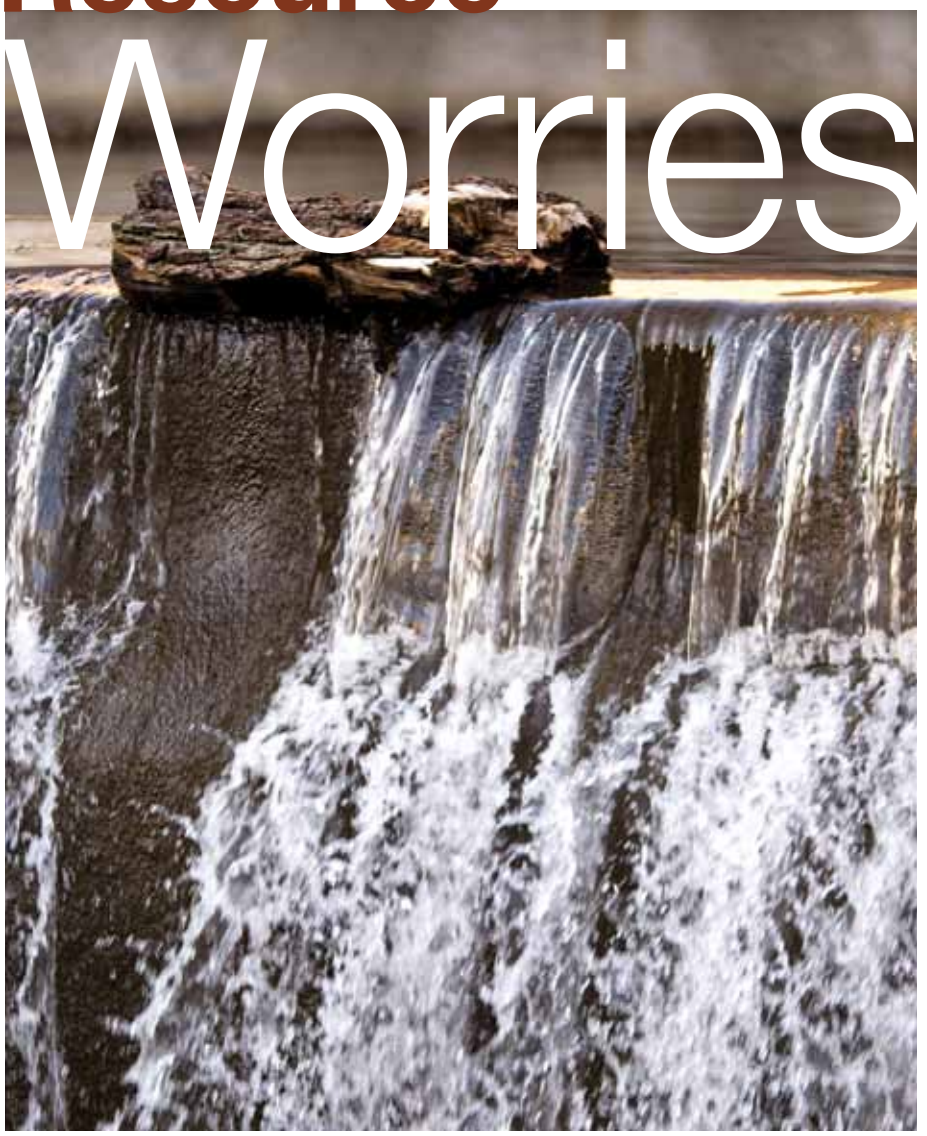
Water Resource Worries



By Marianne Metzger

Fracking's potential effects on drinking water supplies

Hydraulic fracturing, commonly referred to as fracking, is a method of extracting natural gas from shale formations. Fracking has been around for many years, but recently, combining it with horizontal drilling has made it economically practical for gas extraction. While natural gas presents the U.S. with options to become more energy independent, there also are concerns about the process's impact on the environment.

Specifically, there is concern surrounding water resources for two main reasons. The first is the significant amount of water needed for fracking. The second is the possibility of contaminating water resources in both underground aquifers and surface waters, including lakes, rivers and reservoirs.

Wastewater Treatment

Typically, 1 million to 3.5 million gal of water are needed to hydraulically fracture a well. In 2012, due to drought-like conditions during the hot summer months in Pennsylvania, several gas drillers were required to scale back on water withdrawals. This high level of water use can cause issues in states that experience drought conditions, but it also has driven the need for recycling and reusing water for drilling purposes.

