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ENSURING THE SAFETY OF TAP WATER IN EYYOU ISTCHEE COMMUNITIES

*A report to the Board of Directors
Cree Board of Health and Social Services of James Bay*

*Miyupimaatisiwin aa uhchi pimipiyihtaakinuwich utih iigyuu aschiich
Direction de santé publique de la région des Terres crie de la Baie James
Public Health Department of the James Bay Cree Territory*



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Public Health Department of the James Bay Cree Territory*

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Foreword

This report was written by Dr. Cristin Muecke, a physician in residency training to become a public health specialist, and myself. Dr. Muecke spent 6 months, one day a week, in the Cree Health Board's Public Health Department on Duke St. in Montreal, from July to December 2001.

After her final draft of the report was produced in March 2002, we became aware of several new developments having an impact on the provision and safety of drinking water; these are described in Section 4: Recent developments.

The document no doubt contains a number of misunderstandings related to the issue of drinking water systems and quality, especially the legal, jurisdictional, administrative, environmental and engineering aspects. For these we apologize and would appreciate feedback to correct our misunderstandings.

We are grateful to our colleagues from the Cree Regional Authority: Martin Desgagnés, Ginette Lajoie, and Alan Penn for their helpful comments, but we do not hold them responsible for persisting errors in the document.

We also appreciate the insights of the residents of Cree communities and Band Council employees involved in drinking water provision and testing - insights that they have provided over the years during visits to the community treatment facilities and in meetings.

A slide show version of the report was presented to the Board of Directors of the Cree Board of Health and Social Services of James Bay in Val D'Or in April 2002. We hope that the report will contribute to ongoing efforts aimed at maintaining and ensuring the safety of drinking water in the Cree communities of Eeyou Istchee.

Elizabeth Robinson, MD, public health physician,
Public Health Department,
Cree Board of Health and Social Services of James Bay,

August, 2002.

1.1 Introduction

Clean water is one of the fundamental necessities for human health. Several advancements in engineering, microbiology, and public health have allowed most North Americans to feel increasingly confident about the safety of their municipal water supply. While this confidence is not unfounded, several recent events have lead to a realization that these advancements have not made us immune to either water borne disease or the consequences of human error.

The contamination of public water supplies in Walkerton, Ontario in May 2000 and the subsequent investigations have raised concerns nationally over water quality and its monitoring. Investigations into the Walkerton crisis have revealed alarming deficiencies in communication and concerns about water sources and treatment. This has served as a wake-up call for many communities and regions of the vital importance of good maintenance of public water systems and regular monitoring of water quality to the public health.

This report is an attempt to review the drinking water system and its microbiological monitoring in the Cree communities of James Bay, and to make recommendations for its improvement from a public health perspective.

1.2 Waterborne disease outbreaks in North America

In Canada, several large-scale outbreaks have made the headlines in recent years.

In the spring of 2001, the North Battleford region of Saskatchewan experienced an outbreak of *Cryptosporidium* gastroenteritis, which affected more than 5,000 people. The outbreak was epidemiologically linked to the municipal water supply of North Battleford. The surface water treatment plant had experienced an increase in finished water turbidity just prior to the outbreak, although no abnormalities were noted in bacterial quality or chlorine residuals. The ultimate source of the contamination is unknown.

In the spring of 2000, the town of Walkerton, Ontario, experienced the largest bacterial waterborne outbreak ever documented in Canada. An extensive outbreak investigation prompted by increases in diarrheal illness pointed to the municipal water supply as the only plausible source for the outbreak. The public utilities commission assured the investigative team that the water was safe, but despite this the Health Unit issued a boil water advisory and conducted its own water testing, which confirmed contamination with *E. coli* O157:H7 bacteria. Over 2,000 people were estimated to have become ill, and six people died. Several circumstances contributed to the outbreak, including heavy rains causing flooding, presence of livestock farms near municipal wells, wells subject to surface water contamination, and a water treatment system that was unable to handle increased turbidity.

Several thousand people are estimated to have been infected with the parasite *Toxoplasma gondii* in the Greater Victoria area of British Columbia in 1995. Extensive investigations into potential exposures failed to identify a likely source. Based on the geographic distribution of the cases, the municipal water supply was thought to be a plausible explanation.

In Quebec, in 1998 and 1999, there were 19 outbreaks of gastroenteritis related to drinking water; from 2 to 131 persons were sick in each of these outbreaks. Most (12) involved a private well such as for an individual house or a campground. Three outbreaks occurred in municipal water systems with chlorination; water became contaminated due to work on the system or for other reasons (INSPQ, 2001).

Waterborne disease occurs as the result of chemical or microbiological contamination of public or private water supplies. The source may be found in groundwater or surface water, and may be the result of natural occurrences or manmade situations. The water may have received minimal treatment prior to distribution or may have undergone many levels of disinfection and filtration. In the United States, during the period 1993-1998 there were 164 disease outbreaks reported, associated with chemical or microbiological contamination of drinking or recreational water.

In 1997-1998, there were 17 waterborne disease outbreaks reported in the US; of these, a cause was identified in 12. Among the causes were 4 *Giardia*, 2 cryptosporidium, 3 *E.Coli* 0157:H7 and one *Shigella*, as well as 2 chemical outbreaks due to copper. Most outbreaks were associated with unchlorinated well water (15 of 17). (MMWR 1999).

