Understanding Marcellus Shale and Private Water Supplies

This column is presented weekly by the Public Education sub-committee of the Clinton County Natural Gas Task Force in an effort to provide accurate, up-to-date information on activities surrounding the Marcellus Shale formation and the natural gas exploration industry.

Increased gas drilling in the Marcellus Shale throughout Pennsylvania has concerned many of the state's 3.5 million residents who use private water well or spring. These concerns stem from the use of drilling chemicals, production of large amounts of waste fluids, and possibility of methane migration from the gas well into adjacent groundwater aquifers.

Existing state regulations specify gas well construction practices to protect groundwater supplies including setbacks between water supplies and gas drilling, protective casings and cement, and requirements for storage of chemicals and waste fluids. Gas drilling companies are also presumed responsible for contamination of drinking water supplies within 1,000 feet of a gas well site. The presumed responsibility for water supplies typically results in thorough, voluntary testing of water wells and springs by state-accredited water testing labs contracted by the drilling company. Although not required, many drilling companies routinely test fresh water drinking supplies beyond 1,000 feet from the well-head.

In many cases, additional monitoring of water quality can be a good idea for homeowners, especially if their water supply is not tested by the gas drilling company. All water testing should be arranged through a state accredited water testing laboratory. It is important to remember that water samples collected to document impacts from gas well drilling should not be collected by the water supply owner. Rather, water samples should be collected by an unbiased professional employed by or representing the state accredited testing lab. This "third-party" or "chain-of-custody" sampling typically adds less than $100 to the total cost of water testing and will be vital to the admissibility of the results in any legal action related to pollution of a private water supply. You can expect to pay $200 to $1,000 or more to have a pre-drilling water sample collected and analyzed by a certified water testing laboratory depending on the complexity of the test package. The water testing labs or consultants can assist with selection of water quality parameters and many offer standard packages of tests that correspond to gas well drilling activities.

Diminished or lost water supplies resulting from gas well drilling have occurred but are rare. When this does occur, it is usually an obvious, complete loss of water rather than a subtle decrease in water yield. Well and spring owners that wish to document water supply conditions before and after gas well activities would need to hire a professional water well contractor or hydrogeologist to independently measure and document these conditions.

If you pay to have your water tested, you should receive a water test report directly from the state accredited lab usually within about two weeks. If water testing is paid for by the gas drilling company, you have a right to receive a free copy of the water test report. This report may come directly from the water lab or from the drilling company. Discuss how you will receive your water test report with the professional who visits your home to collect the water samples.

Water test reports can include scientific language, symbols, and acronyms that can be difficult to interpret. Most reports will contain the following basic information:

- Client and Sample Information - basic information about the location of the water supply (address), type of water supply, person collecting the water samples, and dates of sample collection and lab analyses.
- Analyses - usually on the far left of the report, you will find a column listing all of the water test parameters that were analyzed by the laboratory. The number of parameters can vary from just a few to dozens of tests depending on what was requested by the gas drilling company or the homeowner. There is no required list of parameters which must be tested in relation to gas well drilling.
- Results - The most important information on your water test report are the actual results that the laboratory found for our water sample. The numbers indicate the concentration of each water quality parameter in your water sample. In some cases, the unit of measure for each test will be shown next to the result. In others, the units will be shown in a separate column (as in the example test report). The result for each test should be compared to the drinking water standard for that parameter. Sometimes, a water test result will be reported as "ND" (Not Detected), which means that the lab was unable to detect any of that pollutant with its equipment. Similarly, some results may have a less than sign (<) in front of a number. This result means the sample contained less than the detection level for that test. Detection levels are often set at the permissible drinking water concentration for a particular pollutant. If the less-than symbol (<) appears before a number and the number is equal to the drinking water standard, the water is likely safe to drink for that particular contaminant.
- Units - Concentrations of pollutants are usually measured in water by a unit of weight such as milligrams per liter (mg/L) or an equivalent unit called parts per million (ppm). Parameters which are found in very small amounts may be reported in micrograms per liter (µg/L) or parts per billion (ppb). Some other parameters, including bacteria, pH, and radionuclides, have unique units.
- Standards - Many laboratories include the specific drinking water standards on the report next to each test result. This allows for an easy comparison of your result with the safe or recommended level for each test parameter.
- Comments - Some water testing laboratories will include a brief explanation of your water test results. Specifically, they often will list those pollutants that did not meet the drinking water standard. Occasionally, these comments will also describe the potential harmful effects of pollutants that exceeded the standard and how these pollutants may be removed from the water.

During and immediately after gas drilling has occurred, water supply owners should watch for obvious signs of problems such as muddy water, foaming, spurting faucets, metallic or salty tasting water, changes in water odor, or reduced quantity of water. Contact the PA Department of Environmental Protection immediately if you notice any of these problems during gas drilling.

For more information about Marcellus Shale and Private Water Supplies or assistance with interpretation of your water test report, refer to the following Penn State Cooperative Extension resources:

Gas well Drilling and Your Private Water Supply: http://extension.psu.edu/water/marcellus-shale

Water Tests: What Do The Numbers Mean – a 28-page detailed publication that explains water test reports and the various parameters that may be tested in water. Available online at: http://pubs.cas.psu.edu/FreePubs/pdfs/AGRS90.pdf

Drinking Water Test Interpretation Tool (DWIT) – an online form where you to enter your water test results. Once you submit your results, you will receive a customized interpretation of your results in comparison to drinking water standards. Available online at: http://www.psiee.psu.edu/water/dwit.asp

Finally, Penn State Cooperative Extension will be offering numerous safe drinking water workshops later this summer and fall throughout the Marcellus region of the state specifically to help homeowners interpret water test results and properly manage their drinking water supplies. Watch our web site (http://extension.psu.edu/water/events) for more details about these events.

Bryan Swistock, Water Resources Extension Specialist, School of Forest Resources, Penn State University

Bryan Swistock