

The Impact of Marcellus Gas Drilling On Rural Drinking 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. For more information on Task Force activities, visit the Task Force page on the Clinton County government website at www.clintoncountypa.com.

The Center for Rural Pennsylvania, a legislative agency of the Pennsylvania General Assembly, funded a study on the impact of Marcellus Shale gas drilling on rural drinking water supplies. The results of that study were released late last month and are highlighted in the following information.

This research looked to provide an unbiased and large-scale study of water quality in private water wells in rural Pennsylvania before and after the drilling of nearby Marcellus Shale gas wells. It also looked to document both the enforcement of existing regulations and the use of voluntary measures by homeowners to protect water supplies.

For the study, the researchers evaluated water sampled from 233 water wells in proximity to Marcellus gas wells in rural regions of Pennsylvania in 2010 and 2011. Among these were treatment sites (water wells sampled before and after gas well drilling nearby) and control sites (water wells sampled though no well drilling occurred nearby).

Phase 1 of the research focused on 48 private water wells located within about 2,500 feet of a nearby Marcellus well pad, and Phase 2 focused on an additional 185 private water wells located within about 5,000 feet of a Marcellus well pad.

During Phase 1, the researchers collected both pre- and post-drilling water well samples and analyzed them for elements of water quality at various analytical labs. During Phase 2, the researchers or homeowners collected only post-drilling water well samples, which were then analyzed for elements of water quality. The post-drilling analyses were compared with existing records of pre-drilling water quality, which had been previously analyzed at state-accredited labs, from these wells.

According to the study results, approximately 40 percent of the water wells failed at least one Safe Drinking Water Act water quality standard, most frequently for coliform bacteria, turbidity and manganese, before gas well drilling occurred. This existing pollution rate and the general characteristics of the water wells, such as depth and construction, in this study were similar to past studies of private water wells in Pennsylvania.

The study's pre-drilling results for dissolved methane also provided new information that documented its occurrence in about 20 percent of water wells, although levels were generally far below any advisory levels.

Despite an abundance of water testing, many private water well owners had difficulty identifying pre-existing water quality problems in their water supply. The lack of awareness of pre-drilling water quality problems suggests that water well owners would benefit from unbiased and consistent educational programs that explain and answer questions related to complex water test reports.

In this study, statistical analyses of post-drilling versus pre-drilling water chemistry did not suggest major influences from gas well drilling or hydrofracturing (fracking) on nearby water wells, when considering changes in potential pollutants that are most prominent in drilling waste fluids. When comparing dissolved methane concentrations in the 48 water wells that were sampled both before and after drilling (from Phase 1), the research found no statistically significant increases in methane levels after drilling and no significant correlation to distance from drilling. However, the researchers suggest that more intensive research on the occurrence and sources of methane in water wells is needed.

According to the Pennsylvania Oil and Gas Act of 1984, gas well operators are "presumed responsible" for pollution of water supplies within 1,000 feet of their gas well for six months after drilling is completed if no pre-drilling water samples were collected from the private water supply. This has resulted in extensive industry-sponsored pre-drilling testing of most water supplies within 1,000 feet of Marcellus drilling operations. However, the research found a rapid drop-off in testing beyond this distance, which is driven by both the lack of presumed responsibility of the industry and also the cost of testing for homeowners.

The research results also suggest that a standardized list of minimum required testing parameters should be required across all pre-drilling surveys to eliminate many questions and confusion among both water supply owners and water professionals. The results from this study indicate that this standardized list should include bromide among other common parameters. The research found that bromide levels in some water wells increased after drilling and/or fracking. These increases may suggest more subtle impacts to groundwater and the need for more research. Bromide increases appeared to be mostly related to the drilling process. A small number of water wells also appeared to be affected by disturbances due to drilling as evidenced by sediment and/or metals increases that were noticeable to the water supply owner and confirmed by water testing results.

Increased bromide concentrations in water wells along with sporadic sediment and metals increases were observed within 3,000 feet of Marcellus gas well sites in this study. These results suggest that a 3,000 foot distance between the location of gas wells and nearby private water wells is a more reasonable distance for both presumed responsibility and certified mail notification related to Marcellus gas well drilling than the 1,000 feet that is currently required.

