



The Water Supply Association of B.C. and the Interior Health Authority

Discussion Paper: A Common Approach to Drinking Water Improvements for the Okanagan Region

October, 2007

Introduction

This paper provides historical context for Okanagan Water Systems and outlines a common approach for Water Suppliers and Interior Health towards drinking water improvements within the Okanagan Region.

The Water Supply Association of BC (WSABC) and the Interior Health Authority (IHA) believe that on-going open discussions should take place on the topic of drinking water improvements. The discussions must consider all aspects of water supply in order to achieve the best overall long term direction for safe water for the Okanagan Valley.

Much of the discussion has been around the issues of turbidity reduction and filtration. Notwithstanding this, discussions amongst stakeholders on the broader aspects of a safe water supply including reduction of drinking water risks, source protection, enhanced disinfection, implementation costs and other factors that impact the provision of safe drinking water are seen as a desirable outcome.

The majority of the residents in the Okanagan Valley obtain their drinking water from unfiltered surface waters. There has been considerable discussion over the past 18 months regarding the degree of human health risk posed by unfiltered water, and the best strategies for attaining water treatment improvements.

The Drinking Water Quality Improvement Program was implemented in the Okanagan in the late 1990's resulting from discussions between Water Suppliers and Interior Health. The program has now been adopted throughout the Interior Health region. The intent of the program is to ensure consistent program delivery and to provide the means for a documented and verifiable management system for promoting and protecting public health. This program addresses long term plans and the desire to accomplish incremental improvements over time.

Objective of this Discussion Paper

This paper was developed out of stimulating and thoughtful discussion with drinking water stakeholders so that a responsible and achievable direction for drinking water improvements can be articulated and agreed upon. Once this is achieved, then all involved parties will be able to work together towards common goals with a view to continuous improvement.

For the valley-wide water treatment program to be successful, it must improve public health, be fiscally achievable and environmentally sustainable.

Our common objective is to protect public health and to ensure that water is provided that consistently and reliably meets the criteria set out within the Guidelines for Canadian Drinking Water Quality (GCDWQ).

Sustaining a high level of public confidence in their water supply is vitally important towards gaining acceptance of proposed infrastructure upgrades. There is increased value when Water Suppliers and Interior Health can align public messaging and hold shared communication objectives. The messaging must be clear, accurate and easily understood by the public

It is recognized that the home treatment and bottled water industries present a challenge to water suppliers in that they divert revenue that could otherwise be used to fund infrastructure upgrades. In addition, water consumers that choose home treatment devices may be at greater health risk if units are not properly maintained. It is also recognized that bottled water is less environmentally responsible and more costly than a safe municipal water supply.

This paper developed out of discussions between Water Suppliers and Interior Health within the Okanagan region and is not intended to represent the thoughts of those in other regions of IHA or the water suppliers elsewhere in the province. It is our opinion that ideas presented herein represent sound practice and others may benefit from our experience. We are strongly encouraged with the direction of this paper and acknowledge that this is a vital step towards our common goal of serving the public.

This document outlines common principles for long term water supply and treatment expenditures in the Okanagan. We recognize, however, that this discussion document is not policy and does not supersede the *Drinking Water Protection Act*. Topics are provided in point form for further discussion and reference.

1.0 The Current State of Drinking Water Supply in the Okanagan

1.1 The majority of drinking water provided in the Okanagan is not filtered

There are two primary reasons for this:

1. The first is that our source waters are relatively uncontaminated in comparison to the majority of water sources in North America and Europe. The deep waters of Okanagan Lake and Kalamalka Lake, and the high elevation areas of the watersheds have limited waste contamination and are considered to be very high quality source water. These high quality sources are still recognized as such, but the GCDWQ now recommends filtration unless the source meets the exclusion criteria. Water from some of these sources maybe within all parameters of the GCDWQ. A primary objective should be to invest in protecting all of our water sources from contamination for future sustainable long term use.

2. The second reason is that the large combined irrigation/domestic water systems originated primarily as irrigation systems. These systems are designed to supply large volumes of water to a semi-arid landscape. Urbanization has increased the number of domestic users and challenged water systems to provide both affordable irrigation water and high quality drinking water.

The cost to treat the entire volume of water for these systems places a substantially greater cost burden on users than a typical water supply system does. The cost to separate off the agricultural component and treat the domestic part of the flow is also substantial. Plans and costs to do either have been developed for many of the suppliers.

