Unpredictable water standards

Current water treatment guidelines don't prepare for the future

By Dr. Hans Peterson

Newly constructed water or wastewater treatment plants should not need to be altered for 10 to 20 years, yet how do we prepare for the seemingly unpredictable guidelines that govern them?

A few years ago, the Canadian guideline for one byproduct of chlorination, trihalomethanes (THMs), was at 350 micrograms per litre. It has since dropped to 100. The guideline for arsenic has dropped to 25 micrograms per litre from 50. Health Canada has further stated it would like to see arsenic levels below 5 micrograms per litre, and actually wanted THM levels set at 50 micrograms per litre. (Other countries are eyeing THM levels no higher than 30 micrograms per litre.)

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The requirements to remove or inactivate viruses, parasites and bacteria are also moving targets.

Meanwhile, it is up to the provinces to implement their own standards – leaving our country with inconsistent approaches while jurisdictions such as the U.S. and the European Union have uniform water and wastewater regulations that are enshrined in law.

To compound matters, Canada's provincial framework is not altogether straightforward. Aboriginal communities are under federal jurisdiction, and when sewage is discharged into a fish-bearing body of water, it can become a federal responsibility. Environment Canada and the Department of Fisheries and Oceans will have to come to terms with how they intend to protect the environment from municipal sewage effluents.

Chemicals and disease-causing microbes do not recognize political boundaries, and effective municipal wastewater systems need to be implemented everywhere. Several years ago, Saskatchewan's chief medical health officer publicly stated that Hepatitis A is only waterborne in developing countries. Yet seven per cent of all wells studied by the U.S. Environmental Protection Agency (EPA) were contaminated by this virus, leading to strict groundwater treatment rules south of the border.

Removing political rhetoric in favour of technical merit would advance our cause.

A good start involves looking at trends in various jurisdictions, such as the U.S., Europe, and more-stringent Canadian provinces like Alberta. The Yellow Quill First Nation's water treatment plant, for example, was designed to "Future Canadian Water Quality Guidelines" which would be as rigorous as current U.S. EPA regulations.

Will existing rural surface water treatment systems meet guidelines 10 to 20 years from now? Not likely.

Existing systems commonly employ direct filtration, with groundwater treatment systems that utilize oxidants to remove iron/manganese such as manganese greensand. Direct filtration

systems typically involve injecting a coagulant, mixing, and filtration, while manganese greensand systems inject an oxidant (potassium permanganate or chlorine) that is followed by filtration through a granular medium. The types of media are different for surface and groundwater applications. The water is then typically chlorinated.

Conventional water treatment plants such as these may still be part of the overall process, but additions addressing the more-stringent inactivation or removal of microbes and chemicals will be required in even the smallest communities.

Indian and Northern Affairs Canada (INAC) has already concluded that the production of unsafe drinking water or inadequate wastewater treatment is not consistent with exercising "due diligence".

"Due diligence" is a key legal term that has driven cities around the world to outperform water quality guidelines. If you know that something could be wrong with the drinking water, you have a duty to correct it … even if current health guidelines do not apply.

After all, problems with water can be costly. In 1993, Milwaukee's water treatment plant inadvertently distributed water with cryptosporidium, leading to a resulting outbreak of cryptosporidiosis. Almost 400,000 people were affected, more than 100 people died, and the financial cost for this outbreak reached US$ 25 billion by 1999.

This has spurred every city and related agency to produce high-quality drinking water instead of limiting themselves to government guidelines. As science has been applied to these water issues, it has become increasingly clear that such investments can produce solutions that not only make the quality of the water much better, but can also achieve this goal at a lesser cost.

So, when faced with the task of replacing water infrastructure, think about where you would like to be 10 to 20 years from now. If you are replacing your infrastructure with strictly conventional technologies, remember to set aside considerable funds for short – and long-term upgrades. You will need it.

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An Industrial Evolution

By Sheryl Boyle

Industrial buildings of the 19th and 20th centuries were constructed to withstand the forces of mechanical production, and their spaces offer an immensity of scale and honesty of materials. Yet many of these structures have been abandoned and contaminated by years of industrial debris or other infestations.

The fundamental design principles that were used to create them are often forgotten in the process.

Industrial architects such as the prolific Albert Kahn used architectural concepts including orientation, materials and form to design buildings that maximized the penetration of daylight to provide a maximum number of working hours. Yet the wonderful quality of natural light has been lost with the adoption of electrical lighting, and the amnesia of modernity. Willis Haviland Carrier's 1902 invention of the air-conditioner (originally called the Apparatus for Treating Air) seemingly went hand in hand with forgetting how to design buildings to support the natural movement and circulation of air. Dependence on city sewers allowed designers to forget how to use the water that their buildings collected.

Many aging industrial buildings provide examples of how basic design principles such as day-lighting, ventilation, and storm water management are lacking in the contemporary practice of architecture. By recognizing what we have forgotten, however, we can begin to revive their critical participation in new designs.

Carleton University's School of Architecture has introduced a third-year studio addressing adaptive reuse and Brownfield revitalization, to focus young designers on issues of sustainability, community revitalization and cultural identity. For a two-week period, students travel from the snow of Chicoutimi, Que. to the smoking sewers of Detroit, exposing them to vibrant and successful adaptive re-use projects, as well as un-touched sites that have enormous potential to enhance a city's experience.

From an early 20th century pulp and paper mill in Chicoutimi, which has been converted into a museum, to Montreal's Lachine Canal revitalization project and its various adaptive reuse projects, on to the deteriorating city fabric of Detroit, students examine the ideological and architectural juncture between the old and the new.

The inherent design qualities of these buildings are a sidebar to the contribution that they offer socially, culturally and economically. The successful adaptive reuse of industrial buildings is a potent catalyst in urban renewal.

Projects like the Zone Building and the Darling Foundry rehabilitation in Montreal's Lachine Canal area are highly successful. They contribute to a re-awakening of an urban neighbourhood by allowing the existing buildings to be illuminated in the area's social fabric, and make architecturally sensitive and culturally relevant insertions into the existing social and cultural milieu. People are coming back to these areas to live, work and play.

Adaptive re-use projects reinforce the idea that context and construction are one project – an idea that has been forgotten in the post-industrial era of the production. It becomes easier to forget, as our tools for representing the built environment become abstract and removed, that what we build must always be re-made and re-invented.

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