

# Groundwater Management: QUALITY

Upper Big Blue NRD

ANNUAL  
REPORT

FY2008

## Groundwater Management Area for Quality

Federal and Nebraska regulations state that nitrate-nitrogen concentrations in drinking water greater than 10 parts per million (ppm) are potentially hazardous to high-risk individuals.

In response to concerns about elevated nitrate levels in District groundwater, the entire Upper Big Blue NRD is designated as a Groundwater Management Area for Quality (GWMA#2). The District's long-range goals for groundwater quality are:

- I.** To use education, research, management practices and incentives to reduce the potential for non-point source contamination of groundwater while not adversely affecting the economy of the area.
- II.** To develop monitoring and evaluation programs for non-point source contamination.
- III.** To encourage the use of "Best Management Practices" and the adoption of equipment and techniques to reduce nitrate leaching.

Twelve nitrate "management zones" have been formed. All zones began in Phase I of the action plan. Phase I prohibits the application of anhydrous ammonia fertilizer prior to November 1st. It also prohibits the application of other forms of nitrogen fertilizer prior to March 1st. Any zones which have nitrate levels of 9 ppm will enter Phase II management. In Phase II, farmers must attend nitrogen and irrigation management training, take deep soil samples, schedule irrigation and submit annual reports to the District on these activities. In 2003, Zone 5 was placed into Phase II with a median nitrate of 9.5 ppm. In 2004, Zone 6 was placed into Phase II with a median nitrate of 9.0 ppm.

Under GWMA#2, awareness efforts include supplements to the District's quarterly newsletter "Blueprint," various brochures, traveling displays, and staff presentations to service clubs, schools and other organizations.

*As part of the management efforts, the Upper Big Blue NRD prohibits application of anhydrous ammonia before November 1st and liquid and dry nitrogen fertilizer application before March 1st.*