Microbiological contamination can be defined by the type of organism involved – bacteria, viruses, or protozoa. While there are many ways to detect and remove bacteria in water, the detection and removal of viruses and protozoa has proven to be a difficult task. This, combined with human error and environmental changes, has led to the need for increased vigilance of municipal water supplies throughout the country.

Not all cases or outbreaks of gastroenteritis are caused by contaminated water. Many of the same microorganisms that cause water-borne outbreaks may be found in food, especially if it has not been cooked thoroughly or kept cold. In the future, the Public Health Department of the CBHSS intends to look more closely at the problem of food-borne disease and what can be done to prevent it.

1.3 Current water quality guidelines and regulations

1.3.1 Water Quality Indicators

An important goal of water purification and treatment is to remove pathogenic microorganisms, therefore reducing the risk of the illness they cause. Due to the technical barriers such as detection problems and cost restrictions, and the biological robustness of the organisms in question, this risk cannot be reduced to zero. Instead, it is reduced to levels deemed acceptable by public health authorities and the general population. This can be achieved by action on several fronts, including water source protection, appropriate treatments, maintenance of the distribution system, and regular monitoring of the water quality (FPSDW, 2001).

It is not currently technically or economically feasible to test for all pathogenic microorganisms in water. In fact, it is generally deemed more useful to test water frequently with simple tests than to test occasionally with a complex and complete testing procedure (Gleeson and Gray, 1997). Indicator organisms are microorganisms whose presence indicates an increased likelihood of fecal contamination of the water supply. These organisms are ideally present only when fecal pathogens are present, have similar resistance to environmental conditions and to treatment processes, and are easier to detect than the pathogens themselves. Several organisms or groups of organisms are used in this manner. It is important to remember that in practice the absence of these bacteria cannot completely guarantee the absence of pathogens.

Total coliforms – the coliform group consists of several types of bacteria belonging to the Enterobacteriaceae family – including *Escherichia*, *Citrobacter*, *Enterobacter*, and *Klebsiella*. While this group commonly originates from fecal contamination, it can also be found in unpolluted soil and vegetation. It therefore indicates the increased possibility of fecal contamination, but further testing is usually required.

Fecal coliforms – this subgroup of the total coliforms includes organisms that are thermotolerant, or able to survive at higher temperatures. This group is more sensitive to the presence of fecal contamination, and is thus widely used in public health assessment of water quality. However, they can still contain some non-fecal species, leading to false positive results.

E. coli – this bacteria is a member of both the total and fecal coliform groups, and is known to be exclusively fecal in origin. It is thus the most sensitive of the coliform tests in determining fecal contamination of drinking water by pathogenic bacteria. The use of this and other coliform tests to determine the presence of pathogenic viruses and protozoa is less reliable.

One of the many sub-types of E. Coli is E. Coli 0157:H7. This specific type of E. Coli is most commonly found in the intestines and manure of cows. It may contaminate raw beef and may cause severe gastroenteritis and in children, a potentially fatal disease, hemolytic uremic syndrome. It was the cause of the outbreak and of the deaths in Walkerton, Ontario in 2000. The presence of a positive E.Coli test in water does not necessarily mean that E.Coli 0157:H7 is present; it is more likely to be another type of E.Coli.

AAHBs – aerobic and anaerobic heterotrophic bacteria – are a large group of microorganisms that are commonly found in raw water. While their presence in and of itself has little health significance (that is, they are not a direct indicator of fecal contamination), they can indicate variation in water quality or treatment and the potential for pathogen survival. Excessive counts have the potential of masking the detection of coliforms.

Turbidity - is caused by suspended matter in the water, both organic and inorganic. Although important from an aesthetic perspective, it also has implications for the microbiological quality of the water. This matter can serve as a source of nutrients for microorganisms, can interfere with their enumeration, and can interfere with disinfection processes and the maintenance of chlorine residuals. Turbidity is measured in nephelometric turbidity units (NTUs).

1.3.2 Canadian Guidelines

The Canadian government publishes the Canadian Guidelines for Drinking Water Quality that is prepared by the Federal-Provincial Subcommittee on Drinking Water of the Federal-Provincial Committee on Environmental and Occupational Health (FPSDW, 1996 and 2001). This document provides recommended limits for substances and conditions that affect the quality of drinking water, but are not considered to be legally enforceable standards.

The Canadian guidelines utilize total and fecal coliforms as the main indicators of water quality, suggesting that immediate corrective action be taken if there are more than 10 total coliforms per 100 ml, or if any fecal coliforms are present. The guidelines also recommend the measurement of heterotrophic bacteria and turbidity as general measures of treatment adequacy. No specific guidelines for protozoa or viruses are provided, although it is acknowledged that their levels should be kept as low as possible.

The last published version of the Canadian Guidelines for Drinking Water Quality was distributed in 1996, but a summary of guidelines as of March 2001 is available over the Internet at the Health Canada website.

