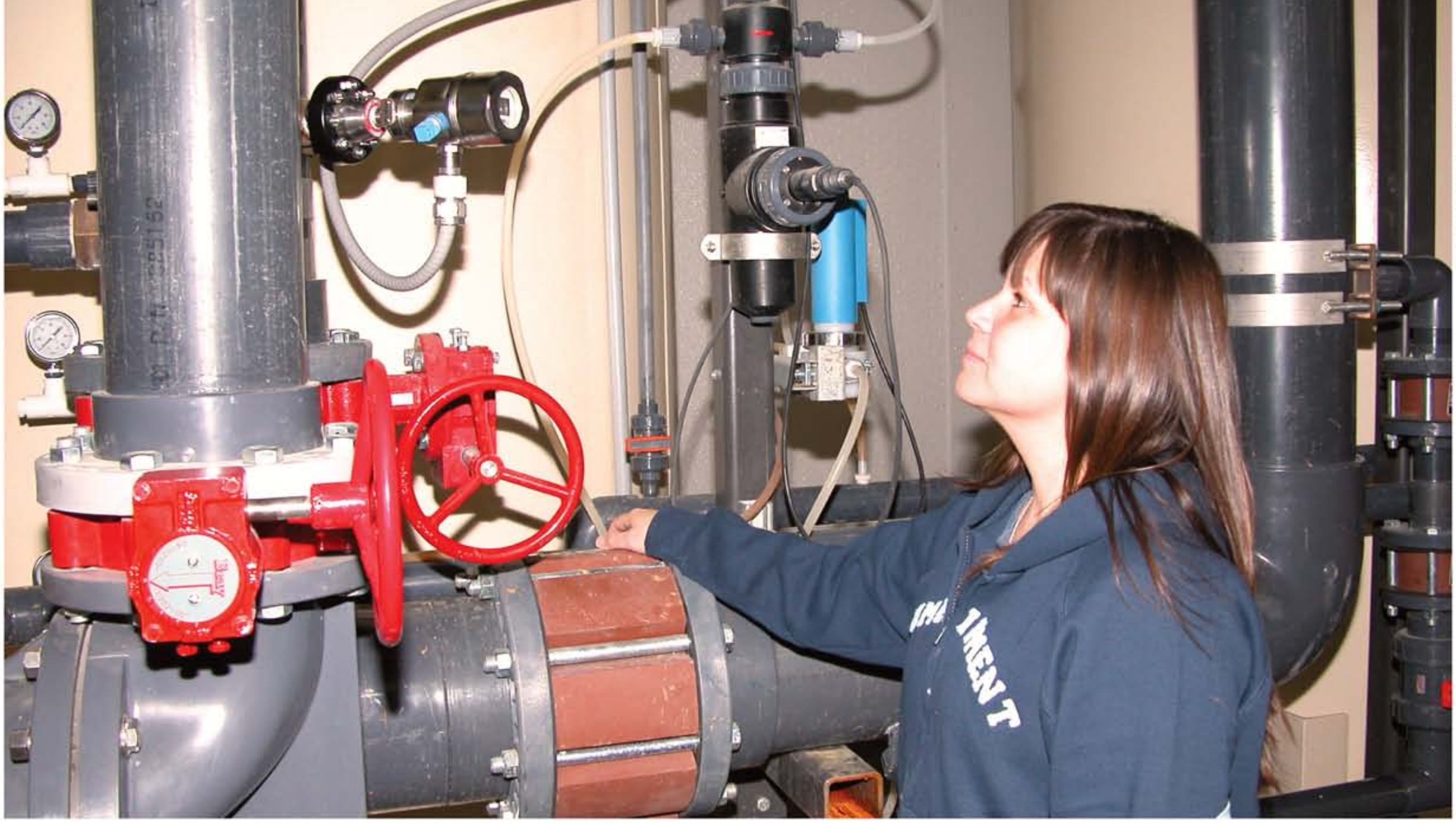

Photo courtesy of Windspeaker Newspaper

WATER, WATER EVERYWHERE…

Seeking effective water treatment infrastructure.

By Dr. Hans Peterson, SDWF

With increasing attention on the production of safe drinking water, large utilities around the world are trying to position themselves to meet the challenges. While the perception that Canada has some of the cleanest and largest water reserves in the world is, in some ways, true, Canadians need to keep an eye to the future. The presence of disease-causing microbes, pesticides and other contaminants that were unknown 100 years ago must be addressed. But large utilities are still relying on conventional, outdated technologies because of the high cost of building new facilities.

That was apparent when, this past May, I participated in an international conference in Europe. We visited two large water treatment plants in Germany and Holland, both of which continue to use technologies that have been in effect for more than 100 years, such as slow sand filters.

To complement the slow sand filters, modifications had been carried out to use more recent developments in drinking water treatment, such as coagulation using metal salts and organic polymers; ozonation; rapid sand filtration; and UV irradiation. Newer and more effective filtration material, such as expanded clay, was rare, with the exception of activated carbon designed to adsorb organic contaminants. Activated carbon was introduced to lower the level of trace contaminants, such as pesticides, in raw water sources.

While these levels were above strict European regulations, Canada is still not concerned with pesticides – we allow up to 1,000 times higher levels in our drinking water. Canadian cities are not yet facing strict government regulations, as most European cities have to contend with. Guidelines, not regulations, for Canada's water treatment standards are put in place by government engineers who don't understand the new threats and the technologies to address them.

