Presentation Outline

• Borehole Filling and Sealing

• High Capacity Wells

• Public System Determination
Presentation Outline

- Borehole Filling and Sealing
- High Capacity Wells
- Public System Determination
"Drillhole" means an excavation, opening or driven point well deeper than it is wide that extends more than 10 feet below the ground surface.

NR 812.07(33)
Applicability

For the purposes of filling and sealing, the provisions of NR 812 apply to all drillholes and wells including elevator shaft drillholes, unsuccessful or noncomplying heat exchange drillholes, mining exploration drillholes not regulated by ch. NR 132 or subch. Ill of ch. 295, Stats., and wells and drillholes not regulated by s. NR 141.25.
Applicability

In other words, NR 812 applies to everything except:

ch. NR 132 – Nonferrous Metallic Mining

subch. III of ch. 295, Stats. – Ferrous Metallic Mining

s. NR 141.25. – GW Monitoring Wells
Applicability

There has been confusion...

**NR 141.03 Applicability.** This chapter applies to all persons installing and abandoning groundwater monitoring wells and boreholes for purposes regulated by the department under ch. [160](https://www.legis.wisconsin.gov/statutes/text/160), [281](https://www.legis.wisconsin.gov/statutes/text/281), [283](https://www.legis.wisconsin.gov/statutes/text/283), [289](https://www.legis.wisconsin.gov/statutes/text/289), [291](https://www.legis.wisconsin.gov/statutes/text/291), [292](https://www.legis.wisconsin.gov/statutes/text/292), [293](https://www.legis.wisconsin.gov/statutes/text/293) or [299](https://www.legis.wisconsin.gov/statutes/text/299), Stats., or in permits, plan approvals, licenses or orders issued under those chapters. In addition, this chapter applies to all persons installing groundwater monitoring wells and boreholes in fulfillment of terms of a contract with the department. All wells and boreholes installed for purposes regulated by the department under this chapter shall be abandoned according to s. [NR 141.25](https://www.legis.wisconsin.gov/statutes/text/NR_141.25). All other wells and boreholes shall be abandoned according to the provisions of ch. [NR 812](https://www.legis.wisconsin.gov/statutes/text/NR_812).
Applicability

There has been confusion...

NR 141.03  Applicability. This chapter applies to all persons installing and abandoning groundwater monitoring wells and boreholes for purposes regulated by the department under ch. 160, 281, 283, 289, 291, 292, 293 or 299, Stats., or in permits, plan approvals, licenses or orders issued under those chapters. In addition, this chapter applies to all persons installing groundwater monitoring wells and boreholes in fulfillment of terms of a contract with the department. All wells and boreholes installed for purposes regulated by the department under this chapter shall be abandoned according to s. NR 141.25. All other wells and boreholes shall be abandoned according to the provisions of ch. NR 812.
Applicability

There has been confusion...

NR 141.03   Applicability. This chapter applies to all persons installing and abandoning groundwater monitoring wells and boreholes for purposes regulated by the department under ch. 160, 281, 283, 289, 291, 292, 293 or 299, Stats., or in permits, plan approvals, licenses or orders issued under those chapters. In addition, this chapter applies to all persons installing groundwater monitoring wells and boreholes in fulfillment of terms of a contract with the department. All wells and boreholes installed for purposes regulated by the department under this chapter shall be abandoned according to s. NR 141.25. All other wells and boreholes shall be abandoned according to the provisions of ch. NR 812.
NR 812 - Requirements

• WHEN - No later than 90 days after removal from service (minimum requirement)

• WHY - Poses a hazard to health or safety, or to groundwater

• WHO - Licensed well driller / Pump Installer
  – If it’s a well
NR 812 - Requirements

- All drillhole locations must be GPS located
  - This includes failed sites

- Submit paperwork
  - Every drillhole needs a report
    - Well construction report or
    - Filling and sealing report
      - Form 3300-005
      - Electronic submittal (wells)
        » As of 7/1/2016
NR 812 - Methods

• Neat cement grout
  – Must use tremie pipe

• bentonite chips
  – Must use screen

• No cuttings
• No granular bentonite

See NR 812.26 for details
https://docs.legis.wisconsin.gov/code/admin_code/nr/800/812/II/26

Filling and Sealing: Why is it important?

Open boreholes are direct conduits for contaminants to reach aquifer below

Cambrian Sandstones are primary water supply aquifers in western WI

Figure Modified from: WGNHS Bedrock Geology West-Central Sheet B. Brown 1988
Contaminant Pathway

Surface water leaking into improperly filled & sealed well.

Washed-out concrete aggregate

Well in service

Unconsolidated overburden

Fractured bedrock

Image from:
Filling and Sealing: Why is it Important?

