WALKERTON INQUIRY PART II

Review of Issue #12 - Communications - in the Powell et al Report "Best Communication Practices in Communicating a Drinking-Water-Related Public Health Emergency: A Paper Prepared for the Walkerton Inquiry"

Prepared on behalf of the Ontario Water Works Association and the Ontario Municipal Water Association

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EXECUTIVE SUMMARY

The Ontario Water Works Association and the Ontario Municipal Water Association (OWWA/OMWA) requested assistance in the evaluation of some of the reports presented as information for Part II of The Walkerton Inquiry. This review looks at the report entitled "Best Communications Practices in Communicating a Drinking-Water-Related Public Health Emergency" by Douglas Powell, Katija Blaine, Liz Gomes, Sarah E. Grant, Bonnie LaCroix and Shane Morris. The Powell et al Report was commissioned to review what is known about:

- risk theory and the communication of risk;
- emergency communications from other outbreaks of food and waterborne illness;
- available technologies and techniques to communicate in an outbreak scenario; and
- what would constitute a best practices approach to communications in future outbreaks.

The Powell et al report was reviewed by a Sub-Committee of the American Water Works Association (AWWA) Risk Management Technical Advisor Workgroup (TAW). The Sub-Committee found that the report did a commendable job summarizing an array of communications issues. To supplement the Powell et al report, the OWWA/OMWA recommends that in its final report to the Ontario Government on communications matters, the Commission recommend that:

1. The Ontario Government should develop programs to provide practical guidance to water utilities on what should be done in a drinking water related public health emergency. Such guidance should include information on what circumstances should trigger an emergency response, what steps must be taken when a trigger is reached, and the importance of building relationships with water utilities and health departments.

2. The Ontario Government, in collaboration with water utilities and local medical officers of health, should establish operational procedures for use prior to and during a public health emergency (to address issues raised in Section 2 of this Review).

3. The Ontario Government should provide guidance to and require water utilities to implement risk communication plans that apply risk management principles while having regard to the need for any training and education of water utility staff that may be necessary to entrench this approach in water system operations.

4. The Ontario Government should apply relative-risk reduction principles, and ensure that appropriate communication of these principles to the public occurs, so that contaminants representing the most significant health risks are regulated first.

5. The Ontario Government should expand section 12 of O. Reg. 459/00 regarding public right-to-know in the manner suggested by the OWWA/OMWA in this Review. In particular, the province should focus on:

    - Requiring water utilities to produce an annual water quality report that must be sent to all consumers. This requirement would ensure that all consumers are informed regarding the

level of contaminants in the drinking water provided by the system. Quarterly reports as submitted to the Director per Section 12 of Ontario Regulation 459/00 (Drinking Water Protection) should continue to be made available to consumers. The frequency of reporting, however, should be reviewed for both public communication and compliance purposes. The recommended Professional Interest Advisory Forum (see Recommendation 6) could undertake this review. Less frequent public reporting (i.e. annual) would address concerns that extensive reporting may cause the public to lose interest in their drinking water quality, especially for parameters that do not change. More frequent compliance reporting (i.e. monthly) could be beneficial for enforcement monitoring.

- Making water quality reporting part of an overall public consultation and communications strategy. Positive relationships must be developed with consumers before water quality reports are distributed to ensure customers are receptive to the information being disseminated. Water utilities should be encouraged to present the results of the source water assessments or protection plans, and information on significant sources of contaminants, to the public. This will provide the public with the opportunity to comment on the establishment of levels of service, costs, existing water quality problems, and the options for protection and improvement of drinking water quality including land use constraints, changes in treatment or infrastructure. Consumers should also be consulted on monitoring requirements and mechanisms for public reporting of system performance.

- Training and education of water utility staff. This will be necessary to develop and implement comprehensive communication and outreach strategies envisioned. Training needs will include: media relations, customer service, etc.

- AWWA focus group results as summarized in this Review (and fully documented in the AWWA document entitled "Preparing Consumer Confidence Reports (CCRs)".

6. The Ontario Government should form a Professional Interest Advisory Forum (PIAF) as described in Section 5 of this Review to develop a drinking water quality management framework to implement the recommendations of The Walkerton Inquiry, to entrench the continuous improvement culture in water system operations and to improve the technical, managerial and financial capacity of the Ministry of Environment (i.e. the regulator) and water utilities.

7. The Ontario Government should support the Water Utility Management Institute of Ontario initiative as developed by the Ontario Water Works Association, through its Management Committee.

Review of Issue #12 - Communications - in the Powell et al Report "Best Communications Practices in Communicating a Drinking-Water-Related Public Health Emergency: A Paper Prepared for the Walkerton Inquiry"

1.0 Introduction

The Ontario Water Works Association and the Ontario Municipal Water Association (OWWA/OMWA) requested assistance in the evaluation of some of the reports presented as information for Part II of the Walkerton Inquiry. This review looks at the report entitled "Best Communications Practices in Communicating a Drinking-Water-Related Public Health Emergency" by Douglas Powell, Katija Blaine, Liz Gomes, Sarah E. Grant, Bonnie LaCroix and Shane Morris. The Powell et al Report was commissioned to review what is known about:

- risk theory and the communication of risk;
- emergency communications from other outbreaks of food and waterborne illness;
- available technologies and techniques to communicate in an outbreak scenario; and
- what would constitute a best practices approach to communications in future outbreaks.

2.0 Review by AWWA Risk Management Technical Advisory Workgroup

The OWWA/OMWA did not retain a "risk" consultant. The report was, however, forwarded to the American Water Works Association (AWWA) Risk Management Technical Advisory Workgroup (TAW) for their review. A Sub-Committee of the Risk Management TAW was formed to review the report comprising: Stephen Estes-Smargiassi, Jonathan Yeo, Josh Das and Barbara Lahage of the Massachusetts Water Resources Authority (MWRA), Andrew DeGraca at the San Francisco Public Utilities Commission and Phillippe Daniel of Camp Dresser & McKee.

The Sub-Committee was charged with ensuring the report was based on "sound science". To complete their review, the Sub-Committee established three aspects to this charge, namely:

a) Is the report based on all the relevant literature?
b) Does the report integrate the literature into the Walkerton scenario?
c) Are other sources of information incorporated?

Is it based on all the relevant literature?

