values indicate an upward hydraulic gradient; negative values indicate a downward hydraulic gradient.

Elevations are in feet above North American Vertical Datum of 1988 (NAVD88).

See Table A-1 for top of well screen and bottom of well screen elevations.
Blind drill to 62’ bgs. Soils were generally classified as brown sand and gravel with cobbles. Driller reported hard drilling conditions at 62’ bgs. Installed B20-1 Deep in borehole.
Blind drill to 62' bgs. Soils were generally classified as brown sand and gravel with cobbles. Driller reported hard drilling conditions at 62' bgs. Installed B20-1 Deep in borehole. (continued)

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>DEPTH (ft)</th>
<th>SAMPLE TYPE NUMBER</th>
<th>RECOVERY %</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS1</td>
<td>30</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>62.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End of boring at 62.0 feet.
Blind drill to 18' bgs. Soils were generally classified as brown sand and gravel with cobbles. Installed B20-1 Shallow in borehole.

End of boring at 18.0 feet.
**GROUND ELEVATION**: 936.7 ft 940

**LOGGED BY**: M. Lindstrom

**DRILLING METHOD**: Rotasonic

**DATE STARTED**: 2/5/20

**DATE COMPLETED**: 2/5/20

**DRILLING CONTRACTOR**: Cascade Drilling

**PROJECT NUMBER**: 3404-19

**PROJECT LOCATION**: Becker, Minnesota

**GROUND WATER LEVELS**:

- **AT TIME OF DRILLING**: ---
- **AT END OF DRILLING**: 10.3 ft / Elev 926.4 ft
- **AFTER DRILLING**: ---

**HOLE SIZE**: 6"

**CLIENT**: Xcel Energy

**PROJECT NAME**: Sherco BAP2 Supplemental Investigation

**PROJECT NUMBER**: 3404-19

**PROJECT NAME**: Sherco BAP2 Supplemental Investigation

**PROJECT LOCATION**: Becker, Minnesota

---

**FORMATION** | **DEPTH (ft)** | **SAMPLE TYPE NUMBER** | **RECOVERY %** | **MATERIAL DESCRIPTION**
--- | --- | --- | --- | ---
0 | RS1 | 100 | | Blind drill to 50.5' bgs. Soils were generally classified as brown sand. Driller reported hard drilling at 50' bgs. Installed B20-2 Deep in borehole.

(Continued Next Page)
Blind drill to 50.5' bgs. Soils were generally classified as brown sand. Driller reported hard drilling at 50' bgs. Installed B20-2 Deep in borehole. *(continued)*

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>FORMATION</th>
<th>RECOVERY %</th>
<th>GRAPHIC LOG</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End of boring at 50.5 feet.
Blind drill to 12' bgs. Soils were generally classified as brown sand. Installed B20-2 Shallow in borehole.

End of boring at 12.0 feet.
Blind drill to 60' bgs. Soils were generally classified as brown sand and gravel. Driller reported hard drilling at 60' bgs. Installed B20-3 Deep in borehole.
Blind drill to 60' bgs. Soils were generally classified as brown sand and gravel. Driller reported hard drilling at 60' bgs. Installed B20-3 Deep in borehole. (continued)

End of boring at 60.0 feet.
Blind drill to 17’ bgs. Installed B20-3 Shallow in borehole. Soils generally classified as brown sand and gravel.

End of boring at 17.0 feet.
**Monitoring Well Diagram**

**Above Grade Completion**

**PROJECT NAME:** Xcel Sherco CCR Wells Supplemental Investigation  
**LOCATION:** Becker, Minnesota

---

**Protective Casing**

**Stick Up**

Type: Pro-top  
Diameter: 6"  
Length: 7'  
Locked: Yes  
Key Number: 1212  

**CAP OR PLUG**

Type: Expansion Plug  
Vented: No

---

**Ground Surface**

**Top of Grout**

**SURFACE BACKFILL MATERIAL**

Type: Concrete  
Total Volume: 4.5 - 80 lb. bags  
Manufacturer: Quikrete

**RISER PIPE**

Type: Schedule 40 PVC  
Inner Diameter: 2"  
Joint Type: Threaded  
Total Length: 15'  
No./Length of Sections: 1/20  
Manufacturer: Cresline