Beyond the risk to drinking water supplies

Safety hazard
  children falling into dug wells
  animals can be injured

Liability – this applies to all of the above
Examples
Examples
Improper Filling and Sealing
Proper filling and sealing
Presentation Outline

• Borehole Filling and Sealing

• High Capacity Wells

• Public System Determination
High Capacity Wells – Fun Facts

• “High Capacity” – total pumping capacity of property is 100,000 gpd (~70 gpm) or greater

• Uses for High Caps – Irrigation, livestock, manufacturing, aquaculture, mining, bottling, fire suppression, some homes, public water supply
High Capacity Wells – Fun Facts

<table>
<thead>
<tr>
<th>Year</th>
<th>IN62: Non-Metallic Mining Processing (Bgal)</th>
<th>IN65: Industrial Sand Mining (Bgal)</th>
<th>Sector Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>1.22</td>
<td>1.47</td>
<td>9</td>
</tr>
<tr>
<td>2012</td>
<td>1.97</td>
<td>0.79</td>
<td>8</td>
</tr>
<tr>
<td>2013</td>
<td>1.20</td>
<td>1.21</td>
<td>9</td>
</tr>
<tr>
<td>2014</td>
<td>1.30</td>
<td>1.59</td>
<td>8</td>
</tr>
<tr>
<td>2015</td>
<td><strong>1.55</strong></td>
<td><strong>1.42</strong></td>
<td><strong>8</strong></td>
</tr>
<tr>
<td>2016</td>
<td>1.44</td>
<td>0.83</td>
<td>10</td>
</tr>
</tbody>
</table>

* Combined IN62 and IN65

- In 2015, non-metallic mining ranked 8\(^{th}\) with 2.97 billion gallons of groundwater withdrawn or 1.3% of Wisconsin’s groundwater withdrawal
- Average withdrawal (2011-2016) for ISM well = 33.4 MG/yr
- Compare this with Avg Irrigation withdrawal (2010-2016) of 24.3 MG/yr and Avg Municipal well withdrawal (2010-2016) of 61.9MG/yr
This presentation reflects the Wisconsin DNR’s high capacity well application and review process as of today (05/12/2017) but may not reflect the process in the future due to changes in law, policy and court decisions.
The Wisconsin DNR’s High Capacity Well Approval Process

- **High Capacity Well Application Submitted to WI DNR**
- **WI DNR conducts review of high capacity well application**
- **WI DNR determines outcome of high capacity well application**

**Outcomes:**
- Denied
- Approved with Modifications
- Approved
The Wisconsin DNR’s High Capacity Well Approval Process

High Capacity Well Application Submitted to WI DNR

WI DNR conducts review of high capacity well application

WI DNR determines outcome of high capacity well application

Denied
Approved with Modifications
Approved
High capacity means a well, except for a residential well or fire protection well, that, together with all other wells on the same property, except for residential wells and fire protection wells, has a capacity of more than 100,000 gallons per day (70 gpm). s. 281.34 Wis. Stats.
Submitting the Application

Any new or replacement well on a high capacity property requires one of two types of applications:

Non-Potable High Cap Well Application
WDNR Form 3300-295
4 page application
Submit application and $500 fee

Instructions to complete the high capacity application can be found @

Potable High Cap Well Application
WDNR Form 3300-256
6 page application
Submit application and $500 fee
Submitting the Application

Location

Water Use Type, Frequency, & Volume

Well Construction

Location: dodge.uwex.edu

Water Use Type:

Frequency, & Volume:

Well Construction:

www.bcgroundwater.ca
DNR’s Processing of High Capacity Well Application

1. Application Received by DNR
2. App registered into Water Use System
3. Groundwater Quantity Review
4. Non-Potable Approval Issued
5. Potable Engineering Review
6. Potable Approval Issued

Water Use Program
Public Water Engineering Program
The Wisconsin DNR’s High Capacity Well Approval Process

- High Capacity Well Application Submitted to WI DNR
- WI DNR conducts review of high capacity well application
- WI DNR determines outcome of high capacity well application

Outcome Options:
- Denied
- Approved with Modifications
- Approved
Evolution of High Capacity Well Review in Wisconsin: A Primer of Wisconsin’s High Capacity Well Legal Authority

**1945 - 2004**
Municipal well impacts only

**2004 - 2011**
Within 1,200-feet of designated waters
1 cfs springs
>95% water loss

**2011 - 2014**
Any significant impacts to waters of the State from wells from a high capacity property

**2014 – May 9, 2016**
Cumulative Impacts

**May 10, 2016 - Present**
Within 1,200-feet of designated waters
1 cfs springs
>95% water loss
Wisconsin DNR’s High Capacity Well Review Process: Pre-May 2016
Screen Process
Does the Proposed High Capacity Well:
- fall within a Groundwater Protection Area? (Within 1,200 feet to trout stream, outstanding or exceptional resource water body)
- impact to spring (> 1 cfs)?
- result in 95% Water Loss?
- impact a municipal well?
- impact groundwater quality?

