2019 Papio-Missouri River NRD Groundwater Quality Monitoring Results

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2019 Groundwater Quality Results

- Background

- 2019 sites sampled and results
  - Nitrate, arsenic, manganese, and pesticides
  - Pharmaceuticals and hormones

- 2020 sampling plan

- Publications and available data
Background

- USGS has collected groundwater quality samples in cooperation with the P-MRNRD since 1992
  - Support the P-MRNRD groundwater management plan
    - Monitor trends for selected State of Nebraska Title-118 analytes that have been detected at 30% of the maximum contaminant level
    - Monitor additional nutrients and pesticides
Background

- Well screened in four defined aquifers throughout the NRD
  - Network wells
    - Privately owned wells
  - Focus on a single specific aquifer each year
Background

- Monitoring well clusters
  - Dedicated monitoring wells owned by the NRD
  - Multiple wells at each location, screened at different elevations
  - Each well sampled every two years to support the DEQ in production of the Nebraska Groundwater Quality Report (LB329-2001)
Aquifers within the P-MRNRD
2019 Sites Sampled

- 44 total samples collected
  - 25 Platte/Elkhorn alluvial aquifer samples
    - 13 private wells
    - 5 cluster well sites (12 samples)
  - 19 monitoring well cluster samples
    - Samples collected at 9 sites
2019 Analytes

- Selected major ions, trace elements, and nutrients

- 5 samples analyzed for an in-depth pesticide suite
Nitrate Results

Nitrate, cluster wells

Well depths
- Less than 50ft BLS
- 50-100ft BLS
- 100-150ft BLS
- 150-200ft BLS
- Greater than 200ft BLS

Nitrate values
- No detection
- Nitrate below 5mg/L
- Nitrate 5-10mg/L
- Nitrate greater than 10mg/L
Nitrate Results

Springfield nitrate

Concentration, mg/L

Date


Deep Medium Shallow MCL Half MCL
Arsenic Results

**Well depths**
- Less than 50ft BLS
- 50-100ft BLS
- 100-150ft BLS
- 150-200ft BLS
- Greater than 200ft BLS

**Arsenic concentration**
- No detection
- Less than 5 ug/L
- 5-10 ug/L
- Greater than 10 ug/L
Iron Results
Pesticide Results

Explanation

- 2019 cluster well pesticide samples
- 2019 network well pesticide samples

Rivers

Counties

Aquifers
- Missouri
- Platte/Elkhorn
- Upland
- Dakota sandstone
- No Quaternary-age sediments (bedrock at surface)

Tekamah

Valley
2019 Sampling

Pharmaceutical and hormone sampling

- 17 samples per collection period
- First sample collected June 2019
- Second sample collected Oct-Nov 2019
2019 pharmaceutical and hormone sampling

- 134 total compounds
  - 112 pharmaceuticals, including
    - Acetomenphine
    - Atrazine
    - Caffeine
    - Nicotine
    - Codeine
  - 22 hormones, including
    - Cholesterol
    - Esterol
    - Progesterone
    - Testosterone
    - Diazepam
    - Methotrexate
    - Gabapentin
    - Hydrocortisone
Pharmaceutical detection

Atrazine
- Found in 15 samples at 4 sites
Pharmaceutical detection

Medicines
- Acetaminophen
- Metformin
- Hexamine
- Gantanol
Pharmaceutical detection

Nicotine
Pharmaceutical detection

Methyl-1H-benzotriazole
- Industrial fluid
- Manufacturing fluid
- Pesticide
2020 sampling plan

Upland alluvial aquifer and selected monitoring well clusters
Publications

- **Website**

- **Quality-Assessed Agrichemical Contaminant Database for Nebraska Groundwater**
  - Reports and data can be accessed at [http://dnrdata.dnr.ne.gov/Clearinghouse/Clearinghouse.aspx](http://dnrdata.dnr.ne.gov/Clearinghouse/Clearinghouse.aspx)

- **Scientific Investigations Report:**
  - Altitude, Age and Quality of Groundwater, Papio-Missouri River Natural Resources District, Eastern Nebraska, 1992-2009
Publications

- Nebraska Groundwater Quality Monitoring Report
  - [http://deq.ne.gov/publica.nsf/Pubs_Wat.xsp](http://deq.ne.gov/publica.nsf/Pubs_Wat.xsp)
GWMP Implications

**GWMP Requirements:**

- 50% of samples, >5 mg/L before becoming Phase II Groundwater Quality Management Area

<table>
<thead>
<tr>
<th>Groundwater Sub-Areas of interest (updated thru 2018)</th>
<th>Total Count</th>
<th>Nitrate greater than 5 mg/L</th>
<th>Percent greater than 5mg/L</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase II Subarea, south of Springfield</td>
<td>339346</td>
<td>218223</td>
<td>64%</td>
<td>Increasing trend at depth in Springfield cluster</td>
</tr>
<tr>
<td>Platte/Elkhorn, Douglas and Sarpy County</td>
<td>469474</td>
<td>14</td>
<td>3%</td>
<td>Venice and Ashland clusters</td>
</tr>
<tr>
<td>South Sarpy Dakota</td>
<td>3539</td>
<td>11</td>
<td>34.28%</td>
<td>Not sampled frequently until 2013; South Sarpy and Springfield 2 cluster wells installed in 2016. Does not include wells sampled from undefined aquifers</td>
</tr>
<tr>
<td>Phase II Subarea, Tekamah Cluster</td>
<td>446122</td>
<td>7478</td>
<td>64%</td>
<td>Med and deep wells show all 7477 &gt; 5 ppm and account for 7476 out of 446119 samples or 64.65%</td>
</tr>
</tbody>
</table>
GWMP Implications

- GWMP:
  - NO CHANGE in GW Quality Management Areas based on 2018 WQ monitoring results