Populations at Risk from Private Water Supplies

By Kelly A. Reynolds, MSPH, Ph.D.

Private water supplies appear to be the final frontier in source water protection. With the *Safe Drinking Water Act* (and later amendments) and the newly promulgated *Groundwater Disinfection Rule*, standards mandate treatment and/or quality assessment of community and non-community drinking water sources. Government standards and guidelines, however, fail to address the problem of largely unmonitored and untreated source water that serves approximately 15 percent of the US population: private drinking water.

Defining risks

Private water supplies are defined as not being under the regulatory jurisdiction of the US EPA water quality standards of the *Safe Drinking Water Act*. Although testing services are available, most private water supplies are not routinely monitored, particularly in rural or unincorporated areas. Saying that these populations are 'at risk' suggests the possibility of an adverse impact but requires evaluation of the probability of said impact. Little information is available, however, regarding the frequency and duration of exposures to harmful contaminants in private water supplies or the probability of an adverse outcome due to that exposure. These uncertainties are difficult to define given that survey of private water supplies would require an extensive effort and typically serve a very small segment of the population.

Common groundwater contaminants include enteric microbes, lead, copper, radon, nitrate, pesticides, metals, volatile organic compounds and others. Outbreak data and monitoring articles support the concerns of contaminants in private groundwater supplies.

A full report from the US Geological Survey (USGS) related to survey information of groundwater contamination in the US is to be presented to Congress in March, while other reports of private well contamination abound. In 2006, volatile organic compounds (VOCs) were detected in groundwater and drinking-water supply wells throughout the US.[1] VOCs originate in a variety of products including gasoline, plastics, paints and adhesives. The USGS targeted 2,400 domestic wells and found 14 percent tested positive for VOCs. Only a few wells tested above the threshold level of 0.2 parts per billion but the presence of any level of VOCs suggests a vulnerability of the water source. At question is the level of exposure a family may endure over long periods of time due to variable contamination of their drinking water.

Human illness causing viruses, bacteria and protozoa have all been documented in groundwater sources. Under the *Groundwater Disinfection Rule*, waterborne illnesses due to viruses are expected to drop by more than 42,000 cases per year. Application of the same type of quality standards to private wells would likely result in significant health improvements as well. Septic tanks are found in approximately one in five US households and have been associated with illnesses, increasing with decreasing septic tank distances from drinking water wells. One study showed that 46 percent of all drinking water wells were contaminated if the septic system was within 20 meters of the source.[2]

A survey of 50 private homeowner wells in America found enteric viruses in eight percent of samples collected.[3] *Helicobacter pylori* in homeowner wells was linked to infections in the US and Germany, which included a survey of infected children drinking untreated water. Various studies have found 10-60 percent of individual groundwater wells to be contaminated with *H. pylori*.[4] *H. pylori* is considered a Class 2 carcinogen since infections can lead to ulcers and advance to gastric cancer in some cases.

The latest waterborne disease surveillance report from the CDC reveals a continuing problem with individual water sources. During the surveillance period of 2005-2006, 28 waterborne disease outbreaks were documented in 14 states, resulting in 612 illnesses and four deaths.[5] Of the outbreaks associated with drinking water, 25 percent were due to individual water systems and 87.5 percent due to a groundwater source.

Individual responsibility

The US EPA private well website (www.epa.gov/safewater/privatewells) stresses the need for proper well construction and suggests a minimum setback of 50 feet for septic tanks, livestock yards and leach fields; 100 feet for petroleum tanks, contained manure and fertilizer storage and 250 feet for manure stacks. Wells should also be positioned so that rainwater flows away from it. Snowmelt also contributes to contamination and is difficult to direct, thus deeper wells are preferred.

State environmental departments or natural resources offices, county extension offices and health departments are all effective resources for more information on water testing and groundwater resources. Generally it is recommended that wells be tested once a year, at a minimum, for coliform bacteria, nitrates, total dissolved solids and pH levels. Other contaminant testing is warranted if the site is subject to unique conditions such as close proximity to a chemical spill or livestock. While yearly testing is a practical schedule, the consumer may still be unprotected for long stretches of time when periodic contamination episodes can occur.

For municipal drinking water sources, efforts to control microbial contamination are focused at three primary sites for a combined, multi-barrier approach: 1) the source water, 2) the treatment plant and 3) the distribution system. For the individual well owner, the responsibility of the quality of the water is a personal one. Although the CDC, US EPA, USGS and others provide a list of precautions and proactive approaches for protecting private source waters, monitoring wells and disinfecting when needed, they do not promote the use of highly effective POU/POE systems.

Gaining acceptance

Peter Censky, Executive Director of the Water Quality Association, recently responded to anticipated USGS reports of contaminated private wells stating, "….our [the POU/POE] industry provides the only solutions to treat water from residential wells. We will seek out ways to work with them [USGS] and the EPA to gain greater acceptance of our industry's technologies and Certified Water Specialists."[6]

The overwhelming benefit of POU water treatment at the household level in the developing world has been repeatedly established.[7] In the US, the distinction is less clear given that the overall waterborne disease level is lower and the health endpoints less severe; however, the implication is present. With proper care and maintenance, POU devices can be expected to reduce exposures to a wide variety of water contaminants and offer peace of mind in situations where contamination peaks may occur, such as during a storm event where increased runoff is a concern.

Consumers are confused about POU treatment devices and the variety of choices in technology, efficiency and design. They may tend to select a device based on cost rather than addressing their particular water treatment needs. The National Sanitation Foundation (NSF) (www.nsf.org) provides a detailed summary of POU technologies and their application but such information is not easily found on US Government websites, other than for small system compliance issues related to arsenic. More transparent discussions are needed involving trusted government agencies and stakeholders in water treatment and consumption. Although the risks of private drinking water supplies are outside regulatory agencies' jurisdictions, this population should at least be provided with easy access to information to make an informed choice on the benefits of treatment options at the point of use.

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