



Testing Requirements for *Cryptosporidium* and *Giardia*:
The Changing Policy of the Okanagan Similkameen Health Region

South East Kelowna Irrigation District
Internal Report
Toby Pike

November 30, 2001

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Introduction

Water quality and public health have become front-page news in recent years and the local governments that operate water utilities have been under immense pressure from the public and regulatory agencies to deal with these concerns.

The tragic events in Walkerton, Ontario resulted in the deaths of seven people. This catapulted water quality and public health into the forefront of the national agenda and initiated legislative and regulatory reviews in each province across the country.

Most water purveyors welcome the public discussion on water quality and public health. Many feel an informed public will be better able to direct the decision makers who set public policy on water related issues and less reluctant to pay the associated costs. It is unfortunate, but understandable, that this review is event driven – the safety and affordability of the public water supply is often taken for granted until something goes wrong.

Although Walkerton is an extreme example, outbreaks of waterborne disease have been occurring with alarming regularity over the past decade or so and the issue has been gaining stature in the public forum. Boil water advisories in BC are now commonplace and there has been an increase in bottled water sales and home treatment systems - a trend that reflects the increasing lack of public trust in those who operate public water systems and those who regulate them.

Regaining that public trust can be very difficult. The regulators come under fire for lax enforcement of the regulations and face a tremendous amount of pressure to make

regulations stricter. Frequently, water purveyors are required by the regulators to increase water quality monitoring efforts. This is an important part of the public relations management of these types of events. Both the regulators and the purveyor scramble to test water quality to demonstrate to the public the water supply is safe. This is the beginning of rebuilding the public trust in the water supply.

Unfortunately, efforts by regulators and water purveyors to rebuild the public trust, although well intentioned, can get out of hand. A case in point is the City of Kelowna *cryptosporidium* outbreak of 1996. Hundreds of tests have been conducted since the outbreak to try and determine the presence and numbers of *giardia* and *cryptosporidium* pathogens in the water supply. The validity of these tests has been in question for some time, however, and most experts agree the results are so inaccurate that the data is of no value in protecting public health. In addition, even if the data was credible, the results take too long to get to be used to protect public health.

To make matters worse, the tests are very expensive. The City of Kelowna water utility has spent hundreds of thousands of dollars on these tests alone since 1996, all under the watchful eye of local health officials, who have seriously considered requiring these tests to be done by all water utilities in the health region with over 300 connections - a requirement that would cost ratepayers hundreds of thousands of dollars and do nothing to protect public health. Why would testing be required if the results were unreliable? The answer would appear to be largely an issue of public relations.

The Kelowna *Cryptosporidium* Outbreak, 1996

On August 12, 1996 the Medical Health Officer for the Okanagan Similkameen Health Region (OSHR) imposed a boil water advisory on the City of Kelowna water utility. The advisory was imposed to contain an outbreak of cryptosporidiosis¹ that the Medical Health Officer (MHO), Dr. Bill Moorehead, believed was caused by the city water utility. An extensive telephone survey of 300 Kelowna residences conducted by the OSHR the previous day had led health officials to believe that the other four water purveyors serving the city were not the cause of the outbreak².

The boil water advisory received a tremendous amount of media attention at the local and regional level, eventually becoming a national and even international story. The great extent of the media coverage of this event was possibly due to several factors. One health official had publicly speculated that up to 10,000 people had been infected³. This number was featured prominently in most subsequent news stories. Additionally, it was the middle of August, a relatively slow news time. This coincided with the height of the tourist season, which also provided the opportunity to get quotes from visitors from around the world.

This was not the kind of publicity the city wanted and the negative effects reverberated throughout the community. There were reports of cancelled hotel rooms and of tourists

¹ Cryptosporidiosis is a relatively mild flu-like condition characterized by stomach cramps and diarrhea. Symptoms typically go away after a few days, but can be more severe in those with compromised immune systems. Cryptosporidiosis is caused by the protozoan *cryptosporidium* and can be transmitted by water, food and poor hygiene.

² The other four water utilities serving the City of Kelowna are Black Mountain Irrigation District, Glenmoore Ellison Improvement District, Rutland Waterworks District and South East Kelowna Irrigation District.

³ The number of confirmed cases of cryptosporidiosis was between 200 and 300.

cutting their Kelowna vacation short. It was a situation that called for immediate action and the restoration of public trust in the water supply.

