



Recommendations for Drinking Water Well Sampling Before Oil and Gas Drilling

November 2012

Introduction

This fact sheet provides a basic overview for private and/or public drinking water well owners who are considering collecting samples prior to oil and gas drilling (including in the Marcellus and Utica shale deposits) near their properties. If you are collecting drinking water data to document water quality, you should follow a few important steps as outlined in this fact sheet. These include obtaining information on your well, such as when and how it was constructed; conducting research on sampling costs and certified laboratories in your area; and ensuring labs follow proper procedures and sample collection methods.

Who regulates oil and gas well drilling in Ohio?

The Ohio Department of Natural Resources' Division of Oil and Gas Resources Management is responsible for regulating the permitting, drilling and production of Ohio's oil and natural gas resources. During well construction, all critical aspects are monitored closely by inspection staff to provide further ground water protection. A properly constructed well; the use and testing of well control devices; and isolating oilfield waste fluids by proper containment all minimize the potential for adverse impacts. To learn more, please visit ohiodnr.com and click on the Shale Development link in the upper left hand corner.

Will oil and gas well drilling affect my water well quality or quantity?

Modern oil and gas well drilling is a highly technical and closely monitored process with regulations in place to protect underground sources of drinking water during and after the drilling process. The chance of ground water contamination or loss of water due to oil and gas well drilling is very small. If ground water quality impacts from drilling activities occur, they most often are within a few hundred feet of the drill site.

What information should I obtain prior to collecting a water sample from my well?

Ohio laws require that a water well record known as a well log be filed for all new wells drilled since 1945; some earlier well logs are also available. Well log records are online at www.ohiodnr.com/water/maptechs/wellogs/appNEW/ or call ODNR at (614) 265-6740 for assistance.

Well logs show how deep a water well is drilled and how it is constructed. Knowing the depth of your well and the type of geologic materials (for instance, sandstone, shale, limestone, sand and gravel) that are producing the ground water is important information in the event of water quality impacts.

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What else do I need to know before sampling?

Conduct research on the laboratories in your area and the services they offer. Be an informed consumer and get the most for your money. Water samples must be collected and analyzed using proper sampling and laboratory protocols and methods and careful documentation of sample chain of custody. Some labs will come and collect the sample for you; others will only provide the sample containers. Some local health districts or soil and water conservation offices offer sample collection and coordinate with labs for sample analysis. For best results, use a qualified professional to ensure proper collection of your water sample. Improper sampling can result in unreliable data and waste your money.

Are there special water sampling and analysis procedures?

Water sampling should be done only by a professional who is familiar with all sampling and laboratory protocols. Samples should be submitted to an Ohio Environmental Protection Agency (Ohio EPA) drinking water- certified laboratory or a laboratory with similar certification for the analysis of water (e.g. National Environmental Laboratory Accreditation Program). The laboratory should be certified for each chemical parameter to be tested. Without attention to these details, water analyses will be of little or no value in an oil and gas water contamination investigation or a legal proceeding.

A list of Ohio EPA-certified laboratories for drinking water analysis is available online at www.epa.ohio.gov/portals/28/documents/labcert/chemlabs.pdf.



What procedures should occur during water sampling?

The water sample should be collected before any treatment devices (bypassing these devices) such as water softeners or disinfection units as they can affect water quality. This sample location will likely be a spigot or drain at or near the pressure tank before any treatment units. The water sample collected should be representative of water in the well; therefore, it is important to run the water for at least 5-10 minutes to flush out all the water in the plumbing. This will ensure a sample of fresh ground water is obtained. The water sampling professional will document the sample location, date and time, and will collect the water in containers designed for the specific parameters to be analyzed. Preservatives may also be added to the sample container to stabilize the sample on site before transport to the lab. Parameters such as pH and conductivity may be measured with equipment during sample collection.

What should the water well sample be analyzed for?

Chloride and sodium are principal chemical components in oil and gas field brine waters and are typically elevated compared to shallow ground waters in Ohio. Another indicator of oil and gas activities is the presence of dissolved methane gas in water. The additional recommended parameters (e.g. barium, potassium, sulfate, bromide, BTEX) aid in the interpretation of water quality results and help distinguish various types of water quality contamination.

The sample parameter sets listed in the table on the following page are recommended for establishing background water quality and are grouped in order of importance. The more parameters analyzed, the higher the cost of the water analysis. If funds are limited, start with the Tier 1 sample set. However, because there is normally a sample collection and processing fee associated with professional water sampling, it may be more cost effective to sample for all three tiers at once if possible. Note, not all laboratories provide sample collection services nor are equipped to analyze for methane.