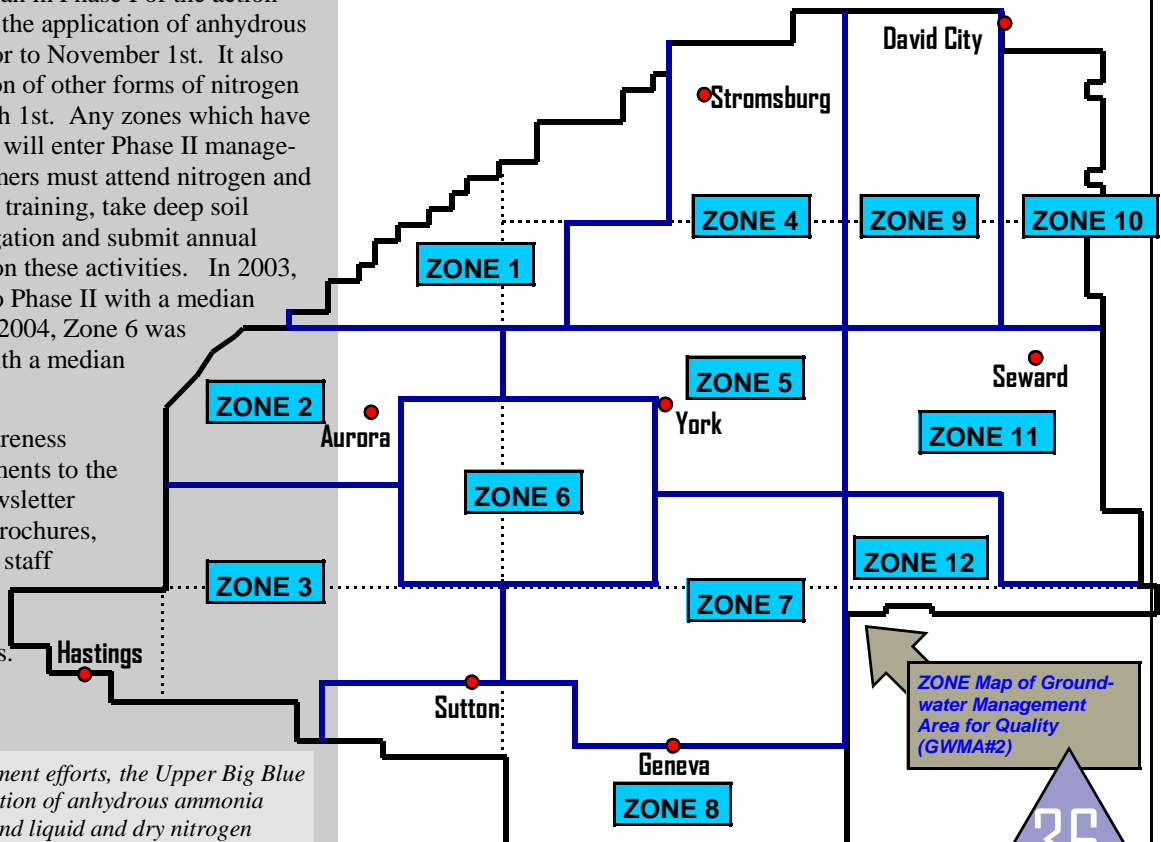
## Nitrate Monitoring

**N**itrate monitoring is an important component of the NRD's Groundwater Management Area #2. Samples from 121 wells in the NRD's Monitoring Well Network were analyzed for nitrates in four of the twelve management zones.

Zones with a median nitrate of 7.0 or greater are tested annually. Those zones that are less than 7.0 are tested every three years. Zones 4, 5, 6, 9, 10, 11, and 12 were sampled in 2007. The median nitrate levels for each zone each year sampled is shown in **Graph Ni-2** on page 38.

The median nitrate value for Zones 4, 5, 6, 9, 10, 11, and 12 were as follows:

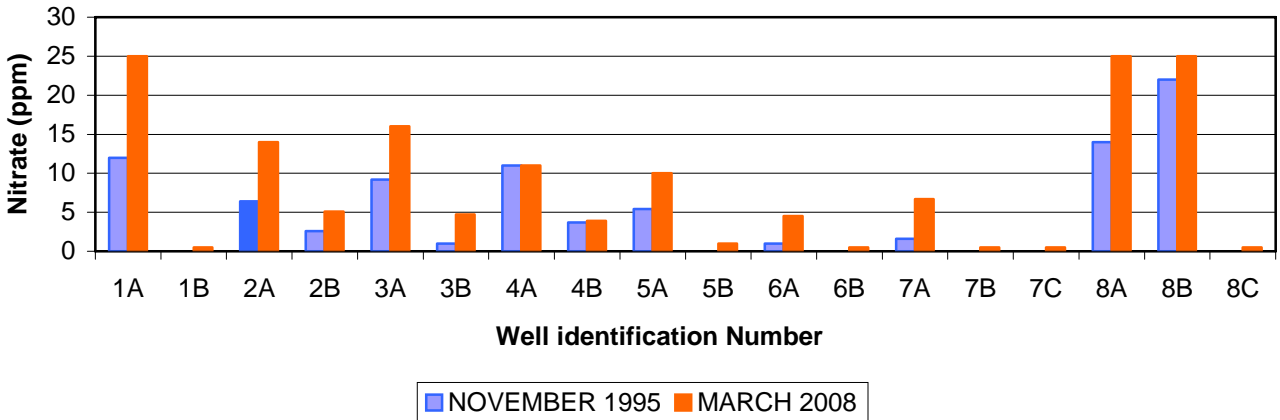
Zone 4	—	6.9 ppm
Zone 5	—	12.0 ppm
Zone 6	—	9.5 ppm
Zone 9	—	3.3 ppm
Zone 10	—	5.7 ppm
Zone 11	—	8.1 ppm
Zone 12	—	1.5 ppm



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## Dedicated Nitrate Monitoring Wells Upper Big Blue NRD

Graph Ni-1.



## LOCATION OF DEDICATED NITRATE MONITORING WELLS

1A & 1B: NW1/4 Section 1-T10N-R8W Hamilton County - 10 miles west of Aurora.

2A & 2B: NW1/4 Section 4-T10N-R5W Hamilton County - 1/2 mile south and 3/4 mile west of Hampton.

3A & 3B: NW1/4 Section 8-T7N-R6W Clay County - 1 mile south and 4-1/2 miles east of Harvard.

4A & 4B: NE1/4 Section 21-T13N-R4W Polk County - 1 mile east and 3/4 mile north of Polk.