At the political level, the Mayor of Kelowna, Walter Gray, struck a Task Force of volunteers to study the problem and make recommendations to the council water committee⁴. The task force was made up of fifteen people representing a cross section of the city population. Significantly, the task force did not consist of experts in the water supply field, although there was representation from the medical community, the local health region and the other water purveyors serving the city. The committee was supported by five city staff members and had a considerable budget to commission reports as required. The city staff arranged for all outside consultants reports and presentations to the committee, as well as providing information directly to the committee.

Meanwhile, prior to and concurrent with the task force proceedings, the Kelowna water utility took a number of measures in conjunction and compliance with local health officials to deal with the issue and restore faith in the water supply. These included flushing all water mains to remove potentially contaminated water, identifying and fixing a number of cross connections in the system⁵ and introducing water quality monitoring procedures to determine if the water was safe to drink.

⁴ The Council Water Committee was formed to oversee the activities of the Task Force. It consists of three councilors and one staff member from the works and utilities department.

⁵ A cross connection is a situation where the potential exists for hazardous substances to enter the water supply. For example, dry cleaning chemicals from a dry cleaners or raw creek water from a golf course irrigation system could get into the public water supply under certain conditions.

One of the procedures implemented was testing for the presence of *cryptosporidium* and *giardia*. Both parasites were relatively new on the water industry landscape. Newly discovered that is, both organisms have been around for a very long time.

The Pathogens

Cryptosporidium and *giardia* are single cell protozoan parasites that have part of their life cycle in the gut of warm-blooded animals. They are found in virtually all surface waters in North America. They are very small, measuring only a few microns across. They reproduce rapidly inside the gut of the host, making the host sick. The reproduced cysts are shed into the environment through the feces of the host, where they complete their life cycle by being taken up by a new host. A common source for infection is drinking water, but the disease can also be transmitted by food, from person to person or in public beaches or swimming pools.

Giardia was the first of the two bugs to be discovered and become a health issue⁶. In the late 1970's and early 1980's a number of outbreaks occurred throughout North America that were attributed to *giardia*. Giardiasis, also known as beaver fever, is a more serious disease than cryptosporidiosis. Fortunately, if *giardia* cysts are exposed to a high enough concentration of chlorine for the right length of time, they will be inactivated. Health officials developed contact time or "CT" tables that water purveyors use to calculate *giardia* inactivation. In some distribution systems there is not adequate contact time before the chlorinated water reaches the first customer for the *giardia* to be inactivated.

⁶ Prior to the discovery of *giardia*, outbreaks were attributed mainly to the stomach flu.

This is the case with the Kelowna water utility, while the other four water utilities serving the city do have protection from *giardia*.

Cryptosporidium became prominent in the late 1980's and early 1990's. One of the more sensational outbreaks occurred in Milwaukee in 1993, where an estimated 400,000 residents were affected. Cryptosporidiosis is a relatively minor disease, the symptoms usually going away in a matter of a few days with no long-term complications.

Cryptosporidium does not respond to chlorine, however, and water utilities using only chlorine for water treatment do not have protection from *cryptosporidium*.

Both pathogens present a much greater health risk to those with compromised immune systems⁷.

The Problem with Testing

The arguments about the wisdom of testing for *cryptosporidium* and *giardia* by public water utilities began almost as soon as the pathogens were discovered. A Vermont-based consultant, Dr. Jennifer Clancy, who worked with the USEPA⁸ to develop the testing method for these parasites, commented that testing benefits are “fairly limited...will not protect public health...[and primarily serve a] public relations function.”⁹ An example of the effectiveness of testing as a public relations tool can be found in Appendix 1.

⁷ These include AIDS patients, patients on chemotherapy and the very young and old. People in these groups should consult a physician about a safe source for drinking water.

⁸ The United States Environmental Protection Agency is responsible for developing federal regulations for drinking water in the US.

⁹ Quoted at the International Symposium on Waterborne *Cryptosporidium* March 2-5, 1997, Newport Beach CA.

The testing method is very complex, requires highly skilled technicians and under ideal conditions produces variable results. The track record for highly qualified laboratories testing for seeded samples¹⁰ is, at best, a 35% recovery. The tests are unable to differentiate between *giardia* and *cryptosporidium*, determine if the organisms are still viable or if they are human specific¹¹. To make matters worse, it takes a minimum of three days to get test results back from the lab, by which time the water that is being tested has already been consumed.