The report does a commendable job summarizing an array of references. There were a few references that might have proved helpful, most notably:

1. Klaidman, Stephen. *How Well do the Media Report Health Risk?* and
2. Sapolsky, Harvey M. *The Politics of Risk*. Both are in Daedalus. *Risk.* Journal of the American Academy of Arts and Sciences. Fall 1990, Vol. 119, No. 4.
3. Various papers by Paul Rozin on the notion of contagion.
4. Centers for Disease Control and Prevention's "Cryptosporidium and Water: A Public Health Handbook".

A few other items were not discussed that might be important:

a. Many of the issues pivot around the notion of what constitutes an acceptable level of risk, which begs the question of risk premium: how much are individuals willing to pay for a certain level of safety?
b. Alternatives to regulation should note accreditation (e.g., the US program Partnership for Safe Water).
c. In most major urban areas is the issue of multi-lingual populations and how this complexes both the content and the communication issues.
d. Existing public education infrastructure.

Does the report integrate the literature into the Walkerton scenario?

To some extent, yes. In applying the literature to Walkerton the authors have to make extrapolations (e.g., from food to water; from different situations and contexts in which the cited research was performed to Walkerton's situation, etc.). And therein lies the challenge: determining what research findings are relevant and how they should be applied to Walkerton.

Much of the application to Walkerton in this report is not transparently literature-derived. What would increase the transparency of the connection is highlighting each study cited within the literature review section, with a sentence or two in either italics or text boxes entitled, "Relevance to Walkerton."

Other parts of the application to Walkerton seem to reflect methodological guidance from various sources not cited but which have been incorporated into the local procedures. This is not necessarily a fault, but should be explicit as to sources or whether they have been developed specifically for Walkerton.

Are other sources of information incorporated?

Utility experience in Boston, San Francisco, Los Angeles, New York City and elsewhere offer insight into how communication about microbial risks have been handled in the absence of an outbreak. Experience of the Santa Clara Valley Water District highlight how to effectively deal with a worrisome epidemiological study about miscarriage risks and THMs. These utilities would provide some helpful insight into some of the strategies being envisioned for Walkerton. Below are some of the comments furnished by MWRA staff.

MWRA staff reviewed the report from the water utility perspective. This perspective involves trying to find the most practical solution to any water-health emergency and involves trying to best communicate any possible health concerns to all those that might be affected. While the report provides a thorough overview of the basics of risk communication, MWRA staff felt that the report did not provide practical guidance on what to do or what should have been done in a drinking water related public health emergency. The report does excerpt findings of some accepted research, but also fails to reference some of the key work that provides guidance on how to specifically address water/health problems. One example is the Centers for Disease Control and Prevention's "Cryptosporidium and Water: A Public Health Handbook".

The Powell et al report focuses on the question "when should the utility/department go to the public", which overlooks a key element in communication – the importance of developing working relationships with set procedures and a decision tree prior to a crisis. This relationship should contain relevant decision-makers from public health, regulatory/government officials, and the water department. This collaboration should attempt to establish a regularized process to find a broad consensus between these decision-makers to determine proper trigger points and what actions should be followed if a trigger is hit.

The MWRA staff discussion also led to some other key points that were missed and should be included in a discussion relating to drinking water and public health emergencies. Some of these points are summarized below:

- Much more information is needed on triggers and how to set them. As discussed above, triggers are vital to a complete communication protocol, and a full analysis of how to set them is needed.

- Also, more practical information is needed on what procedures to follow if a trigger is hit – some practical advice on setting up a decision tree that can be agreed upon by decision-makers from all interested sectors.

- More practical information on false positives would be beneficial. What information should be relayed to the public if a false alarm is sounded? The paper mentions the "crying wolf" syndrome but does not relay practical information of what to do in this situation.

- Gradations of risk are not discussed through the paper. Most risk scenarios are not cut and dry. Generally there are gradations of risk for different populations. All public health emergencies are not "carnage" episodes; most are lesser risks to specific sensitive populations.

- More discussion is needed on how to deal with the media. There are lots of good resources on how to better utilize and work with the media so that the right message is relayed to the public.

- A section that centers on guidance for commonly faced water problems – and list possible triggers and action levels – would be helpful.

- A section that lists best practices relating to communication with your consumers, the media, and the regulators would be useful.

- A summary of the key points of the paper would help to focus the paper, and help the reader to find information relevant to their situation.

The Risk Management TAW Sub-Committee found that the report was helpful in promoting the view that risk is not just a scientific matter, and that the public perception of risk is as important for decision-makers. Unfortunately, the Sub-Committee also felt that the report did not go deep enough into the practical issues involved with public health concerns and drinking water. Such important information as how to set triggers, what to do if a trigger is hit, and the importance of

building relationships with water and health department was not discussed. More practical advice and information is needed, and the paper is an interesting review of a portion of risk literature, but also seems to miss many of the key points in the discussion of what to do in public health emergencies related to drinking water.

3.0 Supplementary Comments by the OWWA/OMWA

In addition to the above, the Powell et al report did not reference an article by Professor S. E. Hrudey entitled "Drinking Water Quality: A Risk Management Approach" (Australian Water Association Journal, January 2001). The article is particularly relevant to the Walkerton Inquiry in that it presents a risk management approach for assuring drinking water quality. In the article, Professor Hrudey advocates that "the conversion of guidelines into enforceable regulations will not, by itself, assure safe water". Rather, "that assurance lies in adopting a total quality management system that uses monitoring effectively as a key element to verify that the entire system from catchment to tap is functioning as needed to deliver safe water". Professor Hrudey then puts forward ten risk management principles for assuring drinking water quality.

Notwithstanding the above omission, there are a number of common key elements that are discussed in both the Powell el al report and Professor Hrudey's article (albeit in different ways), namely:

- Perception is reality;
- Trust is the key component in public perception of risk;
- Risk assessment can not be free of policy considerations;
- Prevention is better than cure;
- Risk managers must be seen as minimizing risk;
- Risk communication must be two way communication;
- Educating the public is no substitute for good risk communication;
- Strive for continuous improvement.

Professor Hrudey's article is easy to read and outlines a pragmatic approach for water authorities to apply in developing good risk communication strategies. As such, I would recommend that water authorities implement risk communication plans that apply the basic risk management principles presented in the article. The goal being as Professor Hrudey notes in the article - "Consumer confidence can be earned and maintained by adopting and practicing effective risk management to achieve the key drinking water quality goals of protecting public health and providing high quality water at an affordable price. These goals favour adoption of a comprehensive quality management approach that documents for everyone concerned that the risk management system is truly effective." The need for training and education of water utility staff that may be necessary to instill this approach into water system operations is an important consideration that cannot be overlooked during implementation of the continuous improvement approach.