1.2 Source Water Protection

Many water suppliers in the Okanagan have been managing their water sources since the start of the 20th Century. It is recognized that local governments who operate water systems rely on sources that are beyond their jurisdictional control (typically land use). Improvement districts have no regulatory abilities to control land use and must rely on other levels of government. Protection of our source water is critical to the long term sustainability of the Okanagan Valley. Source protection extends beyond the drinking water component to encompass land use, the environment, habitat, fisheries, and the entire hydrological cycle. Source protection is a critical component of the multi-barrier approach. A strong source protection program will help ensure that the sources are not degraded to the point where treatment is unachievable.

1.3 Learning from Our Problems

Several water suppliers in the Okanagan have experienced waterborne disease outbreaks, specifically: Black Mountain Irrigation District (*Giardia*, 1988); City of Penticton (*Cryptosporidium*, 1996); and the City of Kelowna (*Cryptosporidium*, 1996). These were difficult events to work through for the staff of those water utilities. The local water suppliers, public health staff, and the BC Centre for Disease Control (BCCDC) learned a great deal from these events. The suppliers improved their disinfection practices, improved their monitoring, set up automated controls and warning systems, established cross-connection control programs, and some utilities spent substantial funds on water treatment. The level of risk is lower and better understood than it was 10 years ago and many of these improved practices have formed the basis of the Drinking Water Quality Improvement Program.

1.4 Documented Level of Sickness in the Okanagan

The BCCDC *Annual Summary of Reportable Diseases for 2005* summarized levels of waterborne diseases throughout regions of the Province. The data can be found on the web at www.bccdc.org under “*Statistics and Reports*” and under “*Annual Reports*”. The Okanagan region is below the average provincial levels or very similar for almost all waterborne illnesses.

The Provincial Health Officer’s report has identified the Okanagan area as having more water utilities at medium and high risk than any other area in the Province. Interior Health rates water systems using unfiltered surface water as higher risk, and there are proportionally more of these systems in the Okanagan than elsewhere in the province.

However, we are concerned that data that is used for resource allocation within the Health Authorities is being reported as an indication of absolute risk. In addition, the criteria that the Health Authorities use to assess risk differ across the Province. Better tools are required to more closely correlate characteristics of a water system with the risk of illness.

When reviewing the data, it should be understood that there are many ways in which to contract a waterborne illness other than through the public drinking water system. We recognize that this data only captures a fraction of the burden of illness and, while it may be useful in identifying trends, other data sets should also be considered as a source of more focused information.

1.5 The Primary Cause of Waterborne Disease Outbreaks in Affluent Nations

Dr. Steve Hrudehy of the University of Alberta recently completed a book documenting waterborne disease outbreaks in North America over the past 30 years. The primary cause of outbreaks included major waste contamination, a lack of treatment, inadequate treatment, a breakdown in the treatment/disinfection process, operator error, operator complacency or a combination of any of the preceding reasons. Many of the outbreaks occurred on groundwater sources or where water filtration plants were in place. The primary conclusion of his research to avoid future waterborne disease outbreaks was to manage our wastes better, ensure appropriate treatment technology is in place, and to ensure that our operators are capable, vigilant, and have the tools and processes to do their jobs properly.

1.6 Alternate Water Supplies

Presently for many water service areas in the region, a segment of the public is utilizing bottled water services or home treatment devices for their drinking water. Important questions about the environmental impacts from the use of bottled water are being raised. In addition, the costs of both bottled water and home treatment are substantially higher than that of a public water supply.

The use of home treatment may lead to a false sense of protection and complacency in the event of a water quality problem such as a disinfection failure. In addition, there is a segment of the population that cannot afford home treatment devices or bottled water. There is also a segment of the population that will not properly maintain their home treatment systems.

1.7 Value of Committed, Qualified Operators

The two most significant barriers protecting the public from a potential waterborne disease outbreak are adequate treatment and effective operators. Operators are the first line of defense against a potential waterborne disease event. They are typically on-call 24 hours a day, 365 days a year. Their vigilance and dedication is critical to protecting public health.

Customers have higher expectations and are placing higher demands on these individuals. As with many professions in the current economic climate, recruitment and retention of these individuals is challenging.