5A & 5B: SE1/4 Section 15-T11N-R3W York County - 2 miles west and 2-1/4 miles north of Hwy. 34 & 81 junction.

6A & 6B: SE1/4 Section 5-T7N-R2W Fillmore County - 3 miles north of Geneva (Fairmont Air Base).

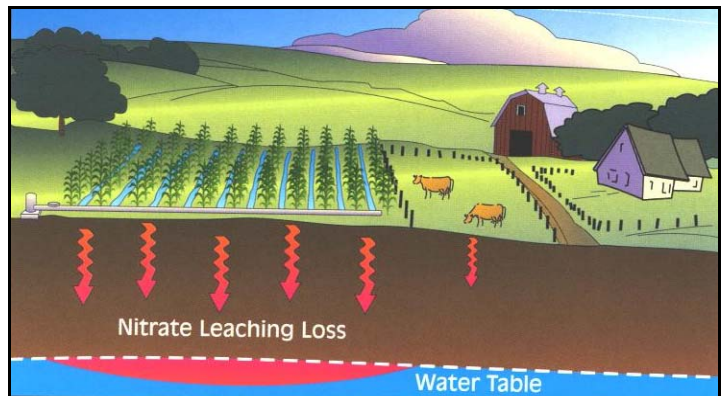
7A, 7B & 7C: SW1/4 Section 24-T13N-R1E Butler County - 2-1/2 miles west and 1 mile north of Ulysses.

8A, 8B & 8C: NE1/4 Section 22-T10N-R1E Seward County - 3 miles north of Beaver Crossing.

**Note:** Wells with an "A" designation are screened in the upper portion of the aquifer.

Wells with a "B" designation are screened in the lower part of the aquifer in the 2 well clusters and in the middle in the 3 well clusters.

Wells with a "C" designation are screened in the lower part of the aquifer.



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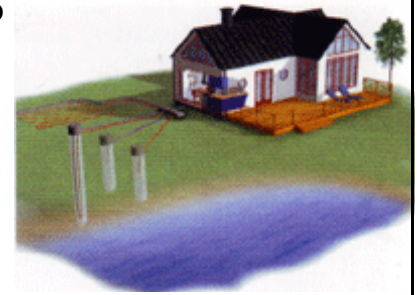


## Domestic Well Testing

*District wide*

The Domestic Well Testing Program keeps rural residents of the Upper Big Blue NRD apprised of the quality of their drinking water. (In towns, the city government or water supplier is required to annually inform residents of their water quality).

The NRD tested nitrate levels in 239 domestic wells across the District in calendar year 2007. The mean (average) nitrate level for all wells across the District was 8.3 ppm, with a median level of 6.8 ppm. Ninety-four (94) wells had less than 5.0 ppm, 87 wells had between 5.0 ppm and 9.9 ppm, and 58 wells had 10.0 ppm or more.