4.0 Risk Reduction

The above notes that risk managers must be seen as minimizing risk. This is an important component to building public trust. It is also a concept on which the water works profession has operated since the 1880's when it was realized that water treatment could help prevent disease. By the 1920s and 1930s, the use of filtration and chlorination had virtually eliminated epidemics of major waterborne diseases such as typhoid and cholera from the American landscape (Opflow, June 2000). By the early 1960s, there were more than 19,000 municipal water systems in operation throughout the US. This has grown over the past four decades to approximately 55,000 municipal water systems (EPA, December 1999). This growth in water treatment and disinfection of drinking water via municipal water systems has been a significant factor in preventing waterborne disease throughout North America.

Regardless of the decades of success that water authorities have had at avoiding large and/or fatal waterborne epidemics (Hrudey, 2001), water authorities must strive for continuous improvement to continue to minimize risk to their customers.

The AWWA has two published White Papers on risk reduction. Both are presented in full in Appendix A but the concluding positions of the papers are summarized as follows:

White Paper on Relative-Risk Reduction Principles (Approved June 9, 1994)

Relative-risk reduction allows regulatory flexibility so that environmental problems can be evaluated on the benefits of reducing one or several risks and remedied by priorities set through public choices. It does not mean that the final standards will be relaxed, although that too could be the public choice. Standards could remain the same or be made more or less stringent depending on the results of relative-risk analysis. It also implies the flexibility to extend compliance deadlines in order to allow a locality to address its most serious environmental problems first.

Only with the implementation of relative-risk reduction principles will we ensure that the contaminants representing the most significant health risks will be regulated first. The use of relative-risk reduction principles should be a major consideration in the standard-setting process under the SDWA, along with the required public involvement to assure that the final choices are wise ones.

White Paper on What Water Utilities Can Do to Minimize Public Exposure to *Cryptosporidium* in Drinking Water (Approved January 1995)

Cryptosporidium is a parasite that has become a significant public health concern. AWWA is aggressively acting to understand Cryptosporidium and to develop suggestions that utilities can use to control this organism and other pathogens. AWWA recommends that water utilities review the following suggestions to minimize public exposure. Not all these suggestions are practical or possible in all localities; each utility must decide what is appropriate for its operations. Suggestions include: optimizing treatment and watershed protection, enhanced testing, strengthening alliances with the public health community and keeping customers informed.

In addition some actions that water utilities should encourage public health officials to take include:

- *educating sensitive populations to the fact that public drinking water supplies, even when they meet or exceed all state and federal standards, are not sterile drinking water supplies (nor is bottled water or water treated by a home water treatment device);*
- *identifying sources of relevant information, such as tracking the sales of antidiarrheal medicines or diarrhea surveillance in nursing homes, so that water suppliers, health departments, and others can be notified of unusual increases in cases of gastrointestinal illness, the primary symptom of Cryptosporidium infection;*
- *increasing testing of stool samples from patients to determine the extent of cryptosporidiosis when unusual increases in cases of gastrointestinal illness occurs;*
- *establishing a rapid response system of notification for sensitive populations.*

The public has justifiable concerns about the threats posed by Cryptosporidium. Utilities should be open about the issue and share as much information as possible with the media and the public, including developing news releases and fact sheets to educate the media and customers about sources of Cryptosporidium, possible health risks, monitoring efforts, and treatment processes. [AWWA has fact sheets and sample materials available.]

Utilities should keep public health and other local and state officials informed of monitoring results, ongoing research efforts, and emerging technology and should have in place a contingency plan for rapid notification in the event of a waterborne health threat.

Both White Papers identify the need for public involvement - the former in the standard setting process while the latter recommends utilities keep the public well informed about *Cryptosporidium*, its possible health risks, monitoring efforts and treatment processes. The AWWA position regarding public involvement follows in Section 5. The latter White Paper also makes reference to a contingency plan for rapid notification of a waterborne health threat. The Risk Management TAW review also noted that this was missing from the Powell et al report (see Section 2).

While Ontario Regulation 459/00 (Drinking Water Protection) specifies notification requirements for adverse water quality results, the regulation is silent on advising consumers of the risk of exposure to a contaminant or actions the consumer can take to reduce their risk of exposure. It is likely that it was envisioned that the Medical Officer of Heath would consider same when notified of an adverse water quality result, however, the need for more effective risk communication by water authorities should be more explicit. Furthermore, the literature and conclusions drawn from AWWA focus groups confirms that notification is not enough, in and of itself, to inform the public about the quality of their drinking water, increase public confidence and provide information for those who may be at risk (AWWA, 1998).

The value of public notification programs lies in their effectiveness in promoting behavioural changes among water consumers. Studies completed to date (Harding et al, 2000 and Anadu et

al, 2001) have found that to be successful, the public notification must answer the following questions: what is the problem, how can it affect the consumer (i.e. what are the adverse health effects); what can the consumer do to reduce their risk (i.e. specify risk-reduction activities such as boiling water, drinking bottled water, etc.).

Notwithstanding the above, the Harding paper noted that other studies have found that consumers fail to change their behaviour if the effort to avoid illness (either in time or energy expended) is perceived to be greater than the benefit that may result from the behavioural change. Furthermore, where "consumers have been shown to perceive their drinking water as high quality despite government notices to the contrary … neither documentation of potential risk nor the need for risk reduction is likely to provide incentives strong enough to change behaviour" (Harding et al, 2000). This highlights the need for water suppliers to increase the effectiveness of public notification for serious situations by using multiple channels of communication (i.e. radio, television, newspapers, utility mailings, etc.) and ensuring the notices are issued by credible sources.

