

## Vertical Occurrence of Nitrate in Wisconsin Groundwater: Understanding the Graphs

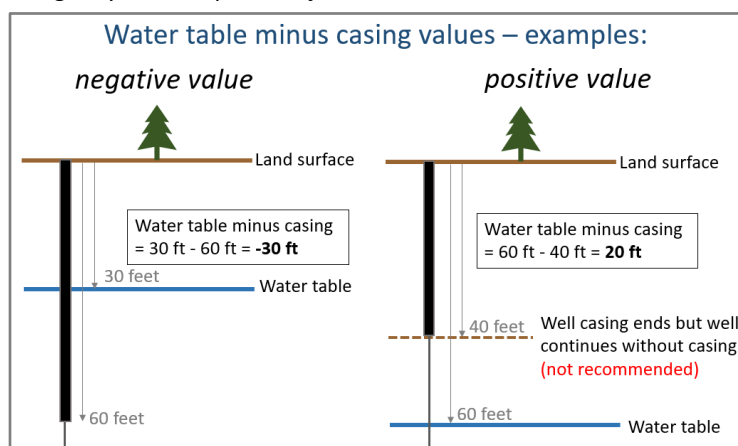
The graphs provided here are for informational purposes only. They are intended as an aid to understanding what nitrate concentrations may exist at a specific casing depth relative to the water table. The graphs show data the Department of Natural Resources (DNR) has aggregated from various sources, including laboratories and well construction reports submitted by well drillers. DNR does not guarantee data accuracy and the graphs are not a complete summary of all existing nitrate data. These graphs will be revised periodically over time to improve presentation of available data, which could include removing data for which accuracy has come into question or adding in older data not previously shown, and to incorporate newly available data. DNR does not require that these graphs are consulted or followed when making decisions about constructing or reconstructing wells. DNR does not guarantee a specific water quality outcome, even if the graphs are used as advised by groundwater experts. Historical data for nitrate showing low concentrations in groundwater do not a guarantee that levels will be low everywhere, or stay low over time. Derived conclusions and analyses generated from these data are not attributable to DNR. Use of these graphs does not preclude the need to follow all laws and regulations, including but not limited to Wis. Stat. ch. 280, Wis. Adm. Code ch. NR 812, and comply with all special well casing depth area requirements. For additional information, please see the [DNR Terms and Conditions](#).

Four graphs are displayed on the following pages:

The **Depth to Water** graph displays the *static water level*, the depth to the water surface encountered during drilling, of existing wells in the township. This gives an indication of how deep drilling may need to proceed just to reach the water table.

The three **Nitrate** graphs indicate the depth of penetration of nitrate in the aquifer. They display *water table minus casing* on the vertical axis. As shown on the sketches to the right, negative values on the vertical axis of each graph indicate that casing is below the water table, and positive values indicate that casing is completed above the water table. The graphs display the vertical occurrence of nitrate at the township scale. Nitrate concentrations in groundwater at your location may vary due to factors such as nearby agricultural practices and septic systems.

The **Nitrate – All Samples** graph shows all available nitrate data from all wells in the township, which in many cases includes multiple samples from a single well.



The **Maximum Nitrate in Each Well (Scatter Plot)** graph displays the maximum concentration measured in each well, so that each well is represented by only one data point. The **Maximum Nitrate in Each Well (Bar Plot)** graph also displays maximum nitrate data, but as a bar plot showing the number of samples in each of four concentration range categories.

**Some additional details:** These graphs display nitrate data available in the DNR's Groundwater Retrieval Network (GRN) database on 2/28/2023. Effecting casing depth corrections have been applied to the water table minus casing calculation for approximately 6% of wells in the statewide dataset. Also note that the vertical axis is cut off at a maximum of -260 feet to display data that are informative for most casing depth decisions for new wells.

### How can I decide on a casing depth?

The following are suggestions to aid in deciding on the casing depth below the water table for a new well:

- Although the graphs display positive values of water table minus casing, in general it is recommended to install casing to a depth below the water table to protect groundwater quality.
- Find the set of nitrate graphs for your township. Look at nitrate-nitrogen concentrations for small negative values (indicating shallow casing depths) of water table minus casing. If concentrations at shallow casing depths are above 10 mg/L or if there are frequent instances of concentrations higher than you would like in your water, look at concentrations in deeper-cased wells (larger negative values of water table minus casing). Identify a depth at which there is a reasonable likelihood of obtaining low-nitrate water.
- Once you identify a casing depth with nitrate concentrations you are comfortable with, consider adding additional casing depth as a safety factor for long-term water quality and water levels.
- If there are not a lot of data for your township and/or the location for a new well is near the edge of a township, you may want to also look at these graphs for one or more neighboring townships.

If you have questions, please contact a DNR Drinking Water and Groundwater program staff member.