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Recommended Water Quality Sampling Parameters		
Tier 1 Parameters	Tier 2 Parameters	Tier 3 Parameters
Barium Chloride Magnesium Potassium Sodium Strontium Sulfate Total dissolved solids Specific Conductivity	Tier 1 sample parameters + Calcium Hardness Total Alkalinity pH Iron Manganese Total suspended solids Bromide	Tier 1 and 2 sample parameters + BTEX (benzene, toluene, xylene, ethylbenzene) Methane (dissolved)*

*Include with Tier 1 if laboratory can analyze for methane.

Ideally, two or three samples should be collected in different calendar seasons to allow you to establish the normal variability in ground water quality over time due to rainfall and other factors.

When assessing the overall health of your water well, you may want to consider analyzing for nitrate, arsenic and *Escherichia coli* (*E. coli*) bacteria as these are the most common contaminants of concern in ground water. These contaminants are typically not associated with oil and gas production activities.

What do my sample results mean?

Ground water quality can vary over time and the seasons, and is influenced by the type of geologic materials the ground water is moving through, natural replenishment from rainfall and flooding (recharge), and chemicals used or applied on the ground that are transported by recharge moving to the ground water. Subsequently, your water sample is a snapshot in time of the water quality in your well. Ohio EPA and other state agencies have collected background water quality data across the state as part of an ambient ground water quality monitoring program. For data on natural ground water quality, go to www.epa.ohio.gov/ddagw/gwqcp.aspx#LiveTabsContent115418 for data on natural ground water quality.

If the chloride or other parameters are near or higher than a health-based standard or there are detectable levels of methane in your well, you may want to seek the advice of a water quality professional to determine the potential source(s) of the contaminant. The additional Tier 1, 2 and 3 parameters analyzed will be useful for the water quality professional in identifying a potential source of contamination.

Are there health-based standards that apply to private wells?

The Ohio Department of Health (ODH) has established health-based standards for private water systems that are the same as the standards for public water supply systems established by the Ohio EPA and U.S. EPA. For more information, go to www.epa.ohio.gov/portals/28/documents/DWStandardsList.pdf.

Information on health risks associated with each water quality standard can be found at the ODH website at: www.odh.ohio.gov/odhPrograms/eh/water/PWShminfo.aspx and at the U.S. EPA website at: <http://water.epa.gov/drink/contaminants/basicinformation/index.cfm>.

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What type of ground water investigations does ODNR – Division of Oil and Gas Management conduct related to oil and gas drilling?

Since 1983, ODNR – Division of Oil and Gas Resources Management has conducted ground water investigations in Ohio when it receives complaints alleging ground water contamination by oil and gas drilling. ODNR – DOGRM technical staff respond within 24 hours and use advanced equipment that allows for a complete ground water investigation. Since regulations were strengthened in 1985, ground water contamination cases caused by oil and gas operations have dramatically decreased.

Are there regulations to provide for the replacement of my well if it is impacted by oil and gas drilling?

Section 1509.22 (F) of the Ohio Revised Code gives ODNR – Division of Oil and Gas Resources Management the authority to require an owner/operator of an oil and gas well to replace the water supply of the holder of interest in real property whose water supply has been substantially disrupted by contamination, diminution or interruption resulting from the owner's oil and gas operation. This includes supplies of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source.

Where can I get more information about Marcellus and Utica Shale drilling?

- Ohio Department of Natural Resources, Division of Oil and Gas Resources Management website: www.ohiodnr.com/oil/shale/tabid/23174/Default.aspx.
- Ohio Environmental Protection Agency, Shale drilling website: www.epa.ohio.gov/MarcellusandUticaShale.aspx.

Who should I contact with more questions?

**Ohio Department of Natural Resources
Division of Oil and Gas Resources Management**
2045 Morse Rd.
Building H-3
Columbus, OH 43229-6693
(614) 265-6633
Email questions to: minerals@dnr.state.oh.us
www.ohiodnr.com/oil/shale/tabid/23174/Default.aspx

**Ohio EPA
Division of Drinking and Ground Waters**
P.O. Box 1049
Columbus, OH 43216-1049
(614) 644-2752
Email questions to: ddagw@epa.ohio.gov
www.epa.ohio.gov/ddagw

**Ohio Department of Health
Bureau of Environmental Health**
246 N. High St.
Columbus, Ohio 43215
Email questions to: BEH@odh.ohio.gov
www.odh.ohio.gov/odhPrograms/eh/water/water1.aspx

Directory of Local Health Districts in Ohio
www.odh.ohio.gov/localHealthDistricts/lhdmain.aspx