



Recommendations for Water Well Sampling Before Oil and Gas Drilling

June 2011

Introduction

This fact sheet provides a basic overview for private and/or public well owners who are considering collecting samples prior to oil and gas drilling (including the Marcellus and Utica shale deposits) in areas near their properties. If you are collecting 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 certified laboratories in your area and sampling costs; 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 Mineral Resources Management (ODNR–DMRM) regulates and monitors oil and gas drilling in Ohio. More information is located at: http://www.ohiodnr.com/portals/11/publications/pdf/Marcellus_Shale_Fact_Sheet.pdf.

Will oil and gas well drilling really 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 wells drilled since 1945 and some well logs were filed prior to that time. Well log records can be found on ODNR's website at: <http://www.dnr.state.oh.us/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 (i.e. sandstone, shale, limestone, sand and gravel) that are producing the ground water is important information in the event of water quality impacts.

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. The State of Ohio highly recommends using a qualified professional to ensure proper collection your water sample. Improper sampling can result in unreliable data and waste your financial resources.

Recommendations for Water Well Sampling Before Oil and Gas Drilling

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) certified drinking water laboratory. 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 on the Agency's website at <http://www.epa.ohio.gov/ddagw/labs.aspx>.



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 well to 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?

The following sample parameter sets 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.

Tier 1 Water Sample Parameters	Tier 2 Water Sample Parameters	Tier 3 Water Sample 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)

Tier 1 water sample parameters are recommended for homeowners who have basic concerns and would like to establish background water quality. If chloride levels are greater than 250 parts per million (mg/l), then Tier 2 sampling is recommended. Background water quality data for chloride and bromide is useful for identifying potential sources of chloride contamination. Ideally, two or three samples should be collected in different seasons to allow you to establish the normal variability in ground water quality over time due to rainfall and other factors.

Recommendations for Water Well Sampling Before Oil and Gas Drilling

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 surface 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. The 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. Data on natural ground water quality can be found at: http://www.epa.state.oh.us/ddagw/gwqcp_ambient.aspx.

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. They can be found on the Ohio EPA website at <http://www.epa.state.oh.us/portals/28/documents/DWStandardsList.pdf>.

Information on health risks associated with each water quality standard can be found at the ODH website at: <http://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>.

What type of ground water investigations does ODNR – DMRM conduct related to oil and gas drilling?

Since 1983, ODNR – DMRM has conducted ground water investigations in Ohio when complaints alleging ground water contamination by oil and gas drilling are received. ODNR – DMRM technical staff respond within 24 hours and use advanced equipment that allows for a complete groundwater 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 the authority to ODNR – DMRM 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 on Marcellus and Utica Shale drilling?

- **Ohio Department of Natural Resources**, Division of Mineral Resources Management, Oil and Gas website: www.ohiodnr.com/mineral/oil/tabid/10371/default.aspx.
- **Ohio Environmental Protection Agency**, Shale gas drilling website: www.epa.state.oh.us/dsw/pretreatment/marcellus_shale/index.aspx.

Recommendations for Water Well Sampling Before Oil and Gas Drilling

Who should I contact with more questions?

Ohio Department of Natural Resources
Division of Mineral Resources Management
2045 Morse Rd.
Building H-3
Columbus, OH 43229-6693
(614) 265-6633
Email questions to: minerals@dnr.state.oh.us
<http://www.ohiodnr.com/mineral/oil/tabid/10371/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.state.oh.us
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
<http://www.odh.ohio.gov/odhPrograms/eh/water/water1.aspx>

Directory of Local Health District in Ohio:
<http://www.odh.ohio.gov/localHealthDistricts/lhdmain.aspx>