**GROUT**

Type: No grout used due to shallow nature of well  
Total Volume:  
Mix Ratio:  
Manufacturer: 

---

**Top of Seal**

6'

**SEAL**

Type/Size: 3/8" Bentonite Chips  
Total Volume: 2 - 50 lb bag bentonite  
Manufacturer: Baroid Hole Plug

**FILTER PACK**

Type/Size: #40 Red Flint Sand  
Total Volume: 1 - 50 lb bag  
Manufacturer: Red Flint Sand and Gravel

**WELL SCREEN**

Type: PVC  
Inner Diameter: 2"  
Length: 5'  
Effective Length: 7'  
Slot Size: No. 10  
Manufacturer: Johnson

---

**Bottom of Screen**

18'

**WATER SOURCE:** Landfill garage

**NOTES:** 4" cap installed on end of well screen.
**PROJECT NAME:** Xcel Sherco CCR Wells Supplemental Investigation  
**LOCATION:** Becker, Minnesota

### Protective Casing Stick Up

- **Type:** Pro-top  
- **Diameter:** 6"  
- **Length:** 7'  
- **Locked:** Yes  
- **Key Number:** 1212

### Riser Stick Up

- **Type:** PVC  
- **Length:** 2'

### Ground Surface

- **Elevation:** 942.5

### Top of Grout

- **Height:** 5'

### Top of Grout

- **Height:** 53'

### Top of Filter Pack

- **Height:** 58'

### Top of Screen

- **Height:** 60'

### Bottom of Screen

- **Height:** 62'

### Borehole Diameter

- **Diameter:** 6"  
- **Total Length:** 64'

### Total Depth of Boring

- **Depth:** 62'

### Date/Time Started

- **Date:** 2/7/2020  
- **Time:** 9:32

### Date/Time Completed

- **Date:** 2/7/2020  
- **Time:** 12:41

### Water Source

- **Type:** Landfill garage

### Surface Backfill Material

- **Type:** Concrete  
- **Total Volume:** 6 - 80 lb bags  
- **Manufacturer:** Sakrete

### Riser Pipe

- **Type:** Schedule 40 PVC  
- **Inner Diameter:** 2"  
- **Joint Type:** Spigot and Socket - Solvent Welded  
- **Total Length:** 64'  
- **No./Length of Sections:** 3/20, 1/4  
- **Manufacturer:** Cresline

### Grout

- **Type:** Bentonite  
- **Total Volume:** 2 - 50 lb bags  
- **Mix Ratio:** 24 gals/1 bag  
- **Manufacturer:** Quik-grout

### Seal

- **Type/Size:** 2' of #15 Fine Sand with 2' of 3/8" Bentonite Chips  
- **Manufacturer:** Red Flint Sand and Gravel

### Filter Pack

- **Type:** #40 Red Flint Sand  
- **Total Volume:** 1 - 50 lb bag of sand and 1/2 - 50 lb bag bentonite  
- **Manufacturer:** Red Flint Sand and Gravel

### Well Screen

- **Type:** PVC  
- **Inner Diameter:** 2"  
- **Length:** 2'  
- **Effective Length:** 4'  
- **Slot Size:** No. 10  
- **Manufacturer:** Johnson

### Water Source

- **Type:** Landfill garage

### Notes

- **Well initially installed on 2/4/2020, however casing broke during pro-top installation. Well re-installed on 2/7/2020. 4" cap installed on end of well screen. Centralizer installed at bottom of well.
PROTECTIVE CASING
Type: Pro-top
Bumper Posts: No
Diameter: 6"
Length: 7'
Locked: Yes
Key Number: 1212

CAP OR PLUG
Type: Expansion Plug
Vented: No

SURFACE BACKFILL MATERIAL
Type: Concrete
Total Volume: 4 - 80 lb. bags
Manufacturer: Quikrete

RISER PIPE
Type: Schedule 40 PVC
Inner Diameter: 2"
Joint Type: Threaded
Total Length: 9'
No./Length of Sections: 1/10
Manufacturer: Cresline