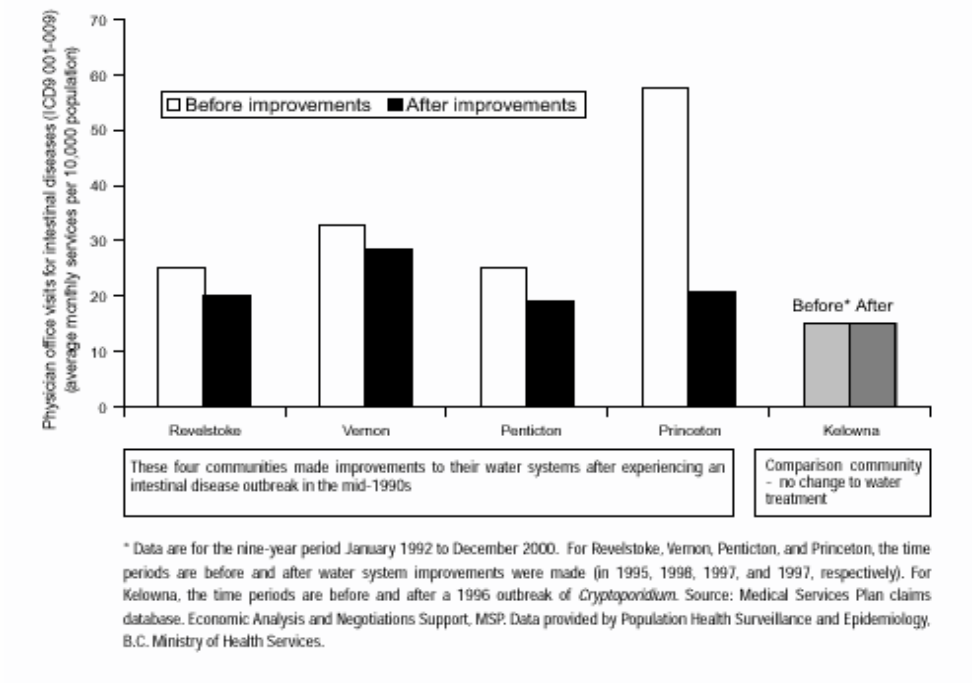
In short, testing for these pathogens does not produce reliable results on which to base decisions affecting public health, nor does testing directly protect public health. To make matters worse, these tests are expensive. The lab cost alone for the most accurate testing method is about \$500 per sample. Add to this the cost of labour, materials and freight and the cost nearly doubles.

It would not be unusual for a utility responding to an event like the one in Kelowna to conduct hundreds of these tests in the weeks, months and years following an outbreak. This was certainly the case in Kelowna, where no testing was done prior to the outbreak and hundreds of tests were done in the period following the outbreak. As the following chart shows, there was no appreciable change in the incidence of intestinal disease in Kelowna after testing was implemented (Provincial Health Officer's Report, 2000).

¹⁰ Seeded water samples have had a known number of pathogens introduced into them. This is a common method used to certify the competency of testing laboratories.

¹¹ Not all strains of *cryptosporidium* or *giardia* are virulent to people.

Figure 8: Intestinal Illnesses Before and After Improvements to Water Systems, Four B.C. Communities, 1992 - 2000*



Many argue the money spent on testing would be much better spent on other measures that actually serve to safeguard public health. In the hours, days and weeks following an outbreak, however, there is tremendous pressure to assure the public the water supply is safe and a number of factors drive the decision to monitor for pathogens.

The Dynamics of the Decision to Test for Pathogens

Given the problems with testing noted above, why would a water utility test for pathogens? The answer is singular to each situation and usually motivated by more than one factor. The following is adapted from a paper by Dr. Martin Allen et al in the September, 2000 issue of the Journal of the American Water Works Association. As the

paper notes, the decision process to monitor for pathogens is complex. The forces driving this decision typically fall into five categories:

1. *Monitoring is directed by regulatory and health agencies, utility management, and elected officials.*
2. *Monitoring is expected by consumers, elected officials, the media, the medical community, and special interest groups.*
3. *Regulatory and health agency staff, utility personnel, elected officials, consumers, and special interest groups believe that monitoring ensures pathogen-free drinking water.*
4. *Monitoring feeds the public perception and image that regulatory and health agencies, utilities, and elected officials are protecting public health.*
5. *Monitoring is a self-perpetuating exercise that ensures financial resources for the continued development of pathogen detection methods and implementation of monitoring programs.*

In most cases the decision to monitor for pathogens is based on a combination of the above reasons. This was certainly the case with the City of Kelowna Water Utility. As previously described, the utility and health officials were under considerable pressure from a number of sources to do something. Most of the actions taken by the utility at the outset of the crisis were beneficial in protecting health; pathogen monitoring was not.

It was generally expected by elected officials, the public and media that testing for *cryptosporidium* would be carried out. The public assumes the technology exists to do

these tests and does not question the validity of the results. Testing also proved to be an effective public relations tool for the utility and health officials to use in rebuilding public trust in the water system. The results were reported regularly to the media and played a key role in the decision to lift the boil water advisory.