5.0 Public Involvement

The AWWA Policy on Public Involvement (adopted by the Board of Directors June 6, 1993 and revised June 18, 1995 and June 20, 1999) is as follows:

> ***The American Water Works Association (AWWA) believes public water suppliers should keep their customers informed about water-related issues of importance to the community and involve citizens in the decision-making process for these issues. As part of this process, water suppliers are encouraged to listen, anticipate and respond meaningfully to public concerns, with significant regard to the concerns of special and/or sensitive populations.***
>
> Water suppliers have a distinctly public role by virtue of their providing a service essential to public health and well being and their managing a sustainable natural resource. Involving the public in decision making is integral to fulfilling that public role. It is also important because many drinking water issues, including adequacy of supply, water quality, rates and conservation, are not only technical issues; they are also social, political, personal health, and economic issues. As such, they are best resolved through a process of meaningful dialogue with concerned parties and the public.
>
> Public involvement incorporates a wide range of communication processes. Depending on the situation, any or all of the following techniques may be necessary: research, information dissemination, advisory groups, facilitated workshops and meetings and conflict resolution. In any event, public involvement must be implemented early and public input must be linked to decisions to be effective. However, the type of involvement appropriate for individual water suppliers and their communities will vary according to the issues, public expectations, and the circumstances.

There are currently a number of ways that the public and/or interested stakeholders can be involved in the "drinking water" decision-making process, namely:

1. Drinking water standards set by the Ministry of Environment (MOE) are posted on the Environmental Registry System (ERS) for public comment in accordance with the Environmental Bill of Rights (EBR) consultation process.

2. Major programs, plans, objectives or guidelines proposed by the MOE that have a significant environmental impact or potential for such impact are posted on the ERS for public comment in accordance with the EBR consultation process.

3. Municipal water projects must proceed through a Class Environmental Assessment (EA) process to be approved. Public consultation is an integral part of the Municipal Class EA process.

4. Instruments (i.e. Certificates of Approval, Permits to Take Water, etc.) that are not subject to the Municipal Class EA process are posted on the ERS for public comment in accordance with the EBR consultation process.

5. Director's Control Orders and emergency situations are registered on the ERS but are not subject to public comment. Long term planning with public consultation is expected once the issue/emergency is abated and the instruments are put in place to fully remediate the situation.

6. Section 12 of Ontario Regulation 459/00 (Drinking Water Protection) requires the owner of a water treatment or distribution system to make publicly available, free of charge, a quarterly report on the quality of the drinking water. The Regulation requires that the following information be included in the quarterly report (MOE, August 2000):

    - a description of the waterworks, the operation of the waterworks, and the water source;
    - availability of source water assessments or protection plans;
    - information on significant sources of contaminants, if applicable;
    - an outline of the measures taken to comply with the Regulation and the Ontario Drinking Water Standards (ODWS);
    - a summary of the analytical results taken during the quarter.

Notwithstanding the existing level of consultation described above, public and stakeholder involvement could be enhanced by the following:

1. The activities of Health Canada and the Federal-Provincial Sub-Committee should be better publicized/communicated to ensure that the presentation of information on public health effects and standard setting is comprehensive, informative, and understandable. This would provide greater opportunity for public education and participation. In addition, the use of relative-risk reduction principles should be a major consideration in prioritizing the standard setting process of Health Canada and the Federal-Provincial Sub-Committee.

2. Water utilities should be required to produce an annual water quality report that must be sent to all consumers. This requirement would ensure that all consumers are informed regarding the level of contaminants in the drinking water provided by the system. Quarterly reports as submitted to the Director per Section 12 of Ontario Regulation 459/00 (Drinking

Water Protection) should continue to be made available to consumers. The frequency of reporting, however, should be reviewed for both public communication and compliance purposes. Less frequent public reporting (i.e. annual) would address concerns that extensive reporting may cause the public to lose interest in their drinking water, especially for parameters that do not change. More frequent compliance reporting (i.e. monthly) could be beneficial for enforcement monitoring.

In addition, it is recommended that water utilities develop public consultation plans to present the results of the source water assessments or protection plans, and information on significant sources of contaminants, that are noted in the water quality reports. Both the 1996 SDWA Amendments relating to source water assessments and the Australian "Framework for Management of Drinking Water Quality" include public consultation provisions. The public consultation plan should address the issues suggested in the Australian Framework, namely:

> *"discussions should include the establishment of levels of service, costs, existing water quality problems, and the options for protection and improvement of drinking water quality including land use constraints, changes in treatment or infrastructure. Consumers should also be consulted on monitoring requirements and mechanisms for public reporting of system performance. Decisions and agreed levels of service should be based primarily on estimates of risk and cost, together with local knowledge of the source water (including the degree of catchment protection), treatment processes employed, history of the distribution system and the quality of the management program exercised over its operation. Consumer needs and expectations will influence the extent to which each community will adopt guideline values." (page 51)*

The establishment of "levels of service" noted above should not be construed as "standards" for regulatory purposes. Rather, they are intended to establish the needs and expectations of consumers. For example, one community may choose to tolerate taste and odour problems whereas another may choose to pay for treatment to address same.

While many water utilities currently address the above noted issues using the Municipal Class EA process, this only applies when new works are being considered. Some water utilities have used similar public consultation processes to present their groundwater management strategies either on their own (i.e. Halton Region, Waterloo Region, City of Guelph, Oxford County) or as part of the Provincial Water Protection Fund (i.e. Victoria County, Town of Stratford, Prescott and Russell United Counties, Stormont, Dundas and Glengarry United Counties).

Regardless of the work completed to date or the public consultation process used, Section 13 of Ontario Regulation 459/00 (Drinking Water Protection) now requires the owner of a water treatment or distribution system to prepare a report in accordance with the MOE publication entitled "Terms of Reference for Engineers' Reports for Water Works". The principal objectives of the Engineers' review and Report are to assess the potential for microbiological contamination of the water works (i.e. source water characterization) and to identify operational and physical improvements necessary to mitigate this potential utilizing multiple barrier concepts. In addition, a monitoring regime for the entire system will be

identified to ensure compliance with the Ontario Drinking Water Standards and Regulation (MOE, August 2000 and Revised January 2001).

The Engineers' Report is a comprehensive process that includes components similar to the source water assessment process included in the 1996 USEPA Safe Drinking Water Act (SDWA) Amendments and many parts of the Australian "Framework for Management of Drinking Water Quality". As such, it is acknowledged that the completion of the Engineer's Report may be necessary to facilitate the public consultation suggested above.