1.3.3 Quebec Regulation 2001

In June 2001, the Quebec government, through the Ministry of the Environment (MENV), introduced a new regulation for drinking water quality. This regulation outlines specific roles and responsibilities for key players (municipalities, drinking water systems operators, public health and MENV) and defines water quality objectives to be met. These regulations establish strict standards for testing frequency and legally enforce most of the Canadian guidelines. New requirements, such as the testing of AAHBs, have been included. Clear delineation of communication channels ensures that key players in health and water quality are informed of key developments. All drinking water systems in Quebec are expected to comply with the new regulation within one year of their publication. Because Cree communities are not defined as municipalities under the Quebec law, the application of Quebec regulations is less clear. (See also, Chiefs of Ontario, Part II submission to the Walkerton Inquiry Commission).

2.1 Water quality measurement guidelines in the Cree region

2.1.1 General description

The monitoring of microbiological standards for drinking water in the Cree Region is coordinated in each community by the local environment administrator, or LEA (see section 2.3.2). They are guided by a Code of Practice developed by the Environmental Co-ordinator's office of the Cree Regional Authority in Montreal. This code of practice is not a by-law, nor has it been officially adopted or endorsed by the communities.

The main tool used in microbiological monitoring of water quality in Cree communities is the Colilert test. Colilert is a water testing procedure that detects both total coliforms and *E. coli* as indicators of potential microbial contamination. This procedure can either be conducted as a presence/absence test or as a quantitative test using a most probable number (MPN) table. It is recommended in the Code of Practice that the LEA use the quantitative test. Additional testing – both microbiological confirmatory testing using conventional filtration analysis and physiochemical testing – is conducted by periodically sending water samples to an accredited laboratory.

With regards to microbiological quality, sampling strategy and testing guidelines are specified for total coliforms and *E. coli*. In both cases, the Code of Practice recommends that 3 samples be obtained per week in all communities. Each LEA develops a sampling program meant to monitor all parts of the distribution system over time. This includes both regularly tested set points and random points throughout the system, as well as a set number taken at endpoints of the distribution system.

The Code of Practice guidelines for testing of total coliforms specify that: 1) no sample should contain more than 10 coliforms per 100 ml; and 2) there should not be more than one positive sample in any 30 day period. Breach of either (as opposed to both) of these guidelines is considered reason for intervention. The guidelines for testing of *E. coli* specify that no sample should contain any amount of *E. coli*. Any breach of this measurement guideline requires immediate intervention.

In both cases, a record of the results is to be maintained, and the results sent to the Ministry of the Environment weekly and “Santé publique” monthly. It is recommended that a sample be sent to an accredited laboratory once every two months for confirmatory testing using conventional filtration analysis.

In the event of excessive values (more than 10 total coliforms or more than one positive test in 30 days, or any presence of *E. coli*), recommended interventions include: 1) immediately advising of the Ministry of the Environment and “Santé publique”; 2) issuing a boiling water notice to the community; 3) investigating

the cause of the contamination; and 4) implementing a special sampling program until the contamination is cleared (2 samples daily until clear for 2 consecutive days).

The current Code of Practice contains no guidelines or sampling strategy for the detection of aerobic/anaerobic heterotrophic bacteria (AAHB) or turbidity.

2.1.2 Comparison with Quebec regulation and Canadian guidelines

When Cree region measures for microbiological water quality monitoring are compared with the new Quebec regulation and Canadian guidelines, a few differences can be seen both at the level of sampling program requirements and at the level of corrective actions. It is important to note that the Cree measures were in place before the new Quebec regulations were implemented in June 2001, and before the new Canadian guidelines were available.

Table 1 compares the 3 levels of documentation on microbial water quality, with respect to sampling frequency, indicator organism parameters and turbidity. On the level of sampling frequency and microbial parameters, it can be seen that the Cree region surpasses provincial regulations and national guidelines. However, the region does not currently have the resources in place to handle the issues of general bacterial counts (AAHBs) or viruses and protozoa. The turbidity parameter may be addressed by the water system operators.

Table 1
Comparison of Cree, Quebec, and Canadian guidelines for water quality
(microbiological elements)

Variable	Canada (1996, 2001)	Quebec (2001)	Cree Region (1998)
Sampling Freq.	4/month	8/month*	12/month
AAHBs	Required	Required	Not required
Total coliforms	Less than 10 and no consecutive positives and 90% clean samples	Less than 10 and 90% clean samples (9/10)	Less than 10 and no consecutive positives in 30 days (11/12 clean)
Fecal/E. coli	Zero	Zero	Zero
Turbidity	Maximum 1 NTU	Maximum 5 NTU	Not specified

AAHB – aerobic and anaerobic heterophilic bacteria (total bacteria count)

NTU - Nephelometric Turbidity Unit

* a modification of Quebec's regulation dated Feb. 27, 2002, reduced the required monthly number of bacterial tests from 8 to 2 for systems serving 21 to 1000 persons.

2.2 Drinking water in Eeyou Istchee and the Colilert testing method

2.2.1 Drinking water in Eeyou Istchee

All 9 Cree communities have community drinking water systems which distribute water to each home. A list of water sources and types of treatment may be found in Appendix A. A survey of Cree community water systems was carried out in December 2001 and a report was produced (BPR report; see section 4, Recent Developments: 2002).

However it is often reported to us that many people do not like the taste of tap water, and go to springs to collect water for drinking. This practice varies from one community to the other and depends also on the time of year, but details have not been documented.