In fairness, little was known at the time locally about the shortcomings of pathogen monitoring and, under the circumstances, time was of the essence in implementing actions to deal with the situation. In the initial days and weeks following the outbreak testing was implemented and soon became a routine part of utility operations. All of this occurred in consultation with and under the watchful eye of local health officials.

The Changing Health Region Policy on Pathogen Monitoring

The matrix of federal and provincial government ministries and agencies associated with water is a formidable challenge for local governments to deal with. No fewer than nine provincial ministries and two agencies have a say in what happens with water in British Columbia. They do so through fifteen different legislative acts and regulations.

Health issues related to drinking water fall under the Safe Drinking Water Regulation of the Health Act. The local MHO has statutory authority under this regulation to order a water utility to take measures to protect public health. The MHO is on the front line of local public health issues.

The MHO for the OSHR was a member of the Kelowna Task Force Committee. During the course of the task force deliberations the efficacy of testing for pathogens was challenged on more than one occasion. These concerns were not heeded, however, and

the final task force recommendations in 1999 advised that not only should the city water utility continue to monitor for pathogens, but that the other four water purveyors in the city be encouraged to do so as well.

There was considerable resistance to this recommendation by the affected utilities and the issue was discussed at length at meetings of the Kelowna Joint Water Committee (KJWC), a committee with representation from each of the five water utilities. The opposition stemmed from the arguments already presented. Specifically, that the tests were unreliable, very expensive and did not provide information that could protect public health. The Medical Health Officer soon became involved, however, and indicated he did not want to be put in the position of having to order the tests to be done.

After considerable negotiation, the MHO agreed to limit the testing requirement to source water only, with one test every two weeks for a one-year period. Even at this rate, the twenty-six tests would cost each utility about \$18,000¹².

The Board of Trustees at the South East Kelowna Irrigation District was not pleased with the requirement and instructed management to do whatever possible to minimize testing costs and attempt to change local health region policy. The district embarked on a thorough and lengthy study of cost effective ways to satisfy the health region's requirement.

In December 2000 the MHO sent a draft of a protocol he was proposing to the KJWC for review and comment. The protocol would apply to all 29 utilities in the Okanagan

¹² This estimate was based on a less expensive, less accurate test method. There seemed to be little point in spending more money on slightly more reliable data when there was no increased benefit to the utility or public health to do so.

Similkameen Health Region with over 300 connections. Most of the protocol requirements were based on best management practices, were cost effective and would result in increased public health protection. Unfortunately, the draft protocol also included what was called “baseline testing” for cryptosporidium and giardia similar to the requirement made of the other Kelowna water utilities: bi-weekly testing for one year (see Appendix 2). There was disagreement among members of the committee regarding this requirement. The Kelowna water utility and the Black Mountain Irrigation District were in favor and the other three utilities were opposed.

If implemented, the combined cost of testing to the affected water utilities would total more than \$500,000. While this expenditure was difficult enough for the larger utilities to accommodate in their budgets, it presented a significant financial burden on most of the smaller utilities. It was at this point that the Water Supply Association of B.C. took an active role in the issue.

The Water Supply Association represents the interests of water purveyors in the southern interior of the province. Formerly the Association of BC Irrigations Districts, the WSABC was formed in 1923 and has been influential over the years in the development of government policy pertaining to water rights and regulations, particularly the interests of improvement districts.

A meeting was arranged in April of 2001 at a large water works convention in Penticton. Seven directors of the WSABC attended, along with the MHO, the OSHR health engineer and the director of technology transfer for the American Water Works Research

Foundation, Dr. Martin Allen¹³. Officials from the City of Kelowna water utility declined to attend. Dr. Allen is a recognized expert in the field of drinking water research with over twenty-six years of experience. He, along with others, including Dr. Jennifer Clancy, had been part of a United States Environmental Protection Agency (USEPA) team who developed and attempted to improve the Information Collection Rule (ICR) pathogen testing method in the US¹⁴. Dr, Martin is one of many experts in the field who openly question the wisdom of requiring local water utilities to do these tests.

Considerable discussion took place on the merits of testing. Dr. Allen gave a first hand account of the shortcomings of the tests and was very forthcoming with his opinion against regulators requiring purveyors to do the tests. He noted that the ICR in the US had required utilities serving more than 100,000 people and using surface water to do monthly testing for an eighteen-month period beginning in July of 1997. The total cost of this testing was conservatively estimated at over US\$120 million. The resulting data has proven to be so unreliable as to have no value for any use. Dr, Allen strongly advised against repeating the same mistake in Canada.