3. It is important that the professionals in the drinking water industry be developed over the next few years to ensure the recommendations of the Walkerton Inquiry can be implemented in a timely fashion and to ensure trust in public institutions is restored. To achieve this goal it will be necessary to document and transfer the knowledge of current water leaders to young professionals, as well as instill the organizational behaviour necessary to achieve excellence. This is particularly important given the demographics of the drinking water profession - many will retire in the next 5 to 10 years. It is therefore recommended that a Professional Interest Advisory Forum (PIAF) be formed to implement a drinking water quality management process in the short term and then to provide ongoing oversight to ensure success of the program.

   It is envisioned that the PIAF would perform a function similar to National Drinking Water Advisory Council (NDWAC) in the US. The NDWAC consults with and makes recommendations on a continuing basis to the USEPA on matters related to the activities, functions and policies of the Agency under the SDWA, as amended. Its membership comprises state and local agencies, private groups concerned with drinking water, academics and the general public.

   The NDWAC has working groups that make recommendations to the full Council, which in turn advises EPA on individual regulations, guidances and policy matters (EPA, 2001). Its functions include (EPA, 1996):

   - provide practical and independent advice to the Agency on matters and policies related to drinking water quality and hygiene;
   - maintain an awareness of developing issues and problems in the drinking water area and advise the Agency on emerging issues;
   - review and advise the Administrator on regulations and guidance that are required by the SDWA;
   - make recommendations concerning necessary special studies and research;
   - recommend policies with respect to the promulgation of drinking water standards;
   - assist in identifying emerging environmental or health problems related to potentially hazardous constituents in drinking water;
   - propose actions to encourage cooperation and communication between the Agency and governmental agencies, interested groups, the general public and technical associations and organizations on drinking water quality.

   In Ontario, it is suggested that the PIAF represent decision-makers from public health, regulatory/government officials, water utilities and other independent stakeholders with an

interest in drinking water issues (i.e. OWWA/OMWA, PEO, Pollution Probe, academics, etc.). In addition to the functions noted above for the NDWAC, it is envisioned that the PIAF Terms of Reference, or scope, would include but not be limited to:

Short Term Needs

- Develop a drinking water quality management framework to implement the recommendations of the Walkerton Inquiry - include a review of consumer expectations and set implementation priorities.
- Work with appropriate stakeholders to develop trigger points (i.e. critical control points) and consistent emergency response protocols for drinking water.
- Work with appropriate stakeholders to ensure that essential programs such as source water characterization, source water protection programs, public consultation, etc. will achieve their objectives.
- Update existing and/or prepare new MOE manuals that document the need and purpose of the ODWS, Ontario Regulation 459/00 (Drinking Water Protection), The Walkerton Inquiry recommendations, multiple barrier concepts, continuous improvement programs, emergency response protocols, etc. - this is critical to ensure the institutional history of the MOE, water utilities, consultants and suppliers is documented and transferred to young professionals.
- Develop and implement training and mentoring programs for public health staff, regulatory/government officials (including inspectors) and water utilities, etc. - the intent of this program would be to improve the technical, managerial and financial capacity of the regulator and water utilities similar to the capacity development initiative in the 1996 SDWA Amendments.
- Provide media and emergency response training to appropriate staff.

Ongoing Oversight

- Determine if the public is reading the water quality reports and if not, assess how the reports could be improved - also assess if extensive reporting, especially for parameters that do not change, is causing the public to lose interest in their drinking water quality.
- Review water utility benchmarking and improvements, including enhanced customer satisfaction programs, status of capacity development and accreditation.
- Review data and trends from the Drinking Water Surveillance Program (DWSP) and identify the need for new standards based on same.
- Review standard setting schedule and recommend revisions accordingly.
- Ensure MOE manuals are current, staff training is in place, including ongoing media and emergency response training, and capacity development is occurring.
- Conduct strategic review of drinking water industry, including a review of consumer expectations using surveys and focus groups where necessary (i.e. where are we, where are we going, how do we get there, how did we do).
- Identify emerging issues and new technologies in the drinking water industry per the above - while having regard for the time it can take to conduct research, prepare guidelines and implement treatment improvements.
- Identify research needs to address emerging issues, assess new technologies and new standard requirements - revise implementation priorities accordingly.
- Provide advice and comment to the Government of Ontario on drinking water policies, programs, best management practices, etc.

- Build relationships with stakeholder organizations and the public.
- Provide a vital communication link between the regulator and water utilities.

To ensure drinking water issues are given high priority over the next few years, and for staffing continuity, it is recommended that the PIAF report to the Assistant Deputy Minister of the MOE. Consideration should be given to supporting the Ontario Water Works Association (OWWA), financially and otherwise, as chair of the PIAF to ensure a third party link between the regulator, water utilities and interested stakeholders.

It is also noteworthy that the OWWA, through its Management Committee, has worked hard over the past few years to develop and implement a Water Utility Management Institute in Ontario. It is recommended that the Government of Ontario support this initiative as the need for management training is expected to be high in the next few years.

6.0 Public Right-to-Know

As noted above, Section 12 of Ontario Regulation 459/00 (Drinking Water Protection) requires the owner of a water treatment or distribution system to make publicly available, free of charge, a quarterly report on the quality of the drinking water. The Regulation requires that the following information be included in the quarterly report (MOE, August 2000):

- a description of the waterworks, the operation of the waterworks, and the water source;
- availability of source water assessments or protection plans;
- information on significant sources of contaminants, if applicable;
- an outline of the measures taken to comply with the Regulation and the Ontario Drinking Water Standards (ODWS);
- a summary of the analytical results taken during the quarter.

The August 2000 Technical Brief prepared by the MOE to assist utilities in preparing their water quality quarterly reports provides details regarding the content of the water quality quarterly reports as follows:

Basic System Information

The introductory section must contain the following:

- name/phone number of contact person;
- mailing address, email address and/or web site;
- information on opportunities for public participation;
- brief description of the treatment processes used to produce drinking water.

Compliance Information

The following items could be covered in a discussion of regulatory compliance:

- use of accredited laboratories;

- operation by licensed operators;
- compliance with sampling and analytical requirements;
- adherences to ministry guidelines and procedures.

Water Sources

This section must contain the following:

- type, name and location of water source(s);
- availability of source water assessments or protection plans;
- information on significant sources of contaminants, if applicable.

This section must be accompanied by a description of how surface water and/or groundwater occur and how contaminants, both natural and manufactured, can be introduced into a water source.