Because Canadian Guidelines are as much political as technical documents, meeting them not only fails to ensure safe drinking water, it also fails to protect utilities from legal action. Meeting stringent U.S. Environmental Protection Agency regulations was not enough in Milwaukee in 1993. Having engineers and scientists on staff did not prevent the distribution of water containing the protozoan parasite Cryptosporidium that resulted in 400,000 people becoming infected and around 100 deaths. The costs of this one outbreak eventually amounted to $29 billion US.

Canadian utilities are nervous about those potential costs, but not enough to avoid a 2001 outbreak in North Battleford, Saskatchewan. The treatment facility there met all the Canadian Drinking Water Quality Guidelines, yet 7,000 people were infected by Cryptosporidium. This generated millions of dollars in law suits which the Saskatchewan Government settled out of court.

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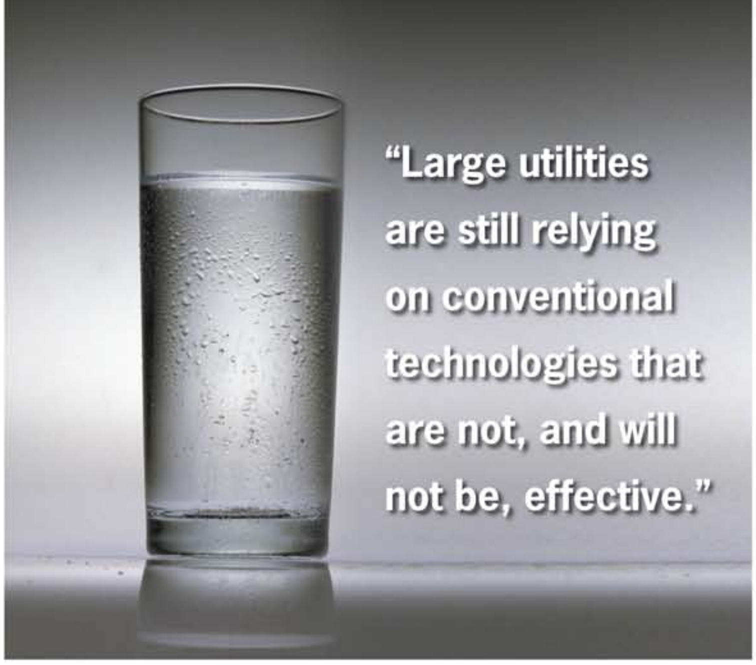
These outbreaks occur because problem compounds are innocent until proven guilty. The burden of proof process is mixed in with water treatment plants' abilities to meet guidelines and individual provinces' desire to have more stringent guidelines. The problems with taking a political stance on drinking water quality contaminants are profound: it allows engineers to design ineffective water treatment processes, and government agencies too much wiggle room. This limits the development of tools that can make drinking water truly safe.

For instance, when Health Canada wanted to lower trihalomethane guidelines from 350 to 50 micrograms per litre, the provinces protested and today, Canada's trihalomethane guideline remains higher than most other developed countries at 100 micrograms per litre.

The provinces protested again when Health Canada wanted to lower arsenic levels to five micrograms per litre and, again, the level remains at 10 micrograms per litre. This despite a statement in 1992 from the U.S. Environmental Protection Agency that arsenic



levels should be less than two micrograms per litre. A worldwide evaluation, "Human Health Effects of Chronic Arsenic Poisoning – A Review," by Simon Kapaj M.D and co-authors also concluded that exposure to levels above five micrograms per litre may cause arsenic poisoning.

When an outbreak occurs, rather than overhauling a treatment facility, the "brushfire" approach is favoured. After both Milwaukee and North Battleford, Cryptosporidium has become the target for surface water treatment plants, to the exclusion of other problem organisms and chemicals.

In order to deal with these large organisms, and other threats, properly, new infrastructure must be built incorporating micro and ultrafiltration membranes. But major cities like Toronto have so much infrastructure in place that to move to a drastically new technology is extremely costly. Big cities in Canada have incorporated UV and ozone technologies as add-ons, but have yet to go to ultrafiltration because it would mean an entirely new facility. While funding has started to come from private-sector investors, it often seems like the technicians at these companies are focused on financial, rather than technical, solutions. Designing water treatment facilities built to last 20 years or more and deal strictly with Cryptosporidium, 14 years after Milwaukee, is foolhardy.

Public-private partnerships (P3s) are also developing in Canada's rural communities. Private investment could potentially take some pressure off of, for instance, Indian and Northern Affairs Canada (INAC), who are putting huge capital into the reservations. But taking ownership of these plants away from the communities, where producing their own clean water is a source of pride, may not be the best solution. A P3 model like the one currently being initiated at Saddle Lake might work, as the community retains ownership of the facility.

Even if ultrafiltration is implemented, the technology is limited in its ability to remove viruses from drinking water. Even Winnipeg and Edmonton's plans for new ultrafiltration plants will need to include add-ons, such as UV and lots of chemistry, to deal with all contaminants.

Canada's big cities, especially Vancouver and Calgary, are currently treating some excellent water. But there is also some challenging water in the small communities. When given the chance to build new facilities at any of these locations, Canadian engineers should ask themselves, "how do we make safe drinking water?" Not, "how do we meet government regulations?" Now is the time to think through already well-documented challenges in drinking water treatment and position any new major infrastructure investment so that it is "fireproof" for at least 10, but preferably 20, years. Anything less could be costly for everybody.

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