The outcome of the meeting was favorable to those who opposed the proposed testing requirement. The MHO agreed that monitoring for cryptosporidium and giardia would not be mandatory. The final MHO protocol does not require testing for protozoa, but rather leaves it as a matter to be discussed between the MHO and each utility (see Appendix 3). The vagueness of the wording in the final protocol on pathogen monitoring

¹³ Dr. Allen had been invited to present a paper to the delegates at the convention on the issue of pathogen monitoring.

¹⁴ The Information Collection Rule (ICR) is a regulation under the United States Federal Safe Drinking Water Act, developed by the USEPA.

presumably provides some justification for the testing and expenditures that have already been done in Kelowna and elsewhere¹⁵.

Summary and Conclusion

Notwithstanding the favorable outcome of the debate with the health officials on this issue, there remains the issue of public health and the water supply. If testing for protozoa does nothing to protect public health, what will? There is clearly no quick fix or simple answer to this question, but a consensus is emerging that that a multi-barrier approach to water treatment holds considerable promise for providing safe potable water.

Such an approach looks to optimize all aspect of water treatment. This includes protecting source water quality through land use restrictions and controls in the watershed, develop appropriate water treatment facilities to treat the water and ensure employees are properly trained to optimize both source water protection programs and water treatment plants.

While this paper presents the debate between local governments and regulators on a controversial regulation, it is significant that all parties have a common goal: public safety and trust in the water supply.

If there is any benefit to events such as the Kelowna outbreak, it is the opportunity to review public policy and procedures in ensuring a safe drinking water supply. Source

¹⁵ Testing had been ordered by the MHO in Vernon and a boil water advisory had been issued there for a short period in the summer of 2000 as a result of the tests. There was no increase in the reported cases of cryptosporidiosis in the Vernon population in the summer of 2000.

water protection, water quality monitoring, treatment plants, and operator training all play a role in providing a safe water supply.

It is the responsibility of regulators to set the standards for the local governments that operate the water systems throughout the province. These regulations must be responsive to local conditions, be based in sound science and be affordable. The best way to define and achieve effective standards is through public education and input on the issues and through consultation with the local authorities that are affected by these regulations.

The Drinking Water Protection Act is currently under review by a panel of experts appointed by the provincial government. This panel has received submissions from several hundred individuals and organizations from around the province. The water supply industry is hopeful this review will result in legislation that is responsive to the needs of British Columbians.

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Appendix 1: Pathogen testing and public relations.

THE OKANAGAN SUNDAY, JUNE 17, 2001

Keeping an eye on H₂O

■ An innovative Kelowna invention is making sure your water is bug-free

By CHUCK POULSEN
The Okanagan Sunday

KELOWNA — The heavy rains this spring have city officials using a made-in-Kelowna machine to keep check on water quality.

The automatic sampler is on duty around the clock to check for an increase in water turbidity, an indicator that cryptosporidium or giardia may be approaching dangerous levels.

"It's an innovative system," says Kelowna water manager Don Degen. "I guess you could say we invented it."

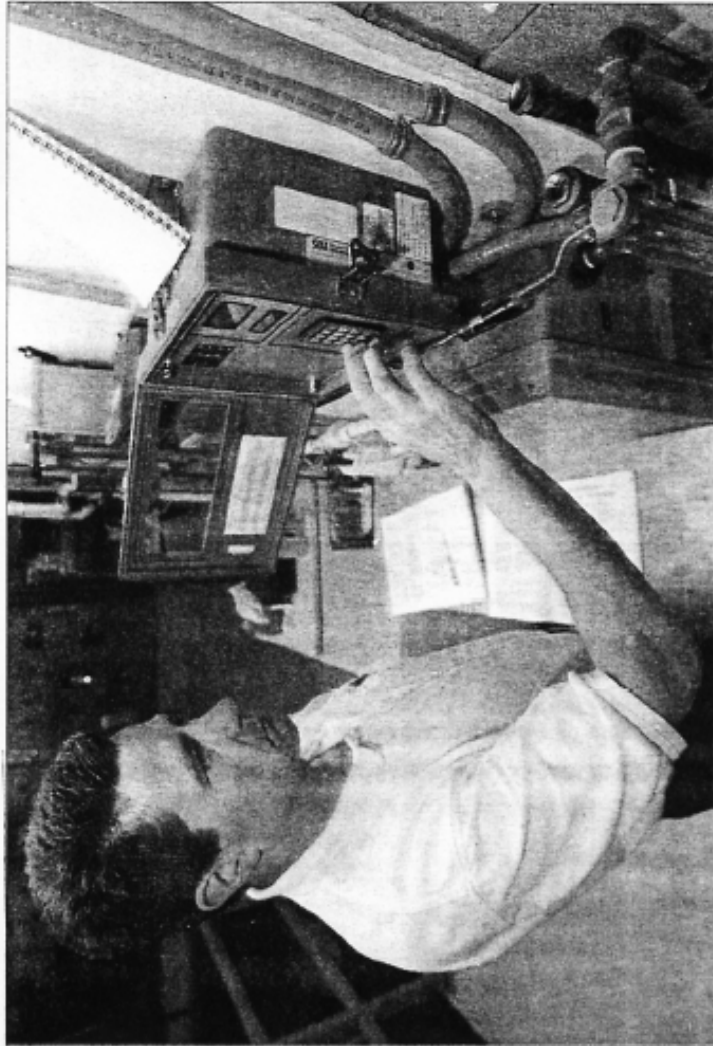
The Kelowna water system and four others in this region — Rutland, Glenmore, Southeast Kelowna and Black Mountain — regularly test water for the two bugs. In Kelowna, a full laboratory work-up is done monthly.