Definitions

In this section any acronyms, symbols, units of measurement or terminology that appear in other sections must be defined or explained to help the reader. Examples include but are not limited to MAC (maximum acceptable concentration), IMAC (interim maximum acceptable concentration) and mg/l (milligrams per litre).

Summary of Analytical Results

This section must have a table showing the occurrence of detectable concentrations of any parameter that a waterworks is required to sample for according to the regulation. The summary of analytical results must contain an easy-to-understand table of detectable results for any parameter a waterworks is required to sample for under the regulation. The table should include units of measurement, standard, number of samples, number of detectable results, range of concentration in detectable results, sampling date(s) and a brief statement on a typical source of that contaminant. In addition, for microbiological parameters, the summary must also contain data on the result of all samples (to make consumers aware of the level of microbiological sampling that is done to safeguard the water supply).

Compliance with the Ontario Drinking Water Standards

Any exceedance of health-related Ontario Drinking Water Standards shall be summarized. This summary should include dates, an explanation for the exceedance, and a description of the action taken to remedy it.

Educational Information

The owner may wish to present a section of additional information for consumers. For example, a warning about microbiological quality for immuno-compromised people may be advisable.

Effective steps must be taken to advise consumers as to when and where they can get a copy of the water quality quarterly report free of charge. Reasonable efforts must be made to inform bill-paying and non-bill-paying consumers (i.e. apartment renters) of the report's availability.

The above compares to the annual consumer confidence reporting requirements established by the USEPA under the 1996 SDWA Amendments, namely:

- information on the source of water;
- source water boundaries;
- definition of terms used;
- detected contaminants and provide regulation standards for comparison;
- include the likely source(s) for each contaminant;
- report violations and relevant information about health effects (i.e. for every contaminant detected at levels greater than the regulation standard, water authorities must provide an explanation of the violation, the length of time the violation occurred, past or future actions taken to prevent the violation or its reoccurrence and the potential adverse health effects using USEPA language verbatim including required language for vulnerable populations);
- context for the reader;
- optional - include information to help public participation in water quality decisions.

Each water authority must deliver one copy of the consumer confidence report directly to each of its customers. In addition, water authorities are asked to make a "good faith" effort to reach consumers who do not receive water bills, such as residents in apartments or condominiums. Alternative delivery methods are available for small system if their mailing requirements have been waived.

While there is no intent or purpose provided for the water quality quarterly reports in Ontario Regulation 459/00, the August 2000 Technical Brief prepared by the MOE indicates that "reporting to consumers promotes accountability for the quality of the drinking water supplied by waterworks". The USEPA intended the consumer confidence reports to be:

- a means for consumers of water (including those with special health needs) to make informed decisions regarding their drinking water;
- a method of informing consumers about where their drinking water comes from, what is involved in the delivery of safe drinking water and the importance of source water protection; and
- a tool to enhance the dialogue between water customers and their utilities and to involve consumers more fully in decisions that may affect their health.

Based on the foregoing, the main differences between the Ontario Water Quality Quarterly Reports and the US Consumer Confidence Reports include:

1. With the exception of sodium, the Ontario water quality quarterly reports do not have prescribed legal verbatim language regarding health risks to consumers whereas the US consumer confidence reports do.

2. Each US water authority must deliver one copy of the consumer confidence report directly to each of its customers whereas in Ontario consumers need only be advised of the availability of the water quality quarterly report.

3. Neither the Ontario water quality quarterly reports nor the US consumer confidence reports require advising the consumer of what they can do to reduce their risk (i.e. specify risk-reduction activities such as boiling water, drinking bottled water, etc.).

As noted in Section 4, public notification must answer the following questions to be successful: what is the problem, how can it affect the consumer (i.e. what are the adverse health effects); what can the consumer do to reduce their risk (i.e. specify risk-reduction activities such as boiling water, drinking bottled water, etc.). The OWWA/OMWA would therefore recommend that:

1. Water quality reporting be part of an overall communications strategy. AWWA has recognized, through information drawn from its focus groups, that positive relationships must be developed with consumers before water quality reports are distributed to ensure customers are receptive to the information being disseminated.

2. Training and education of water utility staff will be necessary to develop and implement comprehensive communication and outreach strategies. Training needs will include: media relations, customer service, etc. For example, companies in the US with the best record for customer service provide 160 or more hours of training to their customer service representatives (CSRs). CSRs are often cross-trained to perform multiple tasks and they receive online training to refresh themselves during planned downtimes (Olstein et al, 2000).

It is noteworthy that the AWWA has published the document entitled "Preparing Consumer Confidence Reports (CCRs)" to assist water authorities in the US to meet the EPA regulatory requirement. The CCRbuilder software package was developed by AWWA to allow utilities to enter their water quality data and formatting instructions. The package generates a camera-ready CCR, as well as pages for the Internet. The Regional Municipality of Ottawa-Carleton (now the City of Ottawa) adapted the AWWA CCRbuilder for their use.

The AWWA focus group results regarding consumer confidence reports are summarized in the above noted report. Some of their key recommendations include:

Identify the objectives you wish to achieve through the dissemination of the information. Make sure these objectives are explicit, measurable and limited to goals that are reasonable and attainable.

Keep the reports simple and straightforward. Don't try to do too much with a single report. The essential elements should address: is the water safe to drink; does it meet the standards; what are the test results; how do the compare with the standards; how might it affect me; how would I know; what is the water authority doing about it; where can I go for more information?

Develop or adopt an effective technique to help readers find and understand the most important test results at a glance. Several methods appeared to be effective, allowing customers

access to the full test results and reducing information overload. One option was to use symbols or highlighting to draw attention to compliance problems or other results of special concern.

Provide customers with independent verification of the test results through a credible source, such as an independent laboratory, health department or university. AWWA's CCRbuilder provides a place in the report to put the name of a laboratory that was used. Remember that USEPA (i.e. the regulator) and environmental groups may not necessarily be considered neutral or credible sources by all customers.

Use advance publicity and promotion to tell customers ahead of time that the report is coming. Tell customers what it is and when and where to look for it.

Use multiple methods and modes to get the message out. This includes both advance publicity as well as supporting communications beyond the report itself (i.e. a comprehensive communications strategy).

Remember that most customers just want to be better informed about the quality and safety of their drinking water. By providing information in a credible, timely and professional manner, water utilities have an important opportunity to: meet their customers' perceived needs and desire for information; increase public confidence in the quality and safety of tap water; demonstrate their concern for their customers.