GROUT
Type: No grout used due to shallow nature of well
Total Volume: Mix Ratio:
Manufacturer:

SEAL
Type/Size: 3/8" Bentonite Chips
Total Volume: 1 - 50 lb bag bentonite
Manufacturer: Baroid Hole Plug

FILTER PACK
Type/Size: #40 Red Flint Sand
Total Volume: 1 - 50 lb Bag
Manufacturer: Red Flint Sand and Gravel

WELL SCREEN
Type: PVC
Inner Diameter: 2"
Length: 5'
Effective Length: 5.5'
Slot Size: No. 10
Manufacturer: Johnson

WATER SOURCE: Landfill garage

NOTES: 4" cap installed on end of well screen.
**PROJECT NAME:** Xcel Sherco CCR Wells Supplemental Investigation  
**LOCATION:** Becker, Minnesota

- **Protective Casing Stick Up:** 2'  
- **Riser Stick Up Diameter:** 6"  
- **Length:** 7'  
- **Locked:** Yes  
- **Type:** Ground Surface, Top of Grout

- **Casing Elevation:** 938.70'  
- **Key Number:** 1212

- **CAP OR PLUG:** Expansion Plug  
- **Vented:** No

- **Ground Surface Elevation:** 936.7'

- **Top of Grout:** 3'

- **Surface Backfill Material:** Concrete  
  - **Total Volume:** 4 - 80 lb. bags  
  - **Manufacturer:** Quikrete

- **Riser Pipe:** Schedule 40 PVC  
  - **Inner Diameter:** 2"  
  - **Joint Type:** Spigot and Socket - Solvent Welded  
  - **Total Length:** 51'  
  - **No./Length of Sections:** 3/20  
  - **Manufacturer:** Cresline

- **GROUT:** Bentonite  
  - **Total Volume:** 2 - 50 lb bags  
  - **Mix Ratio:** 24 gals/1 bag  
  - **Manufacturer:** Quik-grout

- **Top of Seal:** 3'  
- **Seal:** 3/8" Bentonite Chips  
- **Total Volume:** 1 - 50 lb bag bentonite  
- **Manufacturer:** Baroid Hole Plug

- **Filter Pack:** #40 Red Flint Sand  
- **Total Volume:** 1.5 - 50 lb bag sand and gravel  
- **Manufacturer:** Red Flint Sand and Gravel

- **WELL SCREEN:** PVC  
- **Inner Diameter:** 2"  
- **Length:** 2'  
- **Effective Length:** 4'  
- **Slot Size:** No. 10  
- **Manufacturer:** Johnson

- **Water Source:** Landfill garage

- **NOTES:** 4" cap installed on end of well screen. Centralizer installed at bottom of well.
PROJECT NAME: Xcel Sherco CCR Wells Supplemental Investigation
LOCATION: Becker, Minnesota

Drilling Method: 6" Rota-Sonic
Company: Cascade
Foreman: Lenny Rodgers
Rig Model: Mini-Sonic
Geol/Engr: M. Lindstrom

Ground Surface Elevation: 942.8'
MDH Unique Well No.: 847664
Date/Time Started: 2/7/2020 / 802
Date/Time Completed: 2/7/2020 / 911
Coordinates: 865637.9 ft N, 2029253.5 ft E

Protective Casing
Type: Pro-top
Stick Up
Length: 7'
Locked: Yes

Riser Stick Up
Type: Ground Surface
Diameter: 6" Stick Up Diameter:
Length: 14'

Riser Stick Up Diameter:
Length: 14'

Top of Grout 5'
Type: Expansion Plug
Vented: No

Ground Surface
Type: Concrete
Total Volume: 4 - 80 lb. bags
Manufacturer: Quikrete

Riser Pipe
Type: Schedule 40 PVC
Inner Diameter: 2"
Joint Type: Threaded
Total Length: 14'
No./Length of Sections: 1/20
Manufacturer: Cresline

Grout
Type: No grout used due to shallow nature of well
Total Volume: Mix Ratio:
Manufacturer:

Top of Seal
Type: 3/8" Bentonite Chips
Total Volume: 1 - 50 lb. bag bentonite
Manufacturer: Baroid Hole Plug