2.2.2 Colilert Testing Method

As a result of a Health Canada initiative, Cree communities have adopted the Colilert testing procedure for determining microbial contamination of drinking water. The advantage of Colilert is that it can be done in the community by people who are not trained lab technicians; results are available 24 hours after the test procedure is started. The system used by most communities in Quebec, and previously by the Cree communities, is to send a water sample to an accredited testing laboratory, where it is analysed using the filtration method (the standard method). Because there was no accredited lab in northern Quebec, the Saint-Sauveur hospital in Val D'Or was testing water samples for Cree and other northern Quebec communities. Distances and transport difficulties led to delays, and samples from Cree communities sent outside often arrived too late for testing to be valid.

Local environment administrators and other personnel have been trained to use the Colilert method. The testing ingredients are added to a measured amount of water and placed in an incubator for 24 hours at 35° C. The solution will turn yellow in the presence of total coliform bacteria. If *E. coli* is present, the solution will also fluoresce when exposed to the appropriate lighting.

The Colilert method has been evaluated in the United States by the Environmental Protection Agency (Gleeson and Gray, 1997). The evaluation showed that Colilert was as sensitive as standard methods of enumerating coliforms and *E. coli*, and was not subject to false positive and false negative results by heterotrophic bacteria. Although some studies raised the concern that Colilert may be less sensitive for the detection of *E. coli*, the method has been found to be satisfactory for the detection of both total coliforms and *E. coli*. Its robustness in the presence of heterotrophic bacteria have led some to question the need for AAHB testing in situations where the Colilert system is in use (Pierre Payment, personal communication).

2.3 Key players in water quality in the Cree region

2.3.1 Local Band Council

The local Band Councils are the de facto owners and operators of the community water distribution systems and are responsible for ensuring that the water provided to their communities is of good quality. To this end, it hires the Local Environment Administrator to conduct water quality checks, and ensures that other personnel such as the Public Health Officer and Public Works employees are charged with duties appropriate for water quality monitoring. The Band Council would ideally take an active role in promoting and monitoring water quality.

In the event that water fails to meet quality standards, the local Band Council would ideally be actively involved in informing and updating the community, as well as taking measures to ensure that corrective measures are taken and public safety is protected.

2.3.2 Local Environment Administrator

The position of LEA in Cree communities was created under the 1975 James Bay and Northern Quebec Agreement, and involves responsibility for environmental impact assessment, environmental management,

and the monitoring of drinking water quality (both microbiological and physiochemical parameters). The responsibilities of the LEA in these areas are described in detail in the Environmental Code of Practice Manual developed in 1998 for the Cree Regional Authority. The LEA is an employee of the local Band Council, but maintains a close working relationship with the Cree Regional Authority. Funding for LEAs stems partly from a yearly written agreement between each Band and the Quebec Ministry of the Environment; in return for partial funding, the Bands agree that water testing will be carried out regularly.

The LEA is directly responsible for the testing of water quality at regular intervals and for reporting these results to the appropriate agencies. In the event of a breach in water quality standards, the LEA is expected to immediately communicate the results to the appropriate agencies, to investigate the cause of the problem, to issue a boiling water notice if required, and to perform additional testing.

2.3.3 Water distribution system operator

The water distribution system operator is responsible for providing clean potable water to the local community. To this end, the operator manages the technical aspects of water treatment, including filtration and disinfection. Part of this responsibility includes conducting tests that reflect the quality of the distribution system and the effectiveness of treatment, such as turbidity and free or residual chlorine levels. Under the new Quebec water regulation, water distribution operators are expected to have attained a certificate or diploma in water purification/treatment that is recognized by the Ministry of the Environment.

In the event that water quality standards are not met, the operator is expected to ensure that the appropriate agencies have been informed of the problem and the measures that are being taken to correct it. They would likely work closely with the LEAs in the issuance of a boiling water notice and further notification of the community as required.

2.3.4 Other community-based actors

- Public health officer (PHO) – employed by certain Band Councils to oversee the implementation of good public health practices in the community (nutrition, hygiene and sanitation, community organization) and to serve as a link between the Band Council, the population, and the health professionals. The job description varies according to the community but clearly would be a useful link in the event of a water contamination problem.
- Community health representative (CHR) – employed by the Cree Health Board in all communities as a health educator and implementer of community health services (maternal and child health, school health etc). The community health representative tends to be oriented towards individual health education and has fewer administrative responsibilities than the PHO. Clearly, a person who is well trained in community education and participation would be useful for mobilizing the community in the event of a water contamination event.
- Community nurses – the community medical clinics in the Cree region rely on nursing staff for their regular operation. The nurses are usually on the front line of medical triage and initial treatment. Up to this point, nurses have not benefited from regular contact with those involved with issues of water contamination (for more details, see section 3.2). In the case of a breach in water quality, nurses would clearly be an invaluable resource in watching for cases of water-borne disease.

2.3.5 Quebec Ministry of the Environment

The Ministry of the Environment is responsible for establishing the standards of water quality that need to be followed. In this context, the Ministry established a new regulation for water quality in June 2001. A coordinator in the Ministry office in Rouyn receives and monitors the results of water quality checks (Colilert results and physiochemical parameters) that are sent by the LEAs or the operators, according to the prescribed frequency. If communities fail to follow the required frequency of testing, the Ministry can issue notices of offense. It is also in charge of authorizing new water treatment facilities and technologies in Quebec municipalities; its role in First Nations reserves is unclear.