Keep in mind that the water quality report is just a single step towards communicating more effectively and building better relationships with customers. While water quality reports can have an important impact on customer awareness and perceptions, how customers interpret and react to this new communication material may depend more on their current relationship and perceptions of the utility - as shaped by previous experiences, communications and impressions. As such, it is important that water quality reports be: developed and distributed as part of a more comprehensive communication and outreach strategy; tailored to the unique needs of local customers; tested using some form of communications and customers research to make sure that the reports accommodate consumers' perceived needs, expectations and preferences.

7.0 Recommendations

To supplement the Powell et al report, the OWWA/OMWA recommends that in its final report to the Ontario Government on communications matters, the Commission recommend that:

1. The Ontario Government should develop programs to provide practical guidance to water utilities on what should be done in a drinking water related public health emergency. Such guidance should include information on what circumstances should trigger an emergency response, what steps must be taken when a trigger is reached, and the importance of building relationships with water utilities and health departments.

2. The Ontario Government, in collaboration with water utilities and local medical officers of health, should establish operational procedures for use prior to and during a public health emergency (to address issues raised in Section 2 of this Review).

3. The Ontario Government should provide guidance to and require water utilities to implement risk communication plans that apply risk management principles while having regard to the need for any training and education of water utility staff that may be necessary to entrench this approach in water system operations.

4. The Ontario Government should apply relative-risk reduction principles, and ensure that appropriate communication of these principles to the public occurs, so that contaminants representing the most significant health risks are regulated first.

5. The Ontario Government should expand section 12 of O. Reg. 459/00 regarding public right-to-know in the manner suggested by the OWWA/OMWA in this Review. In particular, the province should focus on:

   - Requiring water utilities to produce an annual water quality report that must be sent to all consumers. This requirement would ensure that all consumers are informed regarding the level of contaminants in the drinking water provided by the system. Quarterly reports as submitted to the Director per Section 12 of Ontario Regulation 459/00 (Drinking Water Protection) should continue to be made available to consumers. The frequency of reporting, however, should be reviewed for both public communication and compliance purposes. The recommended Professional Interest Advisory Forum (see Recommendation 6) could undertake this review. Less frequent public reporting (i.e. annual) would address concerns that extensive reporting may cause the public to lose interest in their drinking water quality, especially for parameters that do not change. More frequent compliance reporting (i.e. monthly) could be beneficial for enforcement monitoring.

   - Making water quality reporting part of an overall public consultation and communications strategy. Positive relationships must be developed with consumers before water quality reports are distributed to ensure customers are receptive to the information being disseminated. Water utilities should be encouraged to present the results of the source water assessments or protection plans, and information on significant sources of contaminants, to the public. This will provide the public with the opportunity to comment on the establishment of levels of service, costs, existing water quality problems, and the options for protection and improvement of drinking water quality including land use constraints, changes in treatment or infrastructure. Consumers should also be consulted on monitoring requirements and mechanisms for public reporting of system performance.

   - Training and education of water utility staff. This will be necessary to develop and implement comprehensive communication and outreach strategies envisioned. Training needs will include: media relations, customer service, etc.

   - AWWA focus group results as summarized in this Review (and fully documented in the AWWA document entitled "Preparing Consumer Confidence Reports (CCRs)".

6. The Ontario Government should form a Professional Interest Advisory Forum (PIAF) as described in Section 5 of this Review to develop a drinking water quality management framework to implement the recommendations of the Walkerton Inquiry, to entrench the continuous improvement culture in water system operations and to improve the technical, managerial and financial capacity of the Ministry of Environment (i.e. the regulator) and water utilities.

7. The Ontario Government should support the Water Utility Management Institute of Ontario initiative as developed by the Ontario Water Works Association, through its Management Committee.

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APPENDIX A - AWWA WHITE PAPERS ON RELATIVE RISK REDUCTION

RELATIVE-RISK REDUCTION PRINCIPLES

Approved June 9, 1994. Published October 1994 in AWWA Mainstream Issue

The use of relative-risk reduction principles has been endorsed by drinking water utilities as one of the primary issues for consideration in the reauthorization of the Safe Drinking Water Act. However, many drinking water professionals, congressional staffers, and environmentalists do not understand what the concept means. The purpose of this white paper is to assist in understanding relative-risk reduction principles in relation to the regulation of drinking water.

Consideration of relative-risk reduction principles could affect drinking water standards in two ways. One, by providing a means for ranking contaminants for potential regulation, the worst risks would be addressed before those of lesser concern. For example, the current SDWA specifies a list of 83 chemicals to regulate. Many of these chemicals may never occur in some drinking water supplies; conversely, other potentially serious microbial risks are not addressed at all.

Second, the use of relative-risk reduction principles can optimize public health protection by minimizing incremental cost increases and not increasing the stringency of standards past the point of diminishing returns. Because individual standards would not be unnecessarily stringent, available resources would be directed toward more significant risks across a wide range of contaminants.

The belief that the use of relative-risk reduction principles would ultimately threaten public health and the environment reflects a lack of understanding of their use.

Background

As more environmental requirements became effective over the last few years, cities and towns realized that they might not be able to afford all the required environmental fixes in the short term. A typical municipality could face new landfill requirements, increased drinking water needs, and continuing wastewater treatment requirements, all with overlapping compliance deadlines. Being required to address these environmental problems at the same time could cause local taxes and user fees to increase dramatically over the short term and, in some cases, could exceed political acceptability or the community's financial capacity.

At the same time, the scientific community became concerned that the micro-management of environmental programs by Congress might not address the most important environmental priorities. In the Science Advisory Board (SAB) report, Reducing Risk, the SAB developed 10 recommendations that included targeting risk-reduction opportunities and using risk-based strategic planning and budgeting. The Drinking Water Committee of the SAB has also stated that "the SAB strongly supports the use of a relative-risk orientation as an important consideration in making risk reduction decisions on all sources of risk. ... The SAB strongly encourages the [US Environmental Protection Agency] and Congress to work together to

consider changes in existing statutes that would permit implementation of relative-risk reduction strategies in a more efficient and effective manner."

