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College of Agricultural Sciences • Cooperative Extension

School of Forest Resources

Water Facts #24

Methane Gas and Its Removal from Wells in Pennsylvania

Methane gas, also known as natural gas, occasionally enters private drinking-water wells in Pennsylvania. This rare problem is usually confined to deeper water wells in the state's coal-producing western and northern regions.

Methane may occur in a water well from natural deposits or it may enter a well from various areas such as coal mines, gas wells, and landfills. Naturally occurring methane is a colorless, odorless, tasteless, and combustible gas. Occasionally, production-grade methane penetrates groundwater through a gas well blowout or from an underground gas storage field. Production-grade methane is marked by its pungent odor from mercaptan; a chemical odorant added to methane to help detect leaks.

Methane gas alone does not cause health problems in drinking water, but it does escape quickly from water, causing an explosive hazard in poorly ventilated or confined areas. Escaping gas may seep into confined areas of your home, where it may reach dangerous concentrations. There have been rare cases in Pennsylvania where houses, camps, or wells have exploded due to methane accumulation.

The prevalence of methane in water wells in Pennsylvania is unknown. A survey of 171 groundwater wells in West Virginia found detectable amounts of methane gas in 77 percent, but dangerous concentrations only occurred in about 8 percent of the wells.

How Much Methane Is Too Much?

Methane forms an explosive mixture in air at a concentration of 5 to 15 percent by volume. The exact concentration of methane in water that is capable of producing such an explosive mixture depends on the water temperature, ventilation of the water well, percent composition of the gas, and air movement inside the house. The U.S. Department of the Interior, Office of Surface Mining suggests that homeowners with wells that have methane concentrations above 28 mg/L should take immediate action to reduce this concentration. Homeowners with wells that have 10 to 28 mg/L should routinely monitor the well to ensure that concentrations are not increasing and may want to consider reducing this concentration. Wells with methane concentrations below 10 mg/L are generally considered safe for use.

Measuring Methane in Your Well

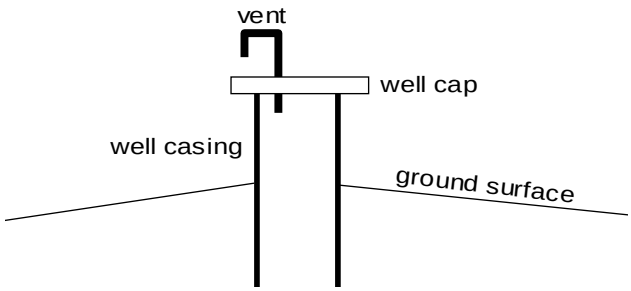
Many homeowners suspect methane when they hear a gurgling noise coming from their wells. Methane can emit this sound, but other gases (such as carbon dioxide) may be the source. Methane escapes quickly from water, making it difficult to accurately measure. Some commercial laboratories can test your water for this gas, but this process must be done at your home for the most accurate results. If you suspect methane in your well, consult a local, certified water-testing laboratory. A list of certified labs is available at your local extension office or online at http://www.dep.state.pa.us/labs/.

A simple test also detects methane gas. Use a plastic container with a narrow neck to allow a small amount of methane to accumulate. Fill the container with water and seal it, leaving a small space at the neck for the gas. Remove the cap and quickly pass a match over the opening. A brief flame indicates methane. **Always perform this test outside, and only use a plastic container (to prevent breakage).**

Gas detectors and meters can also identify the existence of methane and other gases (carbon monoxide and propane) in the home. Some brands of detectors for less than $100 can be found at hardware or home improvement stores. Since methane is lighter than air, in-home detectors should be installed near the ceiling to maximize their effectiveness.

Removing Methane with Well Vents
Inexpensive vents can remove methane from some groundwater wells. A variety of vented caps are available from most well drillers for less than $100. Be sure to install these caps correctly to prevent insects and small animals from entering the well. Most have a screen and are turned down (see diagram below).

If the well cap is buried or in a covered pit, the casing should extend above the ground surface and subsequently be fitted with a cap and vent. Basement wells are especially problematic because the methane escapes directly into your home. You must fit the well with a sealed cap to prevent this leakage. The vent should then extend through the basement wall to the exterior of your house. Local plumbing codes may include venting requirements. Contact a water-well professional to determine the best method.



Methane Removal Through Aeration
Aeration, or air stripping, can also eliminate methane in well water. These units remove methane and other volatile organic chemicals and gases such as hydrogen sulfide and radon. These devices range from simple systems, with spray aerators enclosed in a tank, to packed tower aerators, which collect and release the accumulated gas. These units are expensive, but they may be useful when vents are unable to sufficiently reduce the methane concentration or other gases are present in the water. Installing aeration devices usually costs from $1,500 to $3,000 and requires some routine maintenance. If possible, aeration units should be placed in a separate building where the methane is vented from the water before entering your home. In some cases, this is done by pumping the well into a buried cistern or storage tank that can be vented or aerated outside the home. Installing aeration devices in your basement, with a vent leading outside, is a less desirable alternative

Additional Resources
For additional information on methane in ground water wells, consult the following publications.

U.S. Geological Survey. 2006. *Methane in West Virginia Ground Water*. USGS Fact Sheet 2006-3011, 6 pp. http://pubs.water.usgs.gov/fs20063011

Keech, D. K. and M. S. Gaber. 1982. “Methane in Water Wells.” *Water Well Journal* Feb. 1982:33-36. http://www.seagrant.umn.edu/groundwater/pdfs/Methane.pdf

To learn more about the proper maintenance of your private water well, consult this web site:

http://www.sfr.cas.psu.edu/water

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