If the water fails to meet quality standards, the Ministry is in charge of overseeing the required remedial measures. The Ministry would ideally work closely with the water distribution operator and the LEA to identify the cause of the problem and implement measures to correct it.

2.3.6 Cree Regional Authority

The Cree Regional Authority provides expertise and training for Band personnel identified as playing a role in water quality in local communities. This includes the local environment administrator. The resource person for the LEAs is the Environmental Services Co-ordinator within the Traditional Pursuits Department. This coordinator periodically receives the compiled results of the water quality checks from the Environment Ministry and organizes continuing education for the LEAs. In addition, within the Community Services Division of the CRA, an engineer is employed to act as a resource to the water distribution system operators and to assess the capital needs with respect to water distribution systems. The community services division also provides the service of a circuit rider trainer (technician in water treatment) for the drinking water and waste water treatment plant operators.

2.3.7 Public health department

The public health department of the Cree Board of Health and Social Services has up to the current time played a minor role in water quality management in the Cree communities. This has included the periodic receipt and review of water quality testing results and some consultation. The new provincial water regulations define a more explicit role for the public health department generally, and the regional public health director specifically. The regional public health director is identified as a key person to be notified in the case of a breach in water quality. They are then responsible for ensuring that the “sanitary surveys required” are carried out, and that the appropriate measures have been taken – such as issuing a boiling water notice - to ensure the public’s health. However, the specific functions of the regional public health department remain unclear (Mercier 2001, p. 20).

2.3.8 Indian and Northern Affairs Canada; Health Canada; Hydro Quebec

INAC funds infrastructures, including drinking water and sewage facilities, in the Cree communities, as per the Cree-Naskapi Act.

Health Canada initiated and funded training for the Colilert testing system in the Cree communities. However, the Cree communities do not benefit from the “Environmental Health Program” that Health Canada provides in other First Nations communities in Quebec and in other provinces. This program provides the services of an environmental health officer in the areas of safe water and food supplies, suitably built and maintained housing, proper disposal of wastes and a safe workplace (*Your Environmental Health*

Program, Health Canada, 1995). Some of these services are carried out by Cree Nation Councils or the Cree Regional Authority but others are not available in the Cree communities. One wonders if the EHP was officially transferred during the negotiation of the James Bay and Northern Quebec Agreement; if it was transferred, to whom was it officially transferred – the CRA or the Cree Board of Health?

Hydro Québec was involved in providing some funding for drinking water systems in Chisasibi and Eastmain, through offshoots of the James Bay and northern Quebec Agreement.

3.1 Current practices for water testing

3.1.1 Compliance with Code of Practice guidelines

As discussed in section 2.1, the LEAs are expected to follow a Code of Practice that specifies the frequency at which water samples should be tested, and what parameters should not be exceeded for drinking water. Compliance with the Code of Practice varies from community to community.

Tables 2 and 3 illustrate how practices in individual communities comply with what is laid out in the code of practice. This table is based on information supplied by the LEA to the Environment Ministry's coordinator in Rouyn. It is possible that testing is being done more frequently, but that information has not been made available outside of the community.

In the Code of Practice, it is suggested that water sampling occur three times per week. The second column illustrates that several communities have had one or more periods of time, of varying lengths, in which the water was not tested at this frequency. In addition, most systems are technically only currently being tested once a week since all samples are taken on the same day (that is, 3 samples in one day each week as opposed to one sample three days per week).

The Code of Practice also specifies that samples should be sent for confirmatory testing once every two months. For the period of time examined, samples were sent for filtration analysis ranging from every two months to no sample sent (third column).

In almost all communities in the year 2001, microbiological parameters were not exceeded. In the case of contamination in one community, the regional public health department of the Cree Board of Health was not notified of the results until much later, although it is clear that other action was taken at the time. This means that potentially important surveillance and support activities were not provided by the public health department for this community.

Under the new Quebec regulation, routine results must be transmitted to the Environment Ministry within 10 days. In the LEA Code of Practice, routine results are to be relayed to the Environment Ministry weekly and the public health department on a monthly basis. Up to early 2001, results were received in the public health department every 3 to 5 months through the Environment Ministry. It is not clear at this time how often the Ministry receives results.

Table 2
Compliance with code of practice – January 1-December 26, 2001

Community	Frequency lapses (3 tests per week standard)	Samples for filtration (one test per 2 months standard)	>10 coliforms	Coliforms >monthly	E. coli
Chisasibi	3 episodes – 1 week	1	None	None	None
Eastmain	1 episode – 3 weeks	1	None	None	None
Mistissini	2 episodes – 1-2 months	1	None	None	None
Nemaska	12 episodes – 2-4 wks Last entry Nov 2001	3	None	None	None
Ouje-Bougoumou	8 episodes – 1-5 weeks	4	None	None	None
Waskaganish	1 episode – 2 months Last entry Nov 2001	4	None	None	None
Waswanipi	6 episodes – 1-3 weeks	5	Yes x 7	Yes	Yes x 1
Wemindji	4 episodes – 2-5 weeks	3	None	None	None
Whapmagoostui	8 episodes – 1-4 weeks Last entry Nov 2001	2	None	None	None