Top of Filter Pack 10'
Type: #40 Red Flint Sand
Total Volume: 1.5 - 50 lb. Bag
Manufacturer: Red Flint Sand and Gravel

Top of Screen 12'
Type: PVC
Inner Diameter: 2"
Length: 5'
Slot Size: No. 10
Manufacturer: Johnson

Bottom of Screen 17'
Bottom of Filter Pack 17'
Borehole Diameter: 6"

Total Depth of Boring 17'
Total Length of Well 19'

NOTES: 4" cap installed on end of well screen.
**PROJECT NAME:** Xcel Sherco CCR Wells Supplemental Investigation  
**LOCATION:** Becker, Minnesota

**Drilling Method:** 6" Rota-Sonic  
**Company:** Cascade  
**Foreman:** Lenny Rodgers  
**Rig Model:** Mini-Sonic  
**Geol/Engr:** M. Lindstrom

**Ground Surface Elevation:** 942.7'  
**MDH Unique Well No.:** 847663  
**Date/Time Started:** 2/6/2020 / 1614  
**Date/Time Completed:** 2/6/2020 / 1730  
**Coordinates:** 865633.9 ft N, 2029248.8 ft E

---

**Protective Casing**

- **Type:** Pro-top  
- **Stick Up:** 2'

**Riser Stick Up**

- **Diameter:** 6"  
- **Length:** 7'  
- **Locked:** Yes  
- **Type:** Ground Surface  
- **Top of Grout:** 60'

**Grout**

- **Type:** PVC  
- **Length:** 2'  
- **Slot Size:** No. 10  
- **Manufacturer:** Johnson  
- **Effective Length:** 4'

---

**Surface Backfill Material**

- **Type:** Concrete  
- **Total Volume:** 4 - 80 lb bags  
- **Manufacturer:** Quikrete

---

**Riser Pipe**

- **Type:** Schedule 40 PVC  
- **Inner Diameter:** 2"  
- **Joint Type:** Spigot and Socket - Solvent Welded  
- **Total Length:** 60'  
- **No./Length of Sections:** 3/20  
- **Manufacturer:** Cresline

---

**Grount**

- **Type:** Bentonite  
- **Total Volume:** 3 - 50 lb bags  
- **Mix Ratio:** 24 gals/1 bag  
- **Manufacturer:** Quik-grout

---

**Top of Seal**

- **Type/Size:** 3/8" Bentonite Chips  
- **Total Volume:** 1 - 50 lb bag bentonite  
- **Manufacturer:** Baroid Hole Plug

---

**Filter Pack**

- **Type/Size:** #40 Red Flint Sand  
- **Total Volume:** 1 - 50 lb bag  
- **Manufacturer:** Red Flint Sand and Gravel

---

**Well Screen**

- **Type:** PVC  
- **Inner Diameter:** 2"  
- **Length:** 2"  
- **Effective Length:** 4'