Relative-risk reduction and risk assessment are being debated in Congress. Sen. Daniel Patrick Moynihan (D-N.Y.) has introduced legislation that would require a prioritization of risks. Sen. J. Bennett Johnston (D-La.) has amended the bill elevating USEPA to Cabinet level to include a risk-assessment requirement that illustrates the political concerns regarding risk but may simply add another complication to the issue. This amendment has created enough debate regarding risk or relative-risk reduction so that risk has become a major issue in the deliberations on environmental laws.

Relative-risk reduction allows regulatory flexibility so that environmental problems can be evaluated on the benefits of reducing one or several risks and remedied by priorities set through public choices. It does not mean that the final standards will be relaxed, although that too could be the public choice. Standards could remain the same or be made more or less stringent depending on the results of relative-risk analysis. It also implies the flexibility to extend compliance deadlines in order to allow a locality to address its most serious environmental problems first.

Safe Drinking Water Act

Under a specific regulatory program such as the SDWA, relative-risk reduction can be used in different ways. One method of using relative-risk reduction is to perform a detailed risk analysis, including the benefits and costs of reducing risk, at the contaminant listing stage and to continue to refine and expand this analysis through the entire standard-setting process. This continuous risk analysis can incorporate cost - benefit comparisons in various ways, all of which use some subjective criteria in the process.

One cost - benefit approach for the standard-setting process is known as the "knee of the curve." The knee-of-the-curve approach has been used in USEPA's wastewater programs. Essentially, a graph is constructed of the risk-reduction benefits versus the costs of risk reduction, as shown in Figure 1. The knee of the curve is the point of diminishing returns for the incremental cost. In other words, this is the point where minimal increases in the benefits of risk reduction require a greatly increased cost. Difficulties in this approach include what to do when the knee of the curve still presents a relatively high risk and what to do when the knee of the curve is not that easy to determine (i.e. the shape of the graph may not be as ideal as in the example in Figure 1).

Another cost - benefit approach uses a graph showing the intersection of the curves representing the benefits and costs of risk reduction. The curves intersect where increasing costs produce no significant incremental risk-reduction benefits (Figure 2).

Another method to implement relative-risk reduction is the multimedia approach. This approach is best illustrated by the proposed drinking water regulation for radon. The majority of the radon health risk is from indoor air, with drinking water representing a small percentage of the total risk. USEPA estimates that radon in drinking water represents less than 5 percent of the total health risk from radon, because radon in drinking water is transferred to air at a ratio of 10,000:1. At the proposed radon maximum contaminant level of 300 piC/L, the contribution of drinking

water to indoor air would be 0.03 piC/L. This is two orders of magnitude lower than the USEPA recommended level of 4 piC/L for radon in indoor air and substantially below the average ambient outdoor-air levels of radon. This multimedia approach can be used with other contaminants by fully analyzing the contribution of that contaminant from other sources, such as food. Limited resources are then applied to the media that contribute the most significant risk and where the greatest risk reduction benefit would be derived.

Credible scientific risk reduction and cost data is essential to the public choice process. These tools can be used to compare the effects on risk reduction of regulating various contaminants in terms of costs, so that public choices can be made regarding how available dollars will be spent.

Conclusion

Only with the implementation of relative-risk reduction principles will we ensure that the contaminants representing the most significant health risks will be regulated first. The use of relative-risk reduction principles should be a major consideration in the standard-setting process under the SDWA, along with the required public involvement to assure that the final choices are wise ones.

WHAT WATER UTILITIES CAN DO TO MINIMIZE PUBLIC EXPOSURE TO CRYPTOSPORIDIUM IN DRINKING WATER

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Cryptosporidium is a parasite that has become a significant public health concern. AWWA is aggressively acting to understand *Cryptosporidium* and to develop suggestions that utilities can use to control this organism and other pathogens. AWWA recommends that water utilities review the following suggestions to minimize public exposure. Not all these suggestions are practical or possible in all localities; each utility must decide what is appropriate for its operations.

Optimizing treatment and watershed protection. Water utilities should optimize water treatment processes to remove particulate matter with turbidity monitoring of individual filters and/or particle counting. Utilities should strive to achieve finished water turbidity levels of 0.1 nephelometric turbidity units (ntu) and focus on maintaining 100 percent treatment system reliability by using a redundancy of systems for such needs as chemical feed and capacity.

Utilities should also work to identify and understand the fate of potential *Cryptosporidium* sources in their watersheds and should strengthen alliances with relevant organizations and officials to enhance protection of source water quality.

Testing. Utilities should increase their vigilance and test for *Cryptosporidium* in both source and finished water, understanding the current limitations in testing methodologies and analysis.

Strengthening alliances with the public health community. Public health officials have the responsibility, knowledge, experience, and direct contacts to best communicate the potential risks posed by *Cryptosporidium*. Water utilities should strengthen relationships with health departments, the medical community, regulatory agencies, and organizations representing high-risk populations such as the immunocompromised, organ transplant recipients, and cancer patients. These alliances should be permanent avenues for analyzing risks and communicating with appropriate populations.

Some actions that water utilities should encourage public health officials to take include:

1. Educating sensitive populations to the fact that public drinking water supplies, even when they meet or exceed all state and federal standards, are not sterile drinking water supplies (nor is bottled water or water treated by a home water treatment device). According to a draft report from the Centers for Disease Control, "Immunocompromised persons who wish to take independent action to reduce the risk of waterborne cryptosporidiosis may choose to take precautions similar to those recommended during outbreaks (such as boiling tap water for one minute). Such decisions should be made in conjunction with their health care provider."

2. Identifying sources of relevant information, such as tracking the sales of antidiarrheal medicines or diarrhea surveillance in nursing homes, so that water suppliers, health departments, and others can be notified of unusual increases in cases of gastrointestinal illness, the primary symptom of *Cryptosporidium* infection.

3. Increasing testing of stool samples from patients to determine the extent of cryptosporidiosis when unusual increases in cases of gastrointestinal illness occurs.

4. Establishing a rapid response system of notification for sensitive populations.

Keeping customers informed. The public has justifiable concerns about the threats posed by *Cryptosporidium*. Utilities should be open about the issue and share as much information as possible with the media and the public, including developing news releases and fact sheets to educate the media and customers about sources of *Cryptosporidium*, possible health risks, monitoring efforts, and treatment processes. [AWWA has fact sheets and sample materials available.]

Utilities should keep public health and other local and state officials informed of monitoring results, ongoing research efforts, and emerging technology and should have in place a contingency plan for rapid notification in the event of a waterborne health threat.