The water used in the process is mixed with a variety of chemicals to aid in prevention of corrosion and microbial growth. A sand-like material also is added to the water mixture to help hold open small fractures and allow any natural gas to flow to the surface. The water mixture is injected into the ground under high pressure, and eventually flows back to the surface.

Disposal of this flowback can pose a whole new set of risks to water resources. It is estimated that more than 3 billion barrels of flowback are produced annually in Texas alone. This water-based solution contains naturally occurring metals, minerals and radiologicals, including uranium, strontium, radium 226 and radium 228.

Most wastewater treatment plants are not set up to handle water of this quality. The problem is that the quality is inconsistent, with levels of radiological contaminants ranging from zero to excessive. This means the flowback must be treated onsite, hauled to a facility that can properly process it or injected into a disposal well. Before it can be hauled away, the flowback typically is stored in storage tanks and sometimes also may be stored in open pits, which can be prone to leaks and cause increased concerns about air pollution.

After fracking is complete, the wastewater is pumped from the tanks and/or pits and hauled away to a treatment plant or disposal site. This can be millions of gallons of water containing a slurry of chemicals and possibly radiological contamination, so several truck trips may be necessary to haul this potentially hazardous mixture. There is always a possibility of spills when transferring waste into trucks, and traffic accidents could result in an unintentional release.

Additionally, there are some who may knowingly discharge waste into stream and rivers without the proper permits. Earlier this year in northeast Ohio, a man was charged with discharging more than 20,000 gal of wastewater from oil and gas operations into a tributary of the Mahoning River. Unfortunately, this is not an isolated incident.

Finally, there is the question of disposal by deep well injection and the potential failure of those wells. There are more than 500,000 deep injection wells across the country. According to a ProPublic review, nearly 7,000 deep injection wells were found to be leaking and more than 17,000 were found to have other violations indicating safety and risk of accidental release. The U.S. Environmental Protection Agency acknowledged that once leaks were detected, it could take up to six months to repair and stop them. Furthermore, many wells have been found to be past repair, and many were forced to shut down in 2010, with Kansas shutting down 47, Louisiana shutting down 82 and Wyoming shutting down 144.

Drilling Process

The process of fracking involves drilling several thousand feet down, well below the water table, and then turning horizontally to drill out further. There are requirements for properly casing and cementing the well to provide protection for the aquifer against any gas or fluids flowing back to the surface.

After drilling out horizontally, the fracking fluid is injected under pressure, creating cracks and fractures within the rock to release gas and allow it to flow to the surface. This process not only releases methane gas; it also releases other contaminants within the geologic formations, including metals, minerals and radiologicals.

Methane Contamination

Methane, ethane and propane are the natural gases found in various shale formations across the country. Methane, the most common, is a natural contaminant in some groundwater sources.

Most methane in groundwater sources is referred to as biogenic, which means it comes from the microbiological breakdown of nutrients. The methane found in shale formations is thermogenic in nature, meaning it formed under pressure and heat over a period of time. The fracking process creates cracks and fractures through which natural gas can slowly make its way into the upper layers of the Earth, and under the right geologic conditions, into the freshwater layer or aquifer.

Additionally, poorly constructed wells, including those not properly cemented, can cause methane migration, allowing the gas to migrate into the water table. Poorly constructed water wells have played a role in further aggravating methane and other contaminant issues in some areas of Pennsylvania. Many of these areas were known to have methane contamination already, but saw an increase in methane in areas where gas drilling occurred. In some extreme cases, there have been explosions due to excessive methane buildup in homes near gas drilling operations.

While the hydraulic fracturing of wells for natural gas will continue, more regulatory authorities, including state and local townships, are enacting regulations to help protect public health as well as water resources. While many people may be concerned that fracking water will somehow make its way into aquifers during the fracking process, they should be more concerned about spills on the surface and leaking pits and tanks, which are more likely to contaminate an aquifer or other water resource.

More time should be spent on developing technology to recycle the water used in this process to help conserve and protect drinking water resources. With the estimated cost of $1 million to dispose of all the water used to frack a single well, several companies are starting to introduce treatment technologies to recycle fracking wastewater and reduce disposal costs. *wqp*

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