Table 3
Compliance with code of practice – January 1-December 2000

Community	Frequency lapses (3x/week standard)	Samples for filtration (1x/month standard)	>10 coliforms	Coliforms >monthly	E. coli
Chisasibi	4 episodes – 1-2 weeks	2	None	None	None
Eastmain	3 episodes – 1-2 weeks Last entry Nov 21	3	None	None	None
Mistissini	5 episodes – 1-2 weeks	1	None	None	None
Nemaska	12 episodes – 2-4 wks Last entry Nov 2001	3	None	None	None
Ouje-Bougoumou	Only 12 Colilert tests reported for the year	5	None	None	Yes x 1
Waskaganish	2 episode – 1-2 weeks	5	None	None	None
Waswanipi	6 episodes – 1-3 weeks	4	Yes x 1	Yes x 3	Yes x 1
Wemindji	2 episodes – 1 week	4	None	None	None
Whapmagoostui	10 episodes – 1- 4 weeks	4	None	None	None

3.1.2 Limitations and Challenges

1. Reporting of results – prior to the new provincial water regulation, communication of water quality results tended to be limited to periodic information transfer from the LEA to the Ministry of the Environment. The frequency of this information sharing is specified in the LEA Code of Practice, although the compliance with this varies from one community to another. Although the Code of Practice specifies that “Sante publique” be also notified of the results, it is unclear who specifically is to be contacted, and as a result this has largely not been done.
2. Local communication – Although both the LEA and the water system distribution operator are directly involved in local water quality monitoring, there are no clear lines of communication outlined for them. This may result in certain tests, such as turbidity, not being done. In addition, as mentioned in section 2.3.6, other key community players, such as community nurses, exist whose position in the lines of communication have not been well defined.
3. Limits on available testing services – due to the geographic location and isolation of the majority of Cree communities, conventional laboratory testing procedures are often inconvenient or unavailable. It is difficult for samples to reach the lab within the required 48 hours, since there is currently no accredited laboratory in the Abitibi region. This has led to the adoption of the Colilert system for water quality monitoring. Although arrangements are in place for regular confirmatory testing of samples in accredited labs, the frequency of this testing varies in each community and at different times of the year. There is mention in the LEA code of practice of sending contaminated water samples to the LEA for testing to ensure the performance of the Colilert reagents. It is unclear at this time whether or not this has been done.
4. Untested water supplies – it is well known that a significant percentage of people in Cree communities use spring water, either on a regular basis or when attending semi-permanent hunting camps. The water in these areas does not currently fall under the water quality measurement guidelines in the LEA Code of Practice.

3.2 Survey of local outbreaks of gastroenteritis in the Cree region

In October/November 2001, a telephone survey of Cree community nurses was conducted by Helene Caron on behalf of the Public Health Department of the Cree Board of Health and Social Services. The purpose of this survey was to determine the possibility of under-reporting of gastroenteritis outbreaks to the Public Health Department.

General Findings

- Nurses are not aware of the gastroenteritis prevention protocol that currently exists in their Community Health manual, and are not following any standard protocol for the definition or management of an outbreak of gastrointestinal disease
- Some small outbreaks of gastroenteritis have occurred in Cree communities
- Nurses are not being directly notified of water contamination by the LEAs
- Communication of water contamination occurs largely by local radio and notices, but these are often not reaching key players in the community

Survey Question: What would your criteria be for deciding whether a gastroenteritis outbreak/epidemic was occurring in your community? At what point would you decide to do something and what would you do?

Criteria for defining an outbreak included the number and proximity of gastroenteritis cases. The number of cases that would be considered worrisome varied from 4-5 cases to 20-30 cases. Some felt that proximity in time was an important factor (all cases occurred within a few days of one another) while others considered proximity of the cases to each other to be important (all cases being from the same family, or having attended the same feast).

Actions that would be taken included an investigation of the circumstances surrounding the cases (where they get their water, what they have eaten, where they have been), communication with the MD and the band office, trying to get stool cultures, and management of individual cases with rehydration therapy and diet.

Survey Question: How often have gastroenteritis epidemics/outbreaks occurred in your community? Were any linked to contamination of the community water distribution system?

Most communities report sporadic and isolated cases that were not considered to be of outbreak proportions and were not investigated further. In two communities, small outbreaks of between 5 and 10 cases were reported – in one community this is said to occur regularly.

In one case, a baby became very ill with E. coli gastroenteritis that was directly linked to a contaminated filter on a household tap. In all other cases, there have been no investigations or no proven links between the cases and contamination of the water supply. However, it was noted that increases in gastroenteritis cases have sometimes occurred with changes in season (particularly spring and fall).

Survey Question: Does the local environment administrator (LEA) tell you if the tap water is contaminated?

All communities reported poor communication with the LEAs in the event of water contamination. The clinics are not informed directly, and will usually not find out until several days later. The information is often communicated by radio and nurses may find out this way if they happen to be listening.