2.0 Regulatory Issues

2.1 Action Plan for Safe Drinking Water

In 2002 the Province set out the *Action Plan for Safe Drinking Water* to help protect public health. The Action Plan was influenced by a number of key reports recommending that the province strengthen the protection of its drinking water supplies. These included the *1999 Auditor General's Report "Protecting Source Water"*, the *Drinking Water Review Panel's Final Report* on the proposed *Drinking Water Protection Act* and the Provincial Health Officer's Annual Report 2000, "*Drinking Water Quality in British Columbia*". The B.C. Action Plan includes principles for protecting health including source water protection, appropriate treatment and effective legislation using a multi-barrier approach to ensure the province's drinking water is both safe and affordable. We strongly agree with this balanced approach in addressing the issues.

The *Progress on the Action Plan for Safe Drinking Water in BC* was released in early March, 2007. The progress report identified the need for enhanced data collection and reporting to assist the local health authorities and the drinking water industry in assessing risk and protecting the public.

2.2 Multi-Barrier Approach

The multi-barrier approach to public health protection includes source water protection, sufficient water treatment, distribution system optimization, adequate monitoring of water quality, public involvement and awareness through education, good legislative frameworks in which to work, the optimum use of available technologies, and trained and certified operators to operate the systems. We strongly endorse the multi-barrier approach.

2.3 National Guidelines and Regulatory Requirements

The Guidelines for Canadian Drinking Water Quality (GCDWQ) are evolutionary in nature. They are based on best available science and will continue to change as our understanding of safe drinking water increases. The GCDWQ are a very flexible working document designed to cover the wide range of water supply scenarios across a vast country.

There are areas within the GCDWQ that are subject to interpretation. These include the application of turbidity guidelines to unfiltered sources and what constitutes a protected water source for the purposes of filtration exclusion.

The *Drinking Water Protection Act* affords the Drinking Water Officer a great deal of statutory discretion. Discussions between the regulator and water suppliers are required to address those areas of the GCDWQ that require interpretation and to chart an appropriate course of action.

2.4 Notification Requirements

Within the *Drinking Water Protection Act*, water suppliers are legally responsible for notifying the public of water quality concerns or problems. The IHA Ethics Committee advised that there is a duty to inform the public when the turbidity is above 1.0 NTU; however the committee did not prescribe the methods for notification.

The definitions of background risk and imminent risk were not defined. There is acceptance by the local suppliers that a Boil Water Notice is appropriate at turbidity levels above 5.0 NTU. The style, method and content of notification when turbidity is in the range between 1.0 and 5.0 NTU, remains a point of discussion.

A water industry goal is for the public to have confidence in the safety of their water. An important component of public confidence is ensuring that customers receive timely and relevant information about their water quality in an appropriate form.

2.5 Liability Issues

Liability exposure is inherent in regulating and operating a water system. Further discussion is required by both the water utilities and the regulator to identify areas of potentially high liability so that collectively, the exposure can be minimized. We should have an awareness of where liability exists, but decisions should not be made strictly on the basis of liability concerns. Collaborating to reduce public health risks will in itself reduce much of the liability exposure.

2.6 Strength in Collaboration

There has been stress in the relationship between regulator and the Water suppliers in the Okanagan Basin. We recognize that the escalation in rhetoric has not helped the relationship or the industry in moving forwards together to serve our public. We must recommit to a partnership to protect the public together with consistent messaging. In addition to fostering public confidence, a strengthened relationship will achieve tangible results for improved safety of water throughout the region.

3.0 A Balanced Approach to Safe Drinking Water in the Okanagan

3.1 What level of water quality is achievable for the Okanagan?

This question was asked of the WSABC by the Minister of Health, George Abbott, during the WSABC – MoH meeting on June 6, 2006. The WSABC Directors replied that, “It is realistic that the Okanagan can achieve microbiologically safe water with a turbidity level of below 0.50 NTU for 95 % of the Okanagan population within a time frame of ten years.”

This will depend on a number of factors, not the least of which is the understanding that a safe, affordable water supply depends on commitment to the multi-barrier approach by all agencies involved and at all levels of water resource management.

A balanced approach would rely on high quality water from the valley lakes, utilization of the best quality water from the watersheds, enhanced disinfection practices, filtration where appropriate and comprehensive source protection programs. The cost to achieve this is manageable.