---

**Water Source:** Landfill garage

**Notes:** 4" cap installed on end of well screen. Centralizer installed at bottom of well.
**WELL OR BORING LOCATION**

**County Name:** Sherburne

**TOWNSHIP NAME:** Becket

**Range No.:** 29

**Fraction (th. - sq.):** NW 1/4 SE 1/4

---

**MINNESOTA DEPARTMENT OF HEALTH**

**WELL AND BORING SEALING RECORD**

**Minnesota Statutes, Chapter 103F**

**Minnesota Well and Boring Seal Date:** 3/13/20

**Date of Boring:** 3/13/20

**Depth Before Sealing:** 50 ft.

**Original Depth:** 50 ft.

---

**WELL LOCATION:**

**Latitude:** degrees minutes seconds

**Longitude:** degrees minutes seconds

**Number, Street Address, or Other Number and City or Well or Boring Location:** 12345 Industrial Blvd, Becket

**Sketch map of well or boring location, showing property lines, roads, and buildings.**

---

**WELLBORING:**

**Water Supply Well:**

**Monit. Well:**

**Env. Bore Hole:**

**Other:**

---

**AQUIFER(S):**

**Dolomitic Aquifer:**

**Multiquarier:**

---

**STATIC WATER LEVEL:**

**Measured:**

**Estimated:**

**Date Measured:** 3/13/20

---

**CASING TYPE(S):**

- Steel
- Plastic
- No
- Other

---

**WELLHEAD COMPLETION**

**Outside:**

- Well House
- At Grade
- Buried

**Inside:**

- Basement Offset
- Well Pit
- Buried

**Well Pit:**

**Other:**

---

**Preparation:**

**"First" by pretrip**

---

**PROPERTY OWNER(S)/COMPANY NAME:**

**Northern States Power**

**Property owner's mailing address if different than well location:**

414 Nicollet Mall

Minneapolis MN 55401

**WELL OWNER(S)/COMPANY NAME:**

Same

**Well owner's mailing address if different than property owner's address:**

Same

---

**GEOLOGICAL MATERIAL:**

**COLOR:**

**HARDNESS OR FORMATION:**

**FROM TO:**

Sand

Br

M

U

---

**SCREEN/OPEN HOLE:**

**Screen from:** 48 to 50 ft.

**Open Hole from:**

---

**OBSTRUCTIONS:**

- Roots/Drop Pipe
- Check Valve(s)
- Debris
- Fill
- No Obstruction

**Type of Obstructions (Describe):**

---

**Type Removed:**

- Yes
- No

**METHOD USED TO SEAL ANNULAR SPACE BETWEEN 2 CASINGS, OR CASING AND BORE HOLE:**

- No Annular Space Exists
- Annular Space Grouted with Trench Pipe
- Casing Perforated/Removal
- Casing Perforated
- Removed
- Perforated
- Removed

**Type of Perforation:**

- Other

---

**GROUTING MATERIAL(S):**

- Bentonite

**From:**

**To:**

**Yards:**

- 0 to 50

**Bags:**

---

**OTHER WELLS AND BORINGS:**

**Other unsealed and unused well or boring on property:**

- Yes
- No

**How many:**

---

**LICENSED OR REGISTERED CONTRACTOR CERTIFICATION:**

This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

**License Business Name:**

**License or Registration No.:**

---

**Certified Representative Signature:**

**Certified Rep. No.:**

**Date:**

---

**Name of Person Sealing Well or Boring:**

**Tammy Roy**
**MINNESOTA DEPARTMENT OF HEALTH**

**WELL AND BORING SEALING RECORD**

**Sheboygan**

**MINNESOTA STATUTES, CHAPTER 103F**

**MINNESOTA WELL AND BORING SEALING NO.**

**MINNESOTA UNIQUE WEL NO.**

**Location:** 17999 Industrial Blvd, Becker

**Date Sealed:** 8/30/20

**Date Well or Boring Completed:** 2/3/20

**Depth Before Sealing:** 17 ft

**Original Depth:** 12 ft

**AQUIFER(S):** Multicellular

**WELLBORE:** Monticello Water Supply Well

**Env. Bore-Hole:** Other

**Casing Type(S):**

- [ ] Steel
- [ ] Plastic
- [ ] Tile
- [ ] Other

**Wellhead Completion:**

- [ ] Outside: Well House
- [ ] At Grade
- [ ] Other: 6 in. protech

**Screen/open hole:**

- [ ] Screen from 7 to 12 ft
- [ ] Open hole from to ft

**Obstructions:**

- [ ] Rock/Crop Pipe
- [ ]Check Valve(s)
- [ ]Debris
- [ ]Fill
- [ ]No Obstruction

**Type of Obstructions (Describe):**

- [ ] Other

**Geological Material**: Sand

**Color**: Pale

**Hardness or Formation**: M 0 12

**Remarks, Source of Data, DIFFICULTIES IN SEALING**
WELL OR BORING LOCATION

County Name: Stearns

WELL AND BORING SEALING RECORD

MINNESOTA DEPARTMENT OF HEALTH

WELL NUMBERS: 1234 Industrial Blvd, Becker

Section 11, Township 33, Range 29

Depth Before Sealing: 120 ft

Date Sealed: 3/30/20

Date Well or Boring Constructed: 2/4/20

Depth Before Sealing: 120 ft

Original Date: 120 ft

WATER- Supply Well: Mont, Wld

Peer, Bare Hole: Other

Location: 1234 Industrial Blvd, Becker

Sketch map of well or boring location, showing property lines, roads, and buildings.