But what happens if the turbidity (cloudiness) spikes in the wee hours of the morning or at some other time when a human doesn't have his or her eyes on the meters?

"The deviation response program looks at turbidity every 15 seconds," says Degen. "If it sees an increase, even at 2 a.m., it sends a signal that will automatically draw a sample. We will have that sample at the exact time that the turbidity spiked and we can do an analysis on it."

Although there has been a lot of rain this month, there hasn't been enough of an increase in the turbidity to set off the automatic system.

"But if we were to get a significant amount of rain and therefore runoff, that could change," said Degen. "We have equipment that will tell us if there is any effect."



GARY WYLANDER/The Okanagan Sunday

Don Degen, water manager for the City of Kelowna, examines an automatic water sampler at the Poplar Point water station. The sampler tests for cryptosporidium and giardia.

Although the other water systems in the area don't have the automatic sampler, Degen says they are well protected.

"They haven't gone this extra step, but they all have pretty good monitoring programs," said Degen.

Giardia and cryptosporidium are protozoa that can live in the human digestive tract and cause severe diarrhea and other maladies that in some cases

can be fatal.

The recent outbreak of cryptosporidiosis in Saskatchewan has prompted the B.C. provincial health officer to renew a warning to people with compromised immune systems.

People with the weakened systems are reminded to drink bottled water, or to boil tap water for at least a minute.

Those with HIV, organ or bone mar-

row transplants, and people receiving chemotherapy are at greater risk of prolonged illness or death from crypto.

"Although the risk of cryptosporidiosis from approved drinking water sources is small, current water

treatment (chlorination) in most of B.C. does not eliminate cryptosporidium," said Ken Cooper, chief health inspector for the Okanagan-Similkameen.

Appendix 2: Draft Medical Health Officer Protocol for water systems with more than 300 connections.



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Medical Health Officer

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January 11, 2001

DRAFT

To: All Purveyors Of Water Systems With Over 300 Connections

Re: Drinking Water Quality Program

Over the years we have enjoyed a vital relationship with a sharing back and forth of information, a working together that has *not* resembled a regulatory agency dictating to purveyors, but a partnership of equals working toward some passionately held ideals. We recognize together the trust that is placed in us by the public we serve, a trust that can easily be shattered.

In this time of working together, we have had many successes of which we can be proud.

In 1992, the Safe Drinking Water Regulation was passed. It is a modest regulation in size, with modest rules. Under this piece of legislation, "potable water" is defined as "*water which meets the requirements of the Schedule and is safe to drink and fit for domestic purposes without further treatment*". These are simple words, which have left public health time and freedom to further define what potable water means.

Since 1992, outbreaks of waterborne disease, structural problems, risk assessment, increased barriers, and research have contributed to what drinking water potability means. The provision of safe drinking water is not a static practice, but involves the dynamics and challenges of new technology and demands placed by a growing population. Add to this the reality that in British Columbia, our watersheds have many joint uses. The need for a well-structured Drinking Water Quality Program has become evident.

So, since 1992, we have developed some better idea of what elements such a program should contain:

Certified Operators

- Courses available from such agencies as BCWWA will improve knowledge and motivation among staff, and help eliminate some uncertainties of control.

Bacteriological Sampling

- According to the levels laid out in the Guidelines for Canadian Drinking Water Quality (GCDWQ). The Health Region will continue to supplement this with some sampling also.