3.2 Decisions Based on Science

Over the last 15 years, the water suppliers in the Okanagan Valley consulted regularly with health authority management and engineers. During that time, information on the gastrointestinal (GI) illness in five sub regions of the Southern Interior were provided over a 12 year period from 1991 to 2002. The data confirmed known outbreaks but did not show a definitive correlation between high spring runoff turbidity periods and higher levels of GI sickness in the communities. Additional study is needed to determine if a correlation exists between turbidity events related to weather and rates of GI illness. In addition, there are many causes of GI illness other than drinking water.

The City of Kamloops recently installed a \$48 M membrane filtration water treatment plant. The City's medical services billings show the benefits that public notification and filtration has on sickness levels for this 80,000 person community. Better data should increase our understanding of illness patterns in other communities and the potential effects of enhanced treatment. It should also help the water industry in understanding where expenditures can be directed to best reduce risk.

The precautionary approach recognizes that the absence of full scientific certainty shall not be used as a reason to postpone decisions where there is a risk of serious or irreversible harm. Even though scientific information may be inconclusive, decisions have to be made to meet society's expectations that risks be addressed and living standards maintained.¹ We recognize that the precautionary approach may be applicable in guiding decisions relative to the source protection and treatment aspects of the multi-barrier approach.

3.3 Focused Expenditures

It is recognized that significant capital expenditures would be required to provide filtration throughout the Okanagan Valley. Customers of these water systems will be expected to bear much of the cost, and careful consideration needs to be given to ensure that expenditures are justified.

Treatment technology varies depending on source water and application. However, water treatment experts are fully aware that even membrane filtration plants cannot remove all viruses, algae toxins, dissolved contaminants, endocrine disrupters, pharmaceuticals and personal care products (PCPs). Filtration is not a perfect barrier. Knowledge of these contaminants reinforces the need for protecting our sources and managing our wastes.

Just one percent of the total estimated costs of water treatment improvements would provide \$5M that could be directed to a comprehensive and sustainable source protection strategy. Discussions need to occur with local government and the Okanagan Basin Water Board to set policy, raise funds, and implement. Substantial improvements can be made to manage land uses and wastes in the environment above drinking water intakes.

¹ Source: Environment Canada, *A Canadian Perspective on the Precautionary Approach/Principle*, www.ec.gc.ca/econom/pamphlet_e.htm

3.4 When Unfiltered Water Systems may be Viable

The GCDWQ recommends that all surface water sources should be filtered; the Guidelines do allow exceptions for special cases where source quality is high and source protection exists.

Locally, filtration is not in the long term plans for Victoria's current water source (Capital Regional District) and the Greater Vancouver Water District (Coquitlam Watershed). In the heavily regulated United States, the EPA allows the major population centres of New York City, Boston, San Francisco, Portland, and one of Seattle's sources to remain unfiltered. All of these urban centres have very strong source water protection programs in place with stringent monitoring and reporting requirements. This does not, however, provide a guarantee that they will never have to add filtration.

It is our responsibility to manage our watersheds for the present and future generations. Providing water with minimal chemical conditioning is a desired state that is not possible for most of North America. It is possible for some of the water suppliers in the Okanagan. Where possible, the primary health objective should be to access the purest, most natural source of water available and then to make it microbiologically safe and deliver it to the public with minimal chemical addition.

Further discussion is required to develop this approach. In addition to defining what a "source protection strategy" consists of per the GCDWQ, work is necessary to establish the criteria for deferring filtration, and the types of enhanced disinfection that may be necessary to accompany filtration deferral. Water suppliers who may meet the exclusion criteria in the GCDWQ should be collecting the background data to validate their claim. It is understood that the 4,3,2,1,0 Drinking Water Treatment objective including dual treatment will apply to all water systems in the Interior Health region.

3.5 Best Practices for Safe Water

Water quality improvements always involve a number of steps. A general guideline is set out in Appendix A. The Drinking Water Quality Improvement Program is set out in Appendix B.

4.0 Conclusion and Next Steps

Interior Health and the water suppliers acknowledge the progress that has been made to achieve a common approach to drinking water improvements for the Okanagan. The points set out in this brief provide a basis for discussions with local water suppliers and Interior Health as water suppliers' work toward meeting the long term planning condition on their operating permit.

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APPENDIX A – WSABC Best Practices towards Water Treatment Improvements

For water suppliers considering water treatment improvements, the following steps set out a practical approach that should be considered in conjunction with the IHA Conditions on Permit that follow in Appendix B.