4. Recent developments: 2002

In February 2002, the Crees signed a new agreement with the Quebec government. One aspect of this new agreement was that funds previously allotted to the Ministry of the Environment, and with which they provided training and funding for the LEAs, were transferred to the CRA. It is not clear at this point what the role of the Ministry of the Environment will be with respect to ensuring the safety of drinking water in the Cree communities.

At the same time, the Community Services Division of the CRA hired a technician to train water treatment operators to perform and interpret tests of water quality. In some communities, the water system operators carry out the tests, while in others it is the LEAs. It is not clear how these roles will play out in the future.

A third development was the carrying out of a survey of water and wastewater infrastructures in the Cree communities, and the report (“BPR report”) dated Feb. 7, 2002. This was an initiative of Indian and Northern Affairs Canada and similar studies were carried out in most First Nations Communities across Canada, possibly in reaction to the Walkerton incident. Funding was provided to the CRA by INAC, who then contracted the project to an engineering firm, BPR-Conseil, based in Quebec City. The survey’s

purpose, with respect to drinking water systems, was to appraise the quality of raw and treated water, the treatment facilities, operating and testing procedures, capacity vs demand, and operator training.

The most urgent deficiencies to address were as follows (from the Executive Summary of the report):

- 4 communities which do not disinfect their water supply (from wells) and which do not have backup water chlorination equipment in case of contamination.
- 3 communities which have only one well and need a backup well.
- one community with consistently high turbidity (3-4 UTN); water comes from a lake and there is no filtration treatment.
- water supply in one community could be affected by an old gas station nearby.
- uranium level above norms in drinking water in one community.
- potential contamination of water supply source in one community.

Finally, a drinking water by-law is being developed with and for the community of Eastmain, by Alan Penn, science advisor, Cree Regional Authority. The present Quebec drinking water by-law requires that samples be sent to an accredited lab for testing twice a week, but the Cree communities have been testing with Colilert within the community, so Mr Penn thinks that a by-law specific to Cree communities is necessary.

(A recent report from Ontario (Chiefs of Ontario, 2001) states that the government of Ontario has taken the position that its water regulation regime does not apply to First Nations water and sewage treatment facilities. And in the same document, after 8 pages of legal discussion, the conclusion is reached that “these factors suggest that the regulation of water treatment facilities does touch at the core of federal jurisdictions over “Indians and lands reserved for the Indians”, making it presumptively immune from provincial law.” One important difference between Ontario Indians and the Cree, is that the federal Indian act still applies in Ontario, whereas it does not apply in the Cree communities, because the Crees negotiated a separate act with the Federal government, the Cree-Naskapi Act.)

5.1 A role for the Public Health Department of the Cree Board of Health

The following outline represents a proposed approach that can be taken by the public health department to ensure that the appropriate knowledge is gathered, good communication lines are established, and its role is well defined in the event of a breach in water quality. This information is based on current guidelines and invaluable work done by the Groupe de travail sur l’eau potable (1987) and on INSPQ (Institut national de la santé publique du Québec) guidelines (Groupe scientifique sur l’eau et les maladies hydriques, 2001).

Preparation

- Identify a person responsible for the file in the Public Health Department of the Cree Board of Health and Social Services, and an investigative team.
- Be familiar with the main points (norms) of the Quebec water regulation.
- Establish communication lines with Ministry of Environment, operators, LEAs, medical clinics, Band council.
- Discuss the division of responsibilities in the event of water contamination with key players.

- Prepare a written protocol for public health's role in the case of a contamination incident.
- Update gastroenteritis protocol in Community Health nursing manual and train community health representatives, nurses and supervisors in its use.
- Prepare a dossier containing information on the system operators, number of systems and location, source of raw water and seasonal problems, purification/treatment procedure (chemical, filtration), distribution system, susceptible points, any history of contamination.
- Prepare a dossier of health aspects of water-borne diseases – etiologic agents, incubation period, symptoms and signs, etc.
- Prepare a list of at-risk groups/sites in each community (schools, daycares, homes for the elderly, medical clinics, etc).
- Prepare guidelines for hospitals and clinics (including dental clinics) in the event that a Boil Water Notice is issued.
- Monitor frequency and results of Colilert tests by scrutinizing in a timely manner the reports compiled by the MENV and sent to the Public Health Department.
- Make recommendations regarding testing of commonly used springs or other sources of water in established camps outside the community.

Intervention plan – water not meeting prescribed standards

- **Evaluation**

- *Extent of problem* including geographic location, affected population and location of susceptible groups, recent bacteriologic results, any gastrointestinal illness, probable causes of contamination and date of onset, estimated duration of incident.
- *Actions already taken* including additional testing requested, changes to amount of chlorine added to water and resulting chlorine residuals, other corrective measures taken, investigations performed to determine contamination source, issuing of a boiling water notice (was it done and when), notification of other key players.

- **Development and execution of action plan (if required)**

- Division of responsibilities among key players based on previously discussed parameters.
- Notification of the community if not previously done and targeted information to susceptible groups.
- Notification of health care facilities and workers including physicians, nurses, clinics, hospitals, etc.
- Documenting any follow-up testing of microbiological or treatment measures, and ordering additional tests as required to follow the evolution of the outbreak.
- Medical surveillance of key symptoms (nausea, vomiting, fever, cramps, diarrhea) or illnesses (gastroenteritis, hepatitis) by health personnel and reporting to public health to establish any link between water quality and illness.