Wis. Stat. 281.34, Admin. Code NR 812.09

Application is either conditioned to avoid significant adverse impacts or application is denied.

Application is approved as requested.
The Wisconsin DNR’s High Capacity Well Approval Process

High Capacity Well Application Submitted to WI DNR

WI DNR conducts review of high capacity well application

WI DNR determines outcome of high capacity well application

- Denied
- Approved with Modifications
- Approved
**High Capacity Well Approval Document**

**APPROVAL TO CONSTRUCT A HIGH CAPACITY WELL**

- **Approval Date:** 10/21/2016
- **County:** Pepin
- **High Cap File Number:** 47-01-0058
- **Property Number:** 13669

**Property Water Use:** IR10 - Agricultural irrigation

<table>
<thead>
<tr>
<th>Well Location</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High Capacity Well Number:</td>
<td>74043</td>
</tr>
<tr>
<td>Well Name Assigned by Well Owner:</td>
<td>Irrigation Well</td>
</tr>
<tr>
<td>PLSS Description:</td>
<td>NW/SE Sec03 T25N R12W</td>
</tr>
<tr>
<td>Latitude (Decimal Degrees):</td>
<td>44.6748</td>
</tr>
<tr>
<td>Longitude (Decimal Degrees):</td>
<td>-91.8186</td>
</tr>
<tr>
<td>Approved Pump Type:</td>
<td>Lineshaft turbine</td>
</tr>
<tr>
<td>Approved Pump Capacity (gpm):</td>
<td>800</td>
</tr>
<tr>
<td>Approved Discharge Type (Over Top of Casing, Seal, Pileless Adapter or Unit):</td>
<td>Overtop of casing</td>
</tr>
<tr>
<td>Approved Discharge Location (Building Pressure Tank, Pond, etc.):</td>
<td>Center Pivot</td>
</tr>
</tbody>
</table>

**Well Construction**

<table>
<thead>
<tr>
<th>Drilling Method(s):</th>
<th>Mud Rotary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Well Depth:</td>
<td>400'</td>
</tr>
<tr>
<td>Approved Finished Aquifer:</td>
<td>Sandstone</td>
</tr>
<tr>
<td>Enlarged Drillhole Diameter / Depth Interval:</td>
<td>22'/60' to 60'</td>
</tr>
<tr>
<td>Lower Drillhole Diameter / Depth Interval:</td>
<td>15'/400' to 400'</td>
</tr>
<tr>
<td>Casing Diameter / Wall Thickness:</td>
<td>16'/0.25'</td>
</tr>
<tr>
<td>Casing Material / Joint Type:</td>
<td>Stainless Steel / Welded</td>
</tr>
<tr>
<td>Depth of Grouted Casing:</td>
<td>60'</td>
</tr>
<tr>
<td>Screen Material / Slot Size in Inches / Depth Interval:</td>
<td></td>
</tr>
<tr>
<td>Annular Space Seal Type:</td>
<td>Neat Cement Grout</td>
</tr>
<tr>
<td>Annular Space Seal Length:</td>
<td>60'</td>
</tr>
</tbody>
</table>

**Standard Considerations and Requirements:**

- You or your well driller must contact Stacy J Steinke at 715-839-3773 at least one work day prior to starting construction in accordance with s. NR 812.03 (1), Wis. Adm. Code.
- The pump installation will discharge through a Department-approved pump and the entire discharge piping arrangement system shall be installed in a manner to meet the applicable requirements of Ch. NR 812, Wis. Adm. Code.
- Unless otherwise stated in explicit conditions specified in this approval, the approved high capacity well shall be constructed within a distance of 660 feet around the approved coordinates; this allowance is subject to setbacks defined in Ch. NR 812, Wis. Adm. Code.
## High Capacity Well Approval Document

### High Capacity Well Withdrawal Approval

**Approval Date:** 10/21/2016  
**County:** Pepin  
**High Cap File Number:** 47-01-0058  
**Property Number:** 13669

### New Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Water Use Code(s)</th>
<th>High Capacity Well Number</th>
<th>Pump Capacity (gpm)</th>
<th>Latitude - Decimal Degrees (e.g., 45.12345)</th>
<th>Longitude - Decimal Degrees (e.g., -91.12345)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation Well</td>
<td>IR10</td>
<td>74043</td>
<td>800</td>
<td>44.6746</td>
<td>-91.8188</td>
</tr>
</tbody>
</table>