- 1. Understanding of Source Water.** A thorough understanding of the characteristics of the source water requires monitoring for a range of WQ parameters. Typical parameters that can be measured online include turbidity, conductivity, pH, DOC and temperature. These are all very cost effective to track. In addition, grab samples should be collected for total coliforms and *E.coli*. In addition to the preceding parameters, emerging technologies such as particle counters for small particulate matter measurement; fluorescence measurement tools to determine organic content, and potential bacteria loading should all be considered. Full parameter measurements of water quality data should be taken at reasonable frequencies to determine seasonal variations, and the interaction between groundwater and surface water sources.
- 2. Risk Assessment.** Efforts should be expended to assess the microbiological and chemical risks that may be present and impact on the water utility. This includes a risk assessment of the source waters, the watershed and the land use activities present, and an assessment of the water distribution system. Water source and system assessments are part of the Provincial requirements for both Surface and Groundwater sources. Source risks could include natural wildlife, stream slope instability, livestock, recreational activity in the watershed, mining, forestry or resource based activities that are improperly conducted, fuel spills, leaking septic tanks, etc. Operational and distribution system risks include the potential for bacteria regrowth, lack of a cross-connection-control program, untrained operators, and inadequate operational monitoring and maintenance processes. Stakeholders need to be aware of emerging trends, potential emerging risks, and the vulnerabilities of their water system.
- 3. WQ Improvement Plan.** Once a water supplier understands the present and potential future risks, appropriate plans can be developed. These could include setting aside lands and resources to reduce the future costs, building capital reserve funds and selecting appropriate technologies and/or strategies to address the specific risks. Land purchases and infrastructure improvements should reduce current risks and be sufficiently flexible to accommodate future treatment enhancements.
- 4. Demand Side Management Opportunities.** DSM direction will involve methods in which water consumption can be reduced so that higher quality water can be provided to all customers of water utilities. Where feasible, DSM opportunities could include splitting off of the major irrigation demands from the drinking water system. The issue of cost is magnified where filtration is required for water treatment. The impact of Climate Change may have serious effects on the quality and volume of source water available. Incentive programs should be utilized to reduce water consumption, including rebates, incentive based rate structures, etc. The value/benefit of DSM techniques increases as water treatment processes are added.
- 5. Develop a Financial Plan.** Linked to the WQ Improvement plan is the requirement to develop a realistic financial plan. A financial plan will identify revenue streams available to achieve the recommendations of the WQ Improvement Plan. It is also necessary to develop an understanding of what the customers are prepared to pay for water quality improvements, which may require customer surveys. The financial strategy sets out financial responsibilities, who pays and how much.
- 6. Public Education.** Public acceptance of the plans is critical in being able to fund any water treatment project as the majority of the funding will come from existing ratepayers. If sufficient effort is not made to educate the public, it is possible that there could be insufficient community acceptance of the project.
- 7. Secure Land and ROWs.** Securing land for transmission mains and treatment sites should be done at the earliest possible stage. Even if emerging contaminants and the treatment processes are unknown, securing land is good fiscal management.
- 8. Implement Treatment Upgrades.** Once it is certain which project is required, then pilot testing, detailed design, public education, and construction should take place on the project.

APPENDIX B – Interior Health Drinking Water Quality Improvement Program

CONDITIONS ON OPERATING PERMITS FOR WATER SUPPLY SYSTEMS

The Drinking Water Quality Improvement Program outlines nine typical conditions on operating permits. It is expected that each participating water supplier will use these conditions as guidance for key areas to focus their water system improvements. This is intended to be a continuing process and for many of the conditions, the first step may be to develop a plan or program reference.

As water suppliers move through stages of improvement, the details associated with each condition will change. This allows for water supply systems to progress through improvements at a pace appropriate to their capacity.

Source Protection

- 1. Provide a source protection plan for each water source**

Operation Requirements

- 2. Provide a certified operator to operate the system**
- 3. Operate according to your Water Quality Sampling Program**
- 4. Operate according to your Cross Connection Control Program**

Treatment and Distribution Systems

- 5. Provide Turbidity Monitoring Program – including continuous on-line turbidity monitoring**
- 6. Provide continuous on-line monitoring of the water disinfection process**
- 7. Provide long-term plans for source, treatment and distribution system improvements taking into account the goal of 43210 objectives**

Monitoring and Reporting

- 8. Review and update Emergency Response Plan annually**
- 9. Provide monthly reports and an annual summary**