- In the presence of illness, establish link by comparing disease rates in consumers and non-consumers (direct consumption and other vehicles like food), dose-response relationship with amount consumed, appropriate timeline of events (incubation period), confirmation of same pathogen.
- **Follow-up of situation**
 - Follow-up testing and adjustments in the treatment plant.
- **Report of public health team intervention and recommendations**
 - Identification of strong and weak points of the intervention plan and recommended changes to allow for better preparation in the future.

N.B. Depending on the nature and extent of the water contamination, the above outline can be applied in its fullest detail, in the case of a major contamination and illness outbreak, or quickly and efficiently, in the case of a single deviation in testing results (for example, in the case of a temporary breach of standards, only the evaluation phases may be necessary). The actions of other key players may also preclude the need for extensive involvement of the public health department, due to a certain amount of overlap in responsibilities.

Annual or periodic report

- report to Board of Directors of Cree Board of Health regarding the safety of tap water in the region

5.2 Public Health Department Information Sheet

Role of the regional **Public Health Department** of the **Cree Board of Health and Social Services of James Bay** regarding water quality monitoring in Eeyou Istchee

The regional Public Health Department wishes to be informed immediately of any **abnormal** Colilert test result, meaning

- if E. Coli is present
- if more than 10 total Coliforms are present
- if two or more samples within a 30-day period have **any** total Coliforms

Both the old and the new Quebec water regulations require that abnormal coliform tests be reported to the regional public health department.

Please contact the Montreal office first. If you are unable to get in touch with someone there, contact the Chisasibi office.

- Montreal office, 277 Duke St.
Tel.: 514-861-2352 • Fax: 514-861-2681
Contact person for water quality issues:
Environmental Health Officer: Mathieu Trepanier, ext. 32 or
Dr. Elizabeth Robinson, ext. 29
– If not available:
Secretary: Gaétane Bérubé, ext. 27
Infectious diseases co-ordinator: Dr. Robert Carlin, ext. 33
- Chisasibi office, in the Cree Board of Health's administrative offices, old arena, 2nd floor.
Tel.: 819-855-2844 • Fax: 819-855-9031
Secretary: Reggie Tomatuk, ext. 5341 or 5363
Implementation co-ordinator: Manon Dugas, ext. 5362
Director: Dr. Yv Bonnier-Viger, ext. 5335

On receipt of a notice of abnormal results we will contact the local clinic and find out whether there have been any cases of gastroenteritis or any other potentially waterborne diseases. We will report what we find to the LEA. We would like to be informed of measures taken by the LEA and water treatment plant operators to remedy the problem. We will monitor the situation until the water results return to normal. Please send us a copy of the completed "Contamination Report" (JA 4-4 in the Environmental Code of Practice manual) for each incident of contamination.

In addition, the regional Public Health Department will examine abnormal results of physico-chemical and other tests of water from the Cree communities carried out in outside laboratories. (By regulation, these labs must send us copies of abnormal results.) The Public Health Department will examine all the Colilert results compiled by the Ministry of the Environment and report periodically to the Board of Directors of the Cree Board of Health.

6.1 Recommendations

- The appointment of an environmental health officer in the regional Public Health Department of the Cree Board of Health and Social Services (implemented).
- The further development of the public health department's resources and role definition in the area of water quality management.
- The distribution of the "Public Health Department Information Sheet" to all LEAs and key players in water quality monitoring to improve awareness of the public health department's role in the event of water contamination.
- Coordinate or participate in meetings of key players in water quality monitoring in order to facilitate information sharing. This is urgent in the light of changes in the role of the Quebec Environment Ministry as per the New Relationship Agreement.
- Collaborate with Cree Regional Authority and Grand Council in developing a regional water testing by-law that is adapted to the particular circumstances of the Cree communities.
- Clarification of circumstances under which Boil Water Notices are issued.
- Ensure the adequacy of testing procedures by periodically sending the LEAs randomly contaminated samples for confirmation (if not already being done).
- Include local springs and hunting camp water sources in the mandate for water quality testing by the LEA.
- Investigate the feasibility of having the AAHB testing requirement reduced or waived for the Cree communities, given the Colilert system's robustness.

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Appendix A

Water distribution system sources and treatments Cree communities of Eeyou Istchee: May 2002

Community	Water source	Treatment
Whapmagoostui	Great Whale river	Chlorination only
Chisasibi	LaGrande river	Water treatment plant including coagulation-flocculation and filtration. Chlorination
Wemindji	Well	?treatment to remove uranium - may not be functioning.
Eastmain	Shallow wells	Chlorination
Waskaganish	Rupert river	Water treatment similar to Chisasibi. Chlorination
Nemaska	Well	None
Mistissini	Mistissini Lake	Chlorination only
Oujé-Bougoumou	Well	None
Waswanipi	Wells (2)	None

Appendix B

Testing and monitoring of water quality in water distribution systems in the James Bay Cree communities of Eeyou Istchee

Requirements of the new (2001) Quebec drinking water quality regulation

The two attached tables outline the testing, monitoring and reporting that would be required if the new Quebec regulation were applied in the Cree communities. (My interpretation of the new regulation – E. Robinson.) They do not include actions that would be necