West Wildrose Aquifer

Divide and Williams Counties

Aquifer At-a-Glance

<table>
<thead>
<tr>
<th>Area</th>
<th>16.5 square miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer Type</td>
<td>Unconfined and Confined Surficial</td>
</tr>
<tr>
<td>Major Land Uses over Aquifer (percentage of aquifer area covered in 2017)</td>
<td>Crops (49%) Grassland/Pasture (34%)</td>
</tr>
<tr>
<td>Depth to Water (2015-2021)*</td>
<td>36-80+ feet</td>
</tr>
<tr>
<td>Total Unique Wells Sampled</td>
<td>5</td>
</tr>
<tr>
<td>Wells Sampled in 2021</td>
<td>4</td>
</tr>
<tr>
<td>Years Sampled</td>
<td>2015, 2016, 2018, 2019, 2021</td>
</tr>
</tbody>
</table>

*Depths to water may vary seasonally, year to year, and across the aquifer.

- Aquifer materials consist of sands and gravels deposited by streams carrying meltwater away from glaciers during the last ice age. These materials were deposited in an ancient valley. Part of the aquifer is overlain by silt and clay deposited by glaciers.²,³
- The aquifer ranges from 15 to 46 feet thick and averages around 25 feet thick. The top of the aquifer is often over 80 feet below the surface.²,³
- Domestic and stock wells are common in the aquifer. Several irrigation and industrial wells are also installed in the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2020, 48 million gallons of permitted water were drawn from the aquifer; irrigation use consumed the largest quantity of water. For more information on water use and permits, contact the North Dakota Department of Water Resources (dwr.nd.gov).

2020 West Wildrose aquifer permitted water use (from North Dakota Department of Water Resources (dwr.nd.gov))

<table>
<thead>
<tr>
<th>Use</th>
<th>2020 Water Used (Millions of Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>40</td>
</tr>
<tr>
<td>Industrial</td>
<td>0.02</td>
</tr>
<tr>
<td>Municipal</td>
<td>No Permitted Water Use</td>
</tr>
<tr>
<td>Rural Water</td>
<td>No Permitted Water Use</td>
</tr>
</tbody>
</table>

About the Western Groundwater Monitoring Program

- The North Dakota Department of Environmental Quality (NDDEQ) monitors a network of wells in approximately 20 surficial aquifers that are at elevated risk of oilfield contamination.
- Aquifers are sampled on a 1.5-year rotation.
- Monitoring began in 2013.
- The monitored aquifers are all within the oil-producing counties of northwestern North Dakota.
- Water is tested for general chemistry parameters, trace metals, diesel and gasoline range organics, benzene, toluene, ethylbenzene, and xylenes.

References

### Water Chemistry

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>2021 Median Concentration</th>
<th>Potential Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>Locally</td>
<td>&lt; 0.005 mg/L</td>
<td>Skin or circulatory system damage, increased cancer risk</td>
</tr>
<tr>
<td>Iron</td>
<td>YES</td>
<td>0.84 mg/L</td>
<td>Metallic taste/odor, discoloration of surfaces</td>
</tr>
<tr>
<td>Manganese</td>
<td>YES</td>
<td>0.65 mg/L</td>
<td>Taste, people with certain health conditions may need to limit intake</td>
</tr>
<tr>
<td>Sodium</td>
<td>Locally</td>
<td>98.7 mg/L</td>
<td>Taste/odor, laxative effect for people not used to the water</td>
</tr>
<tr>
<td>Sulfate</td>
<td>YES</td>
<td>345 mg/L</td>
<td></td>
</tr>
</tbody>
</table>

For more information about Maximum Contaminant Levels (MCLs), health effects, and treatment options for these contaminants and more, see the NDDEQ’s fact sheets (deq.nd.gov/wq/1_Groundwater) or visit the US EPA website (epa.gov/ground-water-and-drinking-water).

#### Dominant Water Type
- Calcium-Bicarbonate

#### Water Hardness
- Very Hard

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### Nitrate

**Percentage of Wells Exceeding the Nitrate Maximum Contaminant Level (MCL)* (10 mg/L as N).**

- No Nitrate MCL Exceedances

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### Gasoline and Diesel Range Organics

Gasoline and diesel range organics (GRO and DRO) are groups of chemical compounds containing carbon that are common in either gasoline or diesel fuel. Neither group has a regulatory limit, but the NDDEQ uses a screening level of 500 µg/L. Detections below this may be from other natural carbon sources such as decaying plant matter rather than oil byproducts.

- **GRO Screening Level Exceedances**: None
- **DRO Screening Level Exceedances**: None

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### Chloride

Chloride is both a natural component of groundwater and a component of brine (salt water), a byproduct of oil production.

**Percentage of Wells Exceeding the Non-regulatory Chloride Secondary Water Quality Standard (250 mg/L).**

- **No Chloride Standard Exceedances**

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### Oilfield Compounds

#### BTEX

Benzene, toluene, ethylbenzene, and xylenes (BTEX) are a group of compounds that are naturally occurring in petroleum. All four have Maximum Contaminant Levels (MCLs)* that can be used as screening levels to determine the severity of any detection.

- **Benzene Detections**: None
- **Toluene Detections**: None
- **Ethylbenzene Detections**: None
- **Xylenes Detections**: None

#### Bromide

Bromide is a natural component of groundwater and can also be introduced through oil and gas extraction.

- **Wells Exceeding NDDEQ’s 3-5 mg/L Screening Level**: None

*Note that MCLs are for public drinking water systems; private wells are not regulated in North Dakota. MCLs still provide guidelines for drinking groundwater.

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