PROPERTY OWNERS NAME/COMPANY NAME: Northern States Power

Property owner's mailing address different than well location address indicated above:

WELL OWNER'S NAME/COMPANY NAME: Same

Well owner's mailing address different than property owner's address indicated above:

GEOLOGICAL MATERIAL

If not known, indicate estimated formation log from nearby well or boring.

Clay 5 ft 6 in

COLOR M O Y

HARDNESS OR FORMATION 5 ft 6 in

FROM TO

Casing

Diameter: 4 in

Depth: 4 in to 58 ft

Set in oversize hole? Yes

Annular spaces initially grouted? No

In. from 4 in to 58 ft

Type of Obstructions (Describe):

Obstructions removed? Yes

PUMP

Type: NA

METHOD USED TO SEAL ANNUAL SPACE BETWEEN 2 CASINGS, OR CASING AND BOREホール:

Type of Perforator:

Other

GROUTING MATERIALS

(One bag of cement = 84 lbs, one bag of bentonite = 50 lbs)

Bentonite from 0 to 60 ft yards bags

OTHER WELLS AND BORINGS

Other drilled and unused well or boring on property? Yes No How many?

LICENSED OR REGISTERED CONTRACTOR CERTIFICATION

This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

License Business Name

Certified Representative Signature

Certified Reg. No. Date

Name of Person Sealing Well or Boring

Tammy Roy

MINN. DEPT. OF HEALTH COPY
WELL OR BORING LOCATION

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING SEALING RECORD

MINNESOTA STATUTES, CHAPTER 103I

Minneapolis Well and Boring Sealing No.
Minneapolis Unique Well No. or Waterwell No. (if relevant)

Bann forms technology - 651-224-5135

847464

County Name
Sheboygan

WELL LOCATION

Township Name
Becket

Section No. 1

Range No. 29

Fraction of quarter section

Date Sealed
3/30/20

Date Well or Boring Constructed
2/22/20

Latitude ____________ degrees ____________ minutes ____________ seconds

Longitude ____________ degrees ____________ minutes ____________ seconds

Northward Township

Westward Range

Depth Below Sealing
17 ft

Original Depth
17 ft

Numerical Street Address or Five Number and City of Well or Boring Location

17546 Industrial Blvd. Becket

Sketch map of well or boring location, showing property lines, roads, and buildings.

Casing Type(s)

Q Steel Q Plastic Q Tie Q Other

Aquifer(s)

Q Single Aquifer Q Multi Aquifer

Well-Boring

Q Water-Supply Well Q Monitor Well

Env. Bore Hole Q Other

Static Water Level

Q Measured Q Estimated Date Measure

8 ft below Q above land surface

Property Owner's Name/Company Name

Northern States Power

Property owner's mailing address different than well location/ address indicated above

414 Nicollet Mall

Minneapolis MN 55401

Well owner's mailing address different than property owner's address indicated above

Same

Geological Material

Color

Hardness or Formation

From

To

Clay

Br

M

0

5

5

6

4

5

7

GEOLOGICAL MATERIAL

If not known, indicate estimated formation log from nearby well or boring.

METHOD USED TO SEAL ANNUAL SPACE BETWEEN 2 CASINGS, OR CASING AND BORE HOLE:

No Annual Space Exists Q Annual Space Grouted with Trame Pipe Q Casting Perforation/Removal

Type of Perforation

Other

GROUTING MATERIAL(S)

(One bag of cement = 94 lbs., one bag of bentonite = 50 lbs.)

Bentonite

from

to

Yards

bags

Other Wells and Borings

Other unsealed and unsealed well or boring on property? Q Yes Q No How many?

Licensed or Registered Contractor Certification

This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

License Business Name

Licenses or Registration No.

Certified Representative Signature

Certified Rep. No.