### Existing Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Water Use Code</th>
<th>WUWN or Image File # (if known)</th>
<th>High Capacity Well Number</th>
<th>Pump Capacity (gpm)</th>
<th>Latitude - Decimal Degrees (e.g., 45.12345)</th>
<th>Longitude - Decimal Degrees (e.g., -91.12345)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>DS11</td>
<td>AJ183</td>
<td>74042</td>
<td>10</td>
<td>44.6672</td>
<td>-91.822</td>
</tr>
<tr>
<td>Barn Well #3</td>
<td>LV10</td>
<td>XU835</td>
<td>74532</td>
<td>60</td>
<td>44.6676</td>
<td>-91.8188</td>
</tr>
<tr>
<td>Barn Well 1</td>
<td>LV10</td>
<td>TY138</td>
<td>74539</td>
<td>50</td>
<td>44.6674</td>
<td>-91.8201</td>
</tr>
</tbody>
</table>

### Approved Withdrawals by Source

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Water Use Code</th>
<th>High Cap Well #</th>
<th>Pump Capacity (gpm)</th>
<th>Approved Daily Withdrawal (gallons)</th>
<th>Maximum Approved Monthly Withdrawal Amount (millions of gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>DS11</td>
<td>74042</td>
<td>10</td>
<td>14400</td>
<td>Jan: 0.45, Feb: 0.40, Mar: 0.46, Apr: 0.43, May: 0.45, Jun: 0.45, Jul: 0.46, Aug: 0.45, Sep: 0.45, Oct: 0.45, Nov: 0.45, Dec: 0.45</td>
</tr>
<tr>
<td>Irrigation Well</td>
<td>IR10</td>
<td>74043</td>
<td>800</td>
<td>1152000</td>
<td>0 0 0 34.6 35.7 34.6 35.7 34.6 35.7 34.6 35.7 0 0</td>
</tr>
<tr>
<td>Barn Well #3</td>
<td>LV10</td>
<td>74532</td>
<td>60</td>
<td>86400</td>
<td>2.68 2.42 2.88 2.59 2.68 2.59 2.68 2.68 2.68 2.68 2.68 2.68</td>
</tr>
<tr>
<td>Barn Well 1</td>
<td>LV10</td>
<td>74539</td>
<td>50</td>
<td>72000</td>
<td>2.33 2.02 2.23 2.16 2.23 2.16 2.23 2.23 2.23 2.16 2.23 2.23</td>
</tr>
</tbody>
</table>

### Maximum Property Monthly Withdrawal Amounts (millions of gallons)

<table>
<thead>
<tr>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.36</td>
<td>4.64</td>
<td>5.36</td>
<td>39.7</td>
<td>41.1</td>
<td>39.7</td>
<td>41.1</td>
<td>39.7</td>
<td>41.1</td>
<td>39.7</td>
<td>5.18</td>
<td>5.36</td>
</tr>
</tbody>
</table>

Please note that your property approval is equal to the sum of the approved withdrawal amounts for each source.
Presentation Outline

- Borehole Filling and Sealing
- High Capacity Well Approval
- Public System Determination

Image: Parratt Wolff Inc.
Well Types and Uses

High Capacity Well

- Non-potable
  - Process water, dust suppression, Etc.

- Potable
  - Office well, shop well, Etc.
Is Your Facility a Public System?

- Serves 25 or more 60 days/year
- Serves the same 25 people 6 months/yr

If yes to both, you are a Non-transient, non-community system (NN)
So I’m a Public System. Now What?

Non-community Non-transient (NN)
• Certified Operator required
• Must sample for bacteria and Nitrate annually
• Sampling for other parameters including:
  Lead, copper, inorganics and VOC’s as specified in NR 809 Safe Drinking Water
  https://docs.legis.wisconsin.gov/code/admin_code/nr/800/809/Title
Non-community Non-transient (NN)

- Inspection every 5 years
  - Sanitary survey

- New Systems – Capacity Development
  - Demonstrate ability to provide safe drinking water
Capacity Development Strategy

• New public water systems
  • capacity evaluation performed & approvals issued as part of review process
  • requirement appears in NR 810.24

• Existing water systems
  • sanitary survey is primary tool for evaluating capacity
  • Continuing Ed for Certified Operator
Public Water System Operation

• Status may change
  – If employees are added or cut
  – Certified operator must be aware of status
  – Communicate with DNR
    • Public Drinking Water staff

• This is especially relevant to Industrial Sand facilities
  – Affected by market fluctuations
Capacity development is the process of water systems acquiring and maintaining adequate technical, managerial, and financial capabilities to enable them to consistently provide safe drinking water.

— US EPA
Also subject to NR 810

Requires (TMF):

• Technical—including physical infrastructure, source water adequacy, treatment adequacy, operational capability of system personnel

• Managerial—including ownership, organization structure, staffing, interactions with customers & regulators

• Financial—including revenue adequacy, access to capital, fiscal management & record keeping, budgeting, financial planning, financial management