Editorial

Drinking water: Assessing and managing risk

An adequate supply of safe drinking water is one of the key needs for a healthy life. Canadian drinking water supplies are generally of excellent quality. However, water comes into contact with many substances, all of which have an impact on its quality. While many of these are harmless, some may pose a health risk. The Canadian paradigm for understanding risk, the protection of drinking water and public health is continually evolving. As new information emerges on topics such as chemical and microbiological threats to water quality, the potential impacts of climate change on water resources, and novel or improved analytical and treatment technologies, this information brings with it challenges and opportunities.

It is in this spirit that the Federal-Provincial-Territorial Committee on Drinking Water (CDW), in partnership with the Canadian Water and Wastewater Association, convened the 15th Canadian National Conference on Drinking Water in Kelowna, British Columbia in October 2012. The CDW has played a major role in drinking water quality in Canada since 1968, when the first edition of the Guidelines for Canadian Drinking Water Quality was published by Health Canada. The CDW recognized the need for a national forum that would bring together scientists, regulators and industry experts and focus on scientific data relating to drinking water quality, on assessments of the implications of these data for health and public policies designed to protect the health of the most vulnerable members of society, such as children and the elderly. The guidelines set out the basic parameters that every water system should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible. In recent years, the theme that has preoccupied the water community has been risk: perception, assessment, management, communication, and all too often, controversy. This prevailing thread led Health Canada and the CDW to select the 2012 conference theme of ‘Risk Assessment and Management’.

The papers and posters presented at the 15th National Conference on Drinking Water addressed a wide range of topics, from detecting contaminants, to optimizing treatment processes, to risk assessment and management strategies. The range of topics reflected the multi-barrier approach to safe drinking water that is promoted by the guidelines. This approach looks at each drinking water system from the source all the way to the consumer’s tap to make sure all known and potential hazards are identified and addressed so water remains free of contaminants. The drinking water guidelines can be used as markers to make sure the barriers are working and the treated drinking water is safe. This Special Issue features papers carefully selected from the conference to reflect the source-to-tap continuum of the multi-barrier approach to drinking water safety, supplemented by selected papers from other relevant sources.

The province of Alberta is making strides towards a systematic risk assessment and management structure with the recent introduction of Drinking Water Safety Plans. As noted by the authors of this paper, the traditional regulatory approach to maintaining the quality and safety of drinking water has largely been a reactive one. The work of Alberta Environment and Sustainable Resource Development to develop a template for recording Drinking Water Safety
Plans together with guidance notes to help complete them is described in this paper. A drinking water safety plan is a proactive method of assessing risk to drinking water quality, which better protects public health. The goal is to identify key risks in a drinking water system as well as the interventions needed to bring them into control.

The multi-barrier approach includes an understanding of the contaminants entering a source of drinking water, as illustrated by a study of the wastewater treatment systems that discharge into the Great Lakes basin and their effectiveness at removing chemicals of emerging concern. The Great Lakes and their connecting channels form the largest fresh surface water system on earth and are a source of drinking water to millions of people. Chemicals of emerging concern may include pharmaceutical and personal care products, pesticides and others substances that are found in products used daily in households, businesses, agriculture and industry. The authors suggest that at least half of the 42 substances examined in the study are likely to be removed by municipal wastewater treatment plants. The potential impact of these chemicals on ecosystem health and ultimately drinking water supplies are poorly understood. Studies on anthropogenic inputs of chemicals are an important part of quantifying exposure levels and generating science-based information necessary to identify risks and inform risk management.

Water treatment is also a critical aspect of the multi-barrier approach, and the naturally occurring substances in water can be as significant a treatment challenge as human inputs of contaminants. Thirunavukkarasu et al. in ‘Performance of reverse osmosis and manganese greensand plants in removing naturally occurring substances in drinking water’ examine the performance of reverse osmosis (RO) and manganese greensand plants in removing naturally occurring substances in drinking water. A number of communities in Saskatchewan that depend on ground water as a source for drinking water have reported high levels of naturally occurring substances, such as arsenic, uranium and selenium, in their raw water. Some of these communities are installing new systems or retrofitting with treatment units, such as RO and manganese greensand filters, to address the problem. The treatment performance of these systems was assessed by comparing raw and finished water samples, with a focus on removal efficiency and the effect of other water parameters. The study results described here will help make informed decisions about appropriate treatment.

The storage and distribution of water poses its own unique set of challenges. Hayes et al. in ‘Computational modelling techniques in the optimization of corrosion control for reducing lead in Canadian drinking water’ describe the use of computational modelling techniques to optimize corrosion control and reduce lead in drinking water. Modelling to optimize plumbosolvency control was evaluated in Canadian and US contexts through three case studies. In relation to regulatory compliance, supplementary orthophosphate dosing could be justified in one water supply system but not in another. Compliance modelling illustrated differences in results that were influenced by the stringency of the testing protocol applied, the length of the lead service line and the copper premise pipe and by pipe diameters, as well as flow characteristics (plug vs laminar). For either regulatory compliance assessment or for the optimization of plumbosolvency control measures, routine sequential sampling from the same houses at a normalized flow will minimize these variable effects.

It is clear from the papers presented in this Special Issue that the water industry is continuously re-examining the ways in which it manages risk to drinking water, seeking deeper understanding and innovative solutions from the source of the water, to how drinking water is treated, stored and distributed.

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