Date

Name of Person Sealing Well or Boring

Tipton Roy
**MINNESOTA DEPARTMENT OF HEALTH**

**WELL AND BORING SEALING RECORD**

Minnesota Statutes, Chapter 103F

**MINN. DEPT OF HEALTH COPY**

<table>
<thead>
<tr>
<th>Township Name</th>
<th>Township No.</th>
<th>Range No.</th>
<th>Section No.</th>
<th>Fraction (se - 12)</th>
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<td>Newburn</td>
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<td>3</td>
<td>24</td>
<td>1</td>
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**WELL OR BORING LOCATION**

**Well/Location:**

- Location: Industrial Blvd

**Well Seal Date:**

- Date Sealed: 3/30/20
- Date Well or Boring Completed: 4/1/20

**Well/Seal Depth:**

- Depth Before Sealing: 67 ft
- Original Depth: 67 ft

**Well/Seal Seal:**

- Water/Supply Well: Multiwells
- Monitor Well
- Enc. Bore Hole: Other

**Casing:**

- Diameter: 2 in. from 10 ft to 60 ft
- Depth: 2 in. from 10 ft to 60 ft

**Wellhead Completion:**

- Outside: Well House
- Inside: Basement/Other

**Casing:**

- Type: Steel
- Material: Plastic

**Screen/Open Hole:**

- Screen from 60 ft to 107 ft
- Open Hole from 60 ft to 107 ft

**Obstructions:**

- Rigid/Drill Pipe
- Check Valve(s)
- Debris
- Fill

**Type of Obstruction:**

- Description:
- Other:

**Pump:**

- Type: None

**Method Used to Seal Annular Space Between 2 Casings:**

- No Annular Space exists

**Type of Parapet:**

- Other:

**Grouting Material:**

- Bentonite

<table>
<thead>
<tr>
<th>Grouting Material</th>
<th>From</th>
<th>To</th>
<th>Yards</th>
<th>Bags</th>
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<tr>
<td>Bentonite</td>
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<td>67</td>
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**Remarks, Source of Data, Difficulties in Sealing:**

**Licensed or Registered Contractor Certification:**

- License or Registration No.: 0

- Certified Representative Signature:

- Date: 0

- Name of Person Sealing Well or Boring:

- Tammy Roy
**MINNESOTA DEPARTMENT OF HEALTH**

**WELL AND BORING SEALING RECORD**

**Minnesota Statutes, Chapter 109F**

**Minnesota Well and Boring Sealing No.**

**Minnesota Urgent Well No. or Well No.**

**County Name:** Sherburne

**TOWNSHIP NAME:** Becker

**TOWNSHIP No.:** T33

**SECTION No.:** 29

**FRAC. (a.m. to p.m.):** 11M50'S 56"

**DATE SEALING:** 3/30/20

**DATE WELL OR BORING CONSTRUCTED:** 2/14/20

**DEPT BEFORE BORING:** 18 ft.

**DEPTH ESTIMATED:** 18 ft.

**LOCATION:**

**WELL/BORING:** Water Supply Well

**NUMBER OF PUMPS:**

- Multiquip

**STATIC WATER LEVEL:** 8 ft. below land surface

**WELLHEAD COMPLETION:**

- Well House
- At Grade
- Basement Offset
- Well Pit
- Other

**CASING TYPE:**

- Sheet
- Plastic
- Tile
- Other

**SCREEN/OPEN HOLE:**

- Opened from __________ to __________ ft.

**OBSTRUCTIONS:**

- Pipe/Cable
- Check Valve
- Other

**Casing/Drill:**

- Diameter: __________
- Depth: __________ to __________ ft.
- Yes
- No
- Yes
- No
- Unknown

**METHOD USED TO SEAL:**

- No Annular Space Needed
- Annular Space Grouted with Threom Pipe

**GROUTING MATERIAL(S):**

- Bentonite

- From to __________

- Yards

- Bags

**REMARKS, SOURCE OF DATA, DIFFICULTIES IN SEALING:**

**LICENSED OR REGISTERED CONTRACTOR CERTIFICATION**

This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

**License Business Name:**

**License or Registration No.:**

**Certified Representative Signature:**

**Certified Rep. No.:**

**Date:**

**Name of Person Sealing Well or Boring:**

**Minn. Dept. of Health Copy:**

**Tammy Roy**