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## Testing Private Water Sources and Resolving Contamination Issues near Shale Oil and Gas Development

*Shale Oil and Gas Development Fact Sheet Series***SOGD-ENV1**

Agriculture and Natural Resources

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The development of Ohio's shale oil and gas resources raises concern among many Ohioans about potential impacts on groundwater. While the process of shale development is tightly regulated and closely monitored, some argue that released gas, salts, minerals, metals or chemicals could contaminate private water supplies. Proper water tests are valuable tools for addressing concerns about contamination. If a water test reveals potential contamination, a landowner can take steps to protect health and safety. Ohio law provides for an agency investigation of potential contamination and requires the oil and gas operator to address harm to the landowner. This fact sheet explains private water testing and steps to follow if contamination from oil and gas development is suspected.

### Learn about Your Water Well

Prior to testing water, a landowner should gather as much information as possible about his or her private water well. One way to obtain information is through the state's water well records. Since 1945, Ohio law has required a driller to file a well log with the state upon completing a water well. A well log provides information such as the depth of the water well, how it was constructed, surrounding geological formations and the efficiency of the well. If water quality issues occur in the future, established details about the well can be integral in assessing the situation. Ohio's Department of Natural Resources maintains well log records, which are available

online at [ohiodnr.com/water/maptechs/wellogs/appNEW](http://ohiodnr.com/water/maptechs/wellogs/appNEW) or at 614-265-6740.

## Who Is Responsible for Testing Private Water Supplies?

Nearly one million Ohio households depend on their own private well, spring or cistern for water. A public agency does not monitor these private water supplies, unlike public water supplies. Landowners with private water supplies must test their water to ensure that it is safe. However, in the case of oil and gas development, others may have responsibilities for testing a landowner's private water supply.

Ohio law requires an oil and gas operator to submit water sample results when applying for a drilling permit. The water tests establish baseline data about the landowner's water before any oil and gas drilling activity begins. An applicant seeking to drill a new oil and gas well, deepen or reopen a well, convert a well to any use other than its original purpose or plug back a well must submit water sample results to the Ohio Department of Natural Resources with the permit application and *prior to beginning any drilling*, as follows:

- For a proposed well in an urbanized area, the applicant must submit water samples for all known water wells within 300 feet of the proposed well. An urbanized area is one that is within a municipal corporation or is within a township that had an unincorporated population of more than 5,000 in the last federal census.
- For a new horizontal oil and gas well, the applicant must submit water sample results for all wells within 1,500 feet of the proposed horizontal wellhead.
- If refused access to a water well, the permit applicant must identify in the application the location of any well that the applicant was prevented from sampling. *Ohio Revised Code Section 1509.06*.

Even with these regulatory mandates for water testing by the oil and gas operator, many landowners also include water test requirements in the oil and gas lease. For example, a landowner might negotiate lease provisions that require the oil and gas development company to conduct routine water testing and could also address issues such as water test costs, frequency of tests and following proper procedures for water testing.

## Testing for What?

Landowners often want to test for all possible contaminants that could arise in an oil and gas drilling situation, but testing water for every potential contaminant can be expensive and is probably not necessary for protecting health and safety. The more contaminants tested, the higher the cost of the water test.

Testing for key potential contaminants can provide the landowner with important information. According to the Ohio Environmental Protection Agency, chloride and

sodium are principal chemical elements found in oil and gas field brine waters and elevated levels of these elements are a common indicator that a water supply has been contaminated. Another important indicator is the presence of dissolved methane. The following are key elements to include in a test of water near oil and gas development:

- Total Dissolved Solids
- Chlorides
- Sodium
- Barium
- pH
- Corrosion Index
- Strontium
- Specific Conductivity

The chart below from the Ohio Environmental Protection Agency (EPA) presents slightly different recommendations for determining water test parameters. Tier 1 establishes the minimum recommended testing standards. For more extensive results, add the Tier 2 parameters, which will increase test costs. The most detailed test adds the Tier 3 parameters; this test will also be the most expensive.

<b>Tier 1 Water Sample Parameters</b>	<b>Tier 2 Water Sample Parameters</b>	<b>Tier 3 Water Sample Parameters</b>
Barium Chloride Magnesium Potassium Sodium Strontium Sulfate Total Dissolved Solids Specific Conductivity	Calcium Hardness Total Alkalinity pH Iron Manganese Total Suspended Solids Bromide	BTEX (benzene, toluene, xylene,ethylbenzene) Methane (dissolved) —(unless can be included in Tier 1)
<i>Source: Ohio EPA</i>		

## When and How Often to Test?

All private wells should be tested annually to monitor water quality to protect the health and welfare of the well users. Recommendations vary about how often to test a groundwater source near oil and gas development. According to the Ohio EPA, it is ideal to collect several water samples over an extended period to establish the normal variability in water quality over time due to rainfall and other factors.

Obtaining two or three water samples per year in different seasons is advisable.

The most important time to test water is prior to any oil and gas drilling activity, preferably within a few months or no more than one year before activity. Ohio law now requires water sampling when an oil and gas operator submits an application for a permit to drill an oil and gas well, as explained above.

The oil and gas developer is not required to conduct water sampling *after completing* the drilling activity. If a landowner wants the operator to conduct post-drilling water testing, a provision in the oil and gas lease could require the tests.

## Proper Testing Procedures

Collect and analyze water samples using proper sampling and laboratory procedures. Otherwise, there may be errors in the test results or legal challenges to the validity of the sample. Proper procedures for water testing include:

- using proper sample containers,
- preserving the sample,
- observing holding times,
- documenting the sample's chain of custody,
- following appropriate testing methods,
- testing at a certified laboratory.

Choosing a professional, certified water testing laboratory is important. If water samples are to be used as evidence, they should be collected by a disinterested third party professional. Water samples collected by landowners—while useful for a landowner's personal records—could be dismissed in a legal dispute if the landowner did not follow proper procedures. For these reasons, it is advisable that a landowner hire a professional water specialist or laboratory technician to collect and analyze water samples and maintain water test records. The Ohio EPA provides a list of laboratories that are certified to perform chemical analysis of water, which is available at [epa.ohio.gov/ddagw/labcert.aspx](http://epa.ohio.gov/ddagw/labcert.aspx).

## Interpreting Water Test Results

Penn State University provides a Drinking Water Interpretation Tool that aids citizens in understanding water test results. The website allows a person to enter numerical values from the water test report and receive an explanation as to whether the water sample meets safe drinking water standards for microbes, inorganic chemicals, volatile organic chemicals, synthetic organic chemicals and radionuclides. Visit [psiee.psu.edu/water/dwit.asp](http://psiee.psu.edu/water/dwit.asp) to access the tool.

The Ohio EPA, United States EPA and Ohio Department of Health provide information about drinking water standards and health-based standards for private

water systems. Visit these websites and pages for more information:

- Ohio EPA's information page for Marcellus and Utica Shale: [epa.ohio.gov/MarcellusandUticaShale.aspx](http://epa.ohio.gov/MarcellusandUticaShale.aspx).
- Ohio EPA Division of Drinking and Ground Waters maintains a listing of drinking water standards: [epa.ohio.gov/Portals/28/documents/pws/DWStandardsList.pdf](http://epa.ohio.gov/Portals/28/documents/pws/DWStandardsList.pdf).
- The United States EPA has information on associated health risks for each water quality standard: [epa.gov/dwstandardsregulations](http://epa.gov/dwstandardsregulations).
- Ohio Department of Health resources on private water systems: [odh.ohio.gov/odhprograms/eh/water/PrivateWaterSystems/main.aspx](http://odh.ohio.gov/odhprograms/eh/water/PrivateWaterSystems/main.aspx).

## The Importance of Good Records

Property owners should maintain accurate records of their water well information and all water test results. The landowner should keep up-to-date contact information and a line of communication with the laboratory and water specialists who conduct the tests. If any legal issues should arise, well-kept records can help resolve an issue.

## Investigation of Alleged Contamination

The Ohio Department of Natural Resources Division of Oil and Gas Resources Management conducts a groundwater investigation when contamination from oil and gas activities may have occurred. A well owner may call the ODNR Field Office for the appropriate county or may file a written questionnaire with ODNR. A listing of Field Office contact information is available on the ODNR website. Information requested in the written questionnaire includes water well construction information, history of the water well and a map of the property showing locations and distances between the water well and other structures such as septic systems, oil and gas wells, pipelines and fuel tanks.

Upon receiving a phone call or written complaint, the division dispatches a technical staff person to conduct a complete groundwater investigation. After analyzing information gained through the investigation process, ODNR will provide a report and recommendations to the water well holder. If there is evidence of contamination, ODNR will contact the oil and gas operator to address the problem. For more information about groundwater investigations by ODNR, visit: [oilandgas.ohiodnr.gov/laws-regulations/protecting-groundwater](http://oilandgas.ohiodnr.gov/laws-regulations/protecting-groundwater).

## What if Contamination Occurs?

ODNR has the legal authority to require an operator of an oil and gas well to replace the water supply for a property where the water supply has been substantially disrupted by contamination, diminution or interruption resulting from the oil and gas operation. This authority includes requiring the company to replace supplies of water for domestic, agricultural, industrial or other legitimate uses from an

underground or surface water source.

If drinking water is contaminated but ODNr's investigation does not conclude that the oil and gas operation caused the contamination, the water well owner should take steps to avoid health hazards from the contamination, as follows:

### ***Replace Drinking Water***

Use bottled water as an immediate source of drinking water. A person consumes about one-half gallon of drinking water per day. It may be possible to find a different drinking water source without changing the entire water supply system, as water that is undesirable for drinking may be acceptable for washing clothes, bathing and flushing toilets.

### ***Identify and Eliminate Source of Contamination***

It can be difficult to determine what is causing the water contamination. Contact your local health department for advice and assistance. A specialist in groundwater hydrology may be able to trace the source of contamination. The local OSU Extension office, health department or environmental agency may be able to assist in identifying a competent professional. Once the source is identified, take steps to eliminate the condition. Be aware that eliminating the source of contamination may require time and may not immediately remove all of the contaminants from the groundwater.

### ***Address Long-Term Replacement***

A new water source may need to be developed to address long-term water needs. A cistern is the most feasible household system in areas where groundwater contamination is extensive. For livestock a pond can be developed to provide large volumes of water. Consult a hydrogeologist for an assessment of replacement supply options. To learn more about rainwater cisterns find the Penn State University publication at [extension.psu.edu/natural-resources/water/drinking-water/cisterns-and-springs](https://extension.psu.edu/natural-resources/water/drinking-water/cisterns-and-springs).

### ***Water Treatment***

Treatment of private well waters contaminated by gas and oil drilling is **not recommended**. The treatment equipment required to remove high levels of dissolved salts and organic compounds is expensive to purchase and complicated to operate to protect the health and welfare of water users. Limit water treatment to removing iron or other dissolved minerals that while safe to use can make water unpleasant to use.

## **Contamination and Legal Liability for Oil and Gas Operators**

If an oil and gas operation causes harm to a water supply, Ohio law requires the

operation to replace the landowner's water supply or compensate the land-owner for the harm. This provision creates automatic legal liability for the oil and gas operation, and the Ohio Department of Natural Resources will work with the company to address the company's obligations. If the parties agree to compensation rather than replacement, the operation must pay the landowner the difference between the fair market value of the property prior to contamination and the fair market value after damage occurred. A harmed landowner might also have legal remedies available through the oil and gas lease. It may be necessary for the landowner to review the terms of the lease with a competent attorney to determine liability provisions available in the oil and gas lease.

## Summary

As the oil and gas industry continues to expand in Ohio, people using private water supplies near oil and gas development activities can test their water supplies to monitor water quality. Well owners should follow recommended guidelines for testing and maintain records of their water tests. If contamination issues arise, landowners should avoid consuming potentially contaminated drinking water and use the investigation process provided through Ohio law. Replacement of water sources and compensation to the landowner are two mechanisms Ohio landowners may use to remedy a contamination problem.

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