

Band-Aid Water Treatment in Rural Canada

Dr. Hans Peterson

The world took notice in 1993 when the *Cryptosporidium* parasite eluded the combined water treatment processes in Milwaukee and infected 400,000 people – half of the city’s population. More than 100 people died, even though the treatment plant met the most stringent regulations in the world. The U.S. National Research Council estimated that the cost of this single incident reached \$25 billion U.S. by 1999.

Realizing that drinking water is a perfect medium to spread diseases and that adherence to government regulations may not protect them from lawsuits, most cities are willing to spend even more money to design and implement adequate treatment processes. Whether their water treatment meets government guidelines or regulations is almost a moot point.

Rural Challenges

Seemingly oblivious to the negative impact on the water supply, federal and most provincial agriculture departments continue their promotion of in-

tensive livestock production. They see little need to worry about agriculture’s negative impact on our nation’s water. Or, perhaps they do not realize that farming communities and other rural people are most at risk due to their proximity to both animal manure and human sewage. Cities are far better able to deal with water concerns because they are further away from contamination sources and have better equipment to deal with contamination.

The disparity between urban and rural water treatment plants became even greater during the 1990s as cities, using the more stringent U.S. Drinking Water Regulations as their yardstick, improved treatment. Meanwhile, rural communities continued to just scrape by the Canadian/provincial guidelines and, indeed, using less than 10% of the health parameters in the guidelines to determine if their water was safe. Without adequate drinking water testing, water treatment processes or sufficiently qualified staff, these communities were unable to meet the challenge. Until Walkerton, government agencies

at all levels turned a blind eye to the problems that were becoming apparent to anybody studying drinking water.

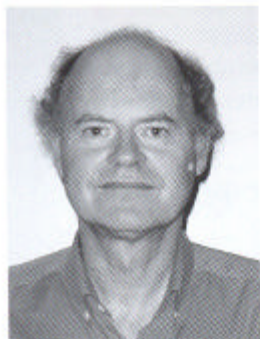
In 2001, Saskatchewan Water Corporation assessed rural water

treatment plants across Saskatchewan. Even though its assessment was based on a “selection” of health parameters, it found that more than 90% could not consistently meet these guidelines. Had they included only one more key component – trihalomethanes (carcinogenic compounds formed during chlorination of water) – they would have been forced to conclude that close to 100% of rural water treatment plants in Saskatchewan cannot consistently meet the guidelines. Moreover, it is reasonable to conclude that this is not simply a regional issue but a national state of affairs.

Water Treatment Systems

So, with poorer water, less stringent rules and less qualified staff, rural Canada’s choice of water treatment equipment becomes a critical issue. This is another strike against rural Canada. Virtually all research on drinking water quality carried out in Canada has been focused on large city systems. Not many rural water treatment systems have ever been piloted before installation.

The design of a rural water treatment system is typically based on a couple of water analyses, followed by a look at specification sheets for different treatment systems. Unfortunately, these specifications are mostly for water that is of far better quality than that found in rural Canada. The failures of rural Canadian water treatment systems can, at least in part, be traced to this.



Dr. Hans Peterson is the Executive Director of the Safe Drinking Water Foundation (SDWF), a national not-for-profit organization dedicated to safe drinking water. SDWF carries out educational programs on drinking water quality (Operation Water Drop). It researches rural water quality problems and encourages others to do the same.

The profusion of boil water advisories across the country since Walkerton and North Battleford suggests even deeper problems. After all, most boil water advisories are lifted after sufficient chlorine has been added to the offending system. While this may have worked for Walkerton's *E. coli*, it would not have prevented North Battleford's *Cryptosporidium*.

At least we now have improved chlorination in rural Canada. The next step is to look at effective filtration to remove *Cryptosporidium* and other bacteria and parasites. But it doesn't end there. Over the past decade, the majority of waterborne illnesses in the U.S. have been viral infections. In Canada, we haven't even started to assess viruses.

Waterborne viruses can cause "mainstream" illnesses, such as heart attacks and insulin-dependent diabetes. In one study, the U.S. Environmental Protection Agency determined that 7% of wells tested positive for hepatitis A, and the presence of viruses were not predicted by "indicator" bacteria (coliforms). In developing countries, we are willing to point to water as the cause of more than 50% of all disease. What about rural Canada?

Yellow Quill Case Study

The situation of the Yellow Quill First Nations demonstrates the severity of the problem. An environmental health officer working in the community repeatedly raised health concerns and, in 1999, I agreed to visit the community to assess the quality of their drinking water. Yellow Quill has been under a boil water advisory since 1995 – which cannot be lifted given the equipment currently in the water treatment plant.

Among the many problems at Yellow Quill, the greatest challenge was a very poor quality water source. The water was picked up from a small creek that flows from four to fourteen days each spring, although in 2002 there was no flow at all. Upstream, there is extensive spreading of hog manure, and a town discharges its sewage lagoons twice yearly in the same watercourse. The

water is pumped into a reservoir and a simple treatment system consisting of an upflow clarifier and a filter is used to treat the water. It is somewhat like trying to remove the colour of tea with a tea strainer. It will not work for poor quality water.

For years, the federal Department of Indian and Northern Affairs Canada (INAC) and Yellow Quill could not reach a consensus, and Yellow Quill went so far to get a legal opinion on the federal government's responsibilities toward First Nations' communities. Safe drinking water was considered a human right.

By then, INAC had started to realize that it would take a concerted effort to solve Yellow Quill's water quality problems. Its first move was to hire a company to deliver bottled water to the community. Its second move was to construct a bottle water treatment plant at Yellow Quill, thereby providing both safe water and employment. Its third move was to hire an engineering company, whose mandate was to find and

pilot water treatment processes that not only meet current Canadian guidelines, but also anticipate more stringent guidelines in the future. Two 15-metre mobile trailers containing water treatment equipment and a laboratory were brought to Yellow Quill in July 2002.

Better Treatment Technologies

Conventional treatment, advanced treatment (such as ozone, UV and membranes) and emerging treatments (such as biological filtration) are being investigated. Many people within government agencies have shrugged their shoulders and taken promotion of rural water pipelines as "the" solution to rural water quality and supply. Maybe some thought should be given to the fact that both primary pathogens, which can cause disease in healthy people, and op-

portunistic pathogens, which can cause disease in people with a compromised immune system, have been found to survive, and some indeed grow, in pipelines. Rural water treatment is therefore still a key challenge.

Improved water treatment systems for rural Canada will likely come from initiatives driven by rural people who are fed up with poor quality water and the health issues that arise. Manufacturers of emerging and advanced water treatment technologies will also be pressing ahead with the implementation of better treatment. However, it will also require scientists, engineers and technicians to physically work in affected communities, and not simply design systems from a city location. Only then will they learn that necessity is the mother of invention. *MW*

The same month as Walkerton (May 2000), an article by Dr. Peterson appeared in *Municipal World*, warning about deteriorating rural water quality and the consequent health concerns. Also before Walkerton, Peterson wrote a peer-reviewed scientific paper "Rural drinking water and waterborne illnesses," published by the Canadian Water and Wastewater Association, which can be viewed at <<http://www.safewater.org>>. The paper warns about the potential link between poor quality water and many mainstream illnesses, and indeed death as infant mortality is possibly implicated.