Baseline Monitoring of Giardia and Cryptosporidium

- This will help determine future treatment needs.

DRAFT

Turbidity Monitoring of Raw Water

- Turbidity helps determine present and future treatment needs. Particle counting is fast becoming a favoured method for assessing quality also.

Cross-connection Control Program

- This cannot be over stressed as a necessary part of quality improvement. Many opportunities exist in commercial, industrial, residential, and agricultural settings for contamination of the distribution system that could have widespread implications.

Wellhead Protection Program

- Taking into account the zone of influence over an aquifer is essential, especially since contamination can enter an aquifer far from the point at which water is drawn out.

Monitoring the Disinfection Process

- Including the initial concentration of chlorine and its level at various points in the system, monitoring disinfection is part of the process done to ensure the "critical control point" of disinfection is met adequately so an unacceptable health hazard is not passed on. Determining chlorine levels is essential in "Giardia Performance Monitoring".

Water Conservation

- Valuation of water and water conservation has a very important role to play in the operating of a water system, the demands made on the system and planning for future treatment.

Watershed Interest

- Maintaining an active interest in the joint use of the watershed will ensure a "seat at the table" in any future discussions and consideration of activity there.

Future Directions

- In treatment and quality improvement, casting a vision for the future is an effective catalyst for action.

SEKID
November 2001

Your feedback on some of these thoughts would be valued. We hope to place a condition on the operating permit of each large system (over 300 connections) in our Region that a Drinking Water Quality Program be in place as an ongoing assurance against potential problems and as a pledge toward improving quality for the future. We envisage placing this condition on the Water System Operating Permit as of April 2002.

If you have any questions or comments, please feel free to contact me at 862-4219, or Ken Cooper, Chief Public Health Inspector at 868-7899.

Sincerely,

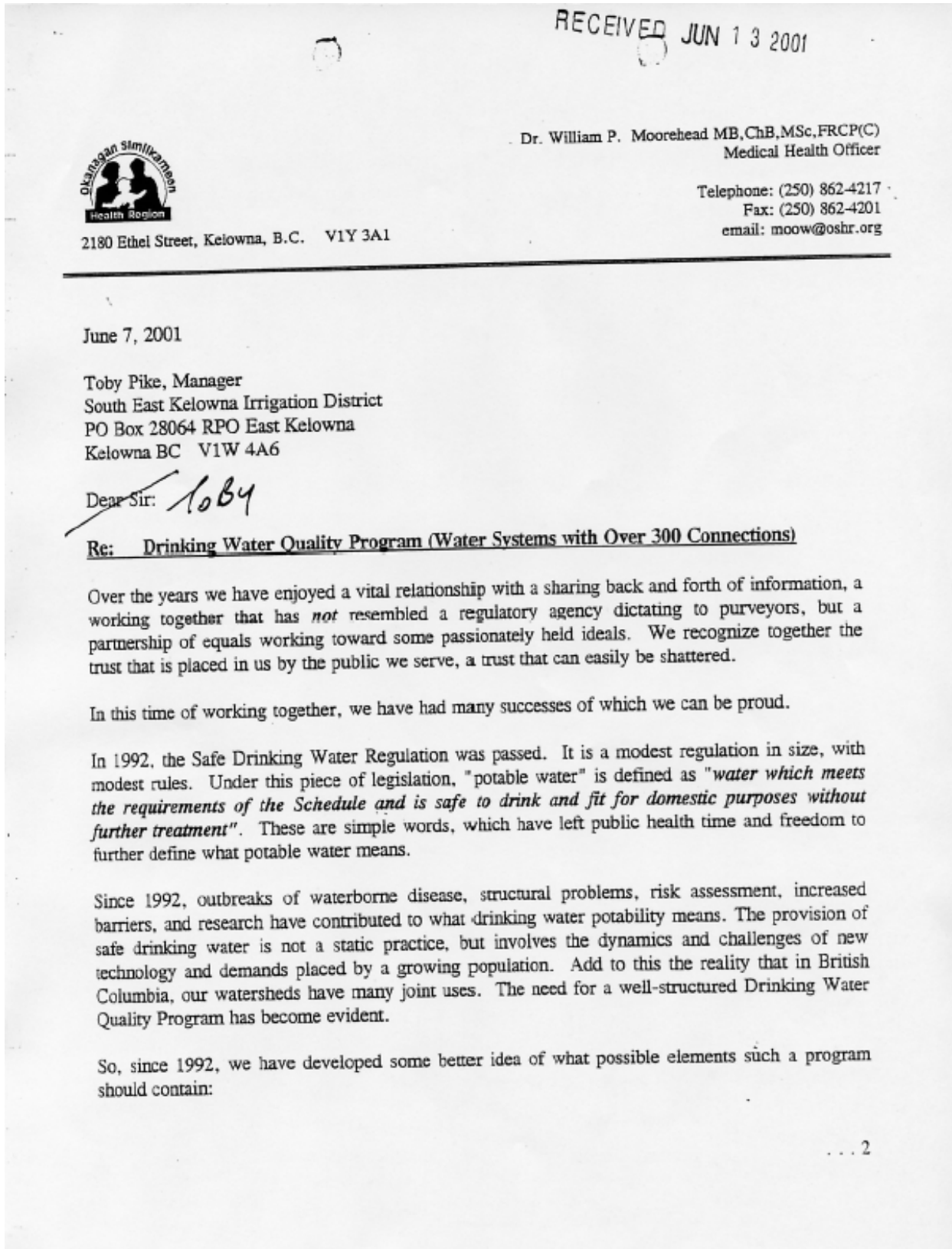
Dr. William P. Moorehead
Medical Health Officer