The research found that regulations requiring certified mail notification of water supply owners, chain-of-custody water sampling protocols, and the Pennsylvania Department of Environmental Protection's investigation of water supply complaints were generally followed, with a few exceptions.

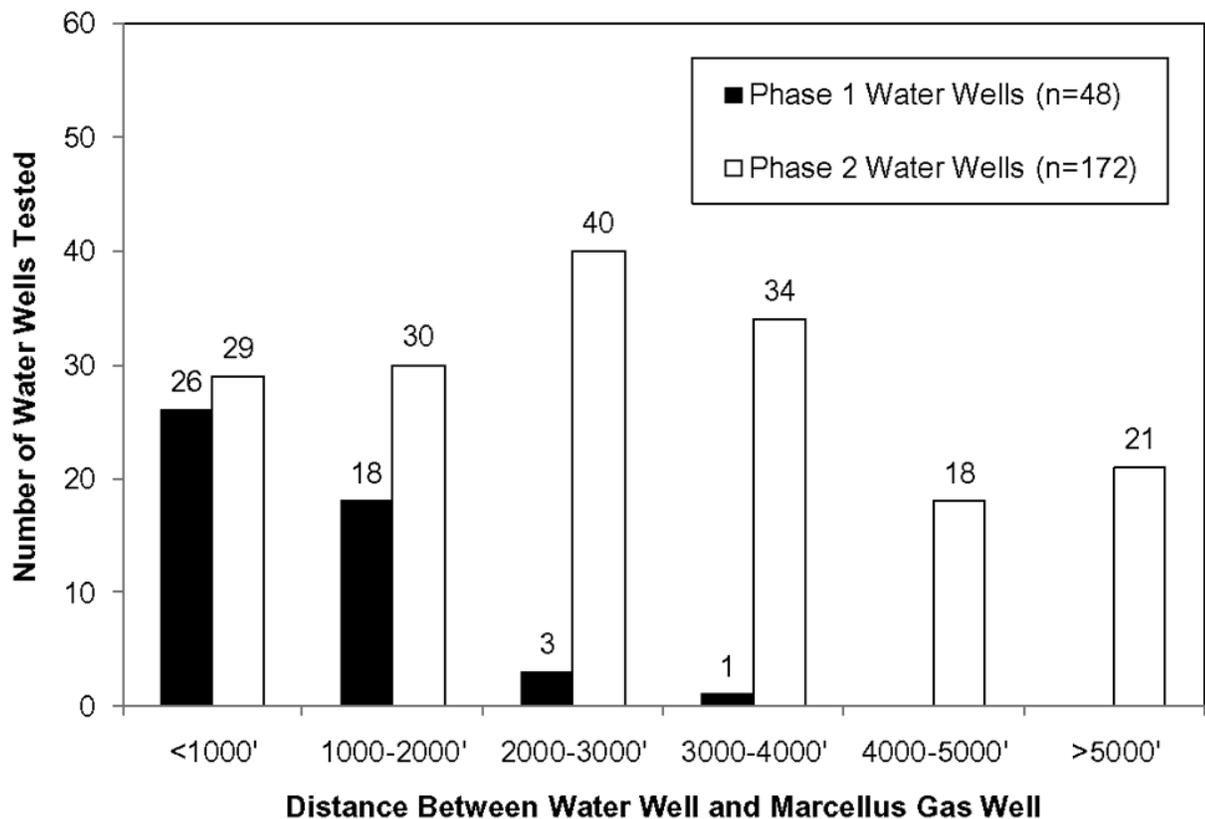
However, since voluntary stipulations were not frequently implemented by private water well owners, there may be a greater need for educational or financial resources to help facilitate voluntary testing among well owners.

This research was limited to the study of relatively short-term changes that might occur in water wells near Marcellus gas well sites. Additional monitoring at these sites or other longer-term studies will be needed to provide a more thorough examination of potential water quality problems related to Marcellus gas well drilling.

To view the entire study, visit The Center for Rural Pennsylvania's web site at www.rural.palegislature.us.

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The number of water wells that were sampled in each phase of this project in relation to their distance from the nearest Marcellus gas well site.



Number of water well owners perceiving various water quality changes to their water well quality as a result of gas drilling activity.

