Oregon DEQ Nitrate Screening Informs Oregonians about Groundwater Pollution

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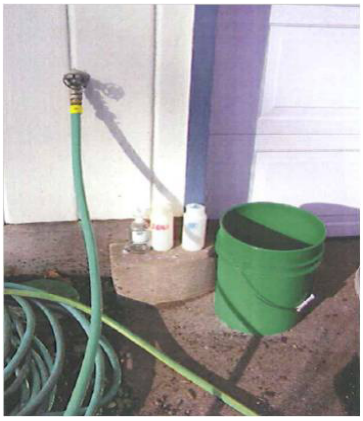
YSI Professional Plus Groundwater Nitrate

Application Note A602

Groundwater in Oregon: Valued Resource

Groundwater is essential to the economic viability and livability of many Oregon communities. It is a source for municipal, commercial and individual drinking water supplies, irrigation water for agriculture, and many other uses. It provides drinking water for over 70 percent of Oregon's residents through public drinking water supply systems and private wells. More than 600,000 Oregonians get their drinking water from individual private water wells.



DEQ staff used a five-gallon bucket and a garden hose as a modified flow through cell for the YSI Professional Plus meter to measure nitrate in domestic wells throughout Oregon.

Groundwater also influences the quality of many Oregon rivers and streams. Especially during the dry summer months, groundwater inflows affect stream flow, chemistry and temperature, which in turn determine the quality of surface waters used for drinking water, irrigation and recreation. High-quality inflows of groundwater are essential for maintaining cold-water fisheries in many streams.

Groundwater Contamination

Groundwater contamination is a serious issue in some areas of Oregon. Many agencies study the quantity and quality of Oregon's groundwater resources. Ambient groundwater quality studies over the past 25 years and routine monitoring of public water supplies found 35 of 45 study areas show some impairment or reason for concern. Nitrate is the most commonly detected contaminant, followed by pesticides, volatile organic compounds, and bacteria. Data collected show that 17 percent of 1,010 wells sampled statewide do not meet the drinking water standard for arsenic. Sixteen percent of 3,199 wells sampled do not meet the drinking water standard for nitrate. Thirty-three percent of Willamette Valley rural wells contain at least one pesticide.

Groundwater Management Areas (GWMAs)

The Oregon Department of Environmental Quality (DEQ) Laboratory and Environmental Assessment staff collect more than 400 water samples each year from domestic and monitoring wells in three groundwater management areas in Oregon. The DEQ samples over 90 wells, including many rural home domestic wells, on a routine basis. Contamination in these areas is associated with nonpoint sources such as agricultural practices and rural residential septic systems. DEQ staff monitor wells in the Northern Malheur County, Lower Umatilla Basin and Southern Willamette Valley GWMAs several times each year to assess nitrate and collect other water quality information.

For years, DEQ's lab staff has sampled groundwater throughout the state. The Oregon Legislature passed the Groundwater Protection Act in 1989, leading to increased interest in groundwater quality. Oregon DEQ responded by forming three distinct GWMAs to address groundwater quality concerns, including high nitrate levels. Traditionally, laboratory analysis provides data to inform voluntary action committees of the extent and status of nitrate contamination. Although quality of data from lab analysis is superb, it may take weeks to analyze and report the data. DEQ groundwater monitoring specialists see benefits in using nitrate meters to get faster nitrate measurements in the field.

Last August, DEQ used the YSI Professional Plus handheld multiparameter instrument outfitted with nitrate, temperature and conductivity sensors. The agency's water monitoring specialists then compared nitrate results from lab analysis with those collected in the field with the handheld meter.

Overall, nitrate values measured with the YSI Professional Plus meter were within -4.6 mg/L to +3.65 mg/L of the respective laboratory analysis values, with an absolute range of 0.017 mg/L to 4.67 mg/L. The meter measured values between 0.03 mg/L and 49.67 mg/L while the laboratory values ranged from <0.005 to 46.000 mg/L.

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The YSI Professional Plus can measure a single parameter to multiple parameters based on application needs.

The lab method is Standard Method 4500 NO3-F (Nitrate-Nitrite by automated cadmium reduction method) with a minimum reporting level (MRL) of 0.0050 mg/L. Since the Pro Plus was calibrated using 1mg/L and 100 mg/L nitrate standards, the MRL for the YSI Professional Plus meter was set to 1 mg/L for data analysis. All values below 0.0050 mg/L and 1 mg/L were set to the MRL for data analyses.

Using the handheld meter could provide DEQ with another tool in its efforts to get better information about nitrate levels in Oregonians' wells, says Wade Peerman, water monitoring specialist at DEQ's Laboratory and Environmental Assessment Division's facility in Hillsboro. "It could give us another option in our efforts to get important information to the public. We like to tell a well owner with a certain degree of confidence what level of nitrate is in their well without having to wait for the lab results," Peerman adds.

Data produced by DEQ's Groundwater Monitoring Program help internal and external stakeholders understand the complex interactions affecting the quality of the groundwater in these areas. With such data, local committees are able to implement best management practices in cooperation with DEQ and other state, federal and local agencies. Over the long term, these practices are expected to result in measurable reductions in groundwater contamination within Oregon's groundwater management areas. DEQ also provides well owners involved in the long term studies a copy of the analytical results for their wells on a regular basis.

DEQ's website has more information on Oregon's three groundwater management areas:

http://www.deq.state.or.us/wq/groundwater/gwmas.htm

Information on the Southern Willamette Valley Groundwater Management Area is on the Oregon State University Extension Service website:

http://gwma.oregonstate.edu/

For information including YSI instrument specifications, visit:
www.ysi.com or *www.ysi.com/proplus*

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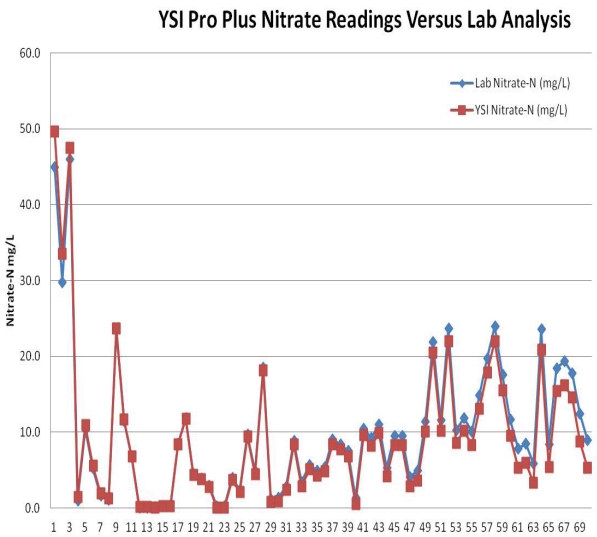

The data in this chart shows a comparison of laboratory nitrate as N values (blue) with those from the YSI Professional Plus meter in the field (red). The data represents nearly seventy samples with extremely close values between the two methods.