WPM/mc

DRAFT

SEKID
November 2001

Appendix 3: Final Medical Health Officer protocol for water systems with more than 300 connections.



RECEIVED JUN 13 2001



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June 7, 2001

Toby Pike, Manager
South East Kelowna Irrigation District
PO Box 28064 RPO East Kelowna
Kelowna BC V1W 4A6

Dear Sir:

Toby

Re: Drinking Water Quality Program (Water Systems with Over 300 Connections)

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-2-

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- Taking into account the zone of influence over an aquifer is essential, especially since contamination can enter an aquifer far from the point at which water is drawn out.

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- Maintaining an active interest in the joint use of the watershed will ensure a "seat at the table" in any future discussions and consideration of activity there.

Future Directions

- In treatment and quality improvement, casting a vision for the future is an effective catalyst for action.

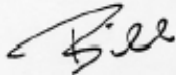
-3-

Enclosed is the Medical Health Officer's Protocol for Conditions on the Water System Operating Permit. The conditions within the protocol were developed through consultation with a number of purveyors who have found it acceptable. For those who wish, a visit can be arranged to discuss the application of the protocol. We will place this protocol as a condition on each Operating Permit meeting the spirit of the new amendments to the Safe Drinking Water Regulation.

A Drinking Water Quality Program will be an ongoing assurance against potential problems and a pledge toward improving quality for the future. We envisage placing this condition on your Water System Operating Permit beginning April 2002, which will allow suitable time to establish administrative direction and policy supporting this initiative.

If you have any questions or comments, please feel free to contact me at 862-4219.

Sincerely,



Dr. William P. Moorehead
Medical Health Officer

WPM/me/cq
Encl.

With Thanks

Medical Health Officer's Protocol for Conditions on Water System Operating Permit (Over 300 Connections)

1. Provide certified operators to operate the water system.
 - Have system classified by December 1, 2001 by the EOCP (Environmental Operators Certification Program).
 - Have all operators certified by July 1, 2002.
 - Have operators certified to the level required by the system classification by July 1, 2003.
 - Continuously provide staff that meets the certification level required after July 1, 2003.
2. Sample and analyze treated water samples for bacteria to the level required in the Guidelines for Canadian Drinking Water Quality. A water system may choose to sample at a much higher level, recognizing a particular vulnerability of source water, treatment and distribution. Water systems are encouraged to set their own performance standards in drinking water quality based on source water quality.
3. Raw water may be sampled for Giardia and Cryptosporidia but the appropriateness of such sampling and frequency should be discussed with the Medical Health Officer.
4. Provide on-line turbidity sampling and recording of raw water for each surface source.
5. Provide a Cross-Connection Control Program.
6. Prepare well protection plan for all wells.
7. Monitor and report on the water system disinfection system performance.
 - Provide Giardia Performance Monitoring Report (showing the log reduction achieved) for surface water systems on a monthly basis to the Regional Public Health Engineer.
 - Provide water system monitoring sheet showing parameters of interest which might include: daily water volume, bacterial tests, temperature, flushing program.
 - Provide an annual summary of all monitoring data and comments on performance.
 - Provide quarterly testing of Trihalomethane levels in chlorinated drinking water.
8. Review and update the Emergency Response Plan annually. This will provide a continual review of performance creating a satisfactory level of risk assessment and risk management and can be used as a communication to the customers of the water system.
9. Develop a 5, 10 and 20 year plan for treatment, source and distribution system improvements.