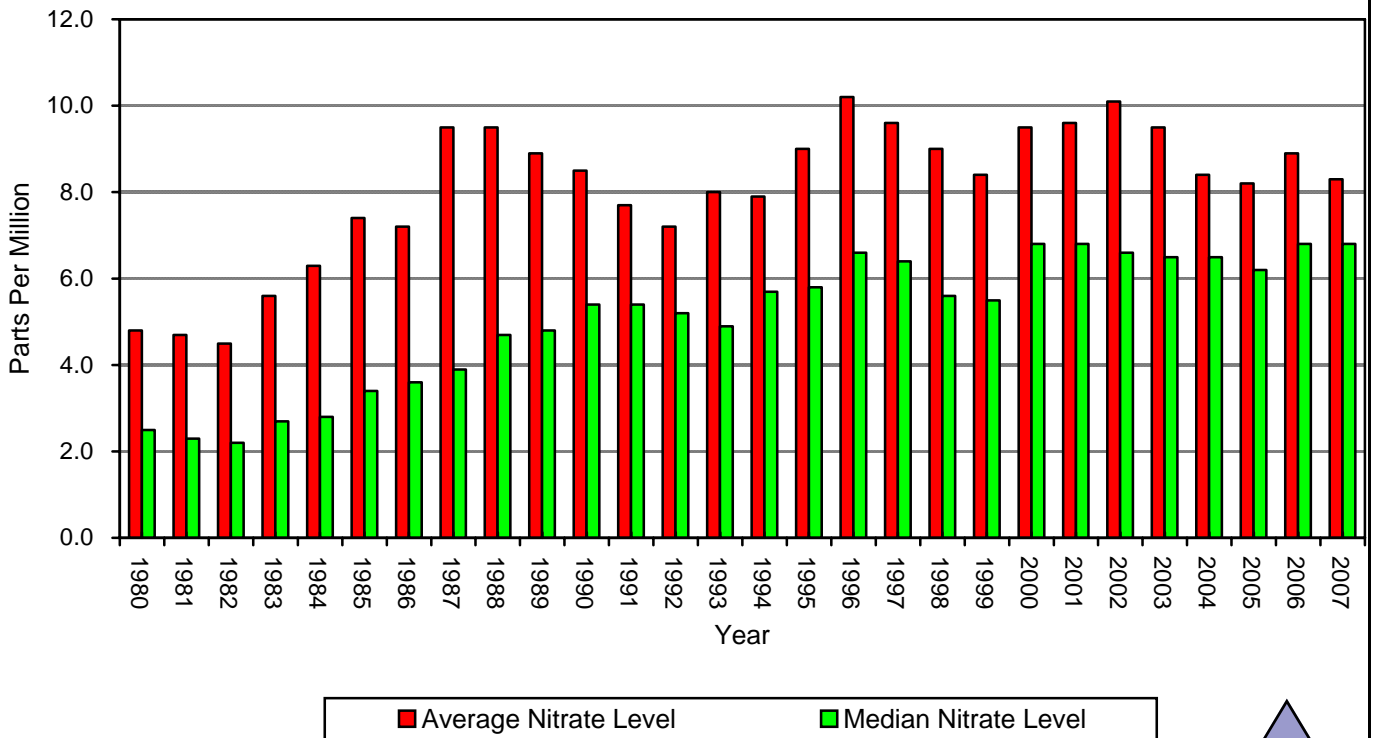


**Dan Leininger, Water Conservationist at the Upper Big Blue NRD takes a domestic water well sample northeast of York, Nebraska.**

**Graph Ni-3.**

## Average Nitrate Level In Domestic Wells

Upper Big Blue NRD

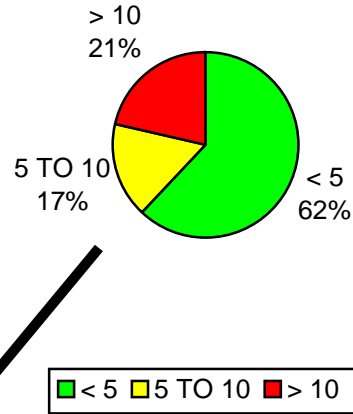


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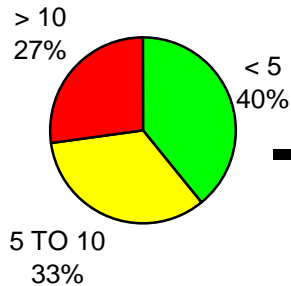
*Russ Gierhart (right), NRD Water Resources Technician, assists Sam Wilton with a 4-H research project sampling nitrates in the central portion of the District. Anyone with a private well in the NRD can receive free nitrate testing. The pie graphs on this page show the parts per million of nitrate in domestic wells during 1985, 2004, and 2007 for comparison. Sam's research has garnered him a spot at the 2008 State Fair to share his findings.*

**Groundwater Nitrate in Domestic Wells  
UBBNRD 1985**



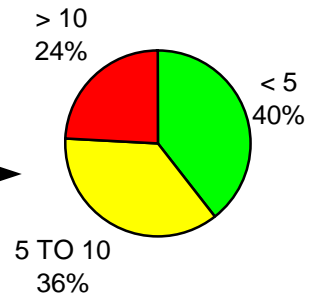
9 Years later

**Groundwater Nitrate in Domestic Wells  
UBBNRD 2004**



3 Years later

**Groundwater Nitrate in Domestic Wells  
UBBNRD 2007**



■ < 5   ■ 5 TO 10   ■ > 10

■ < 5   ■ 5 TO 10   ■ > 10

**NOTE:** > refers to "greater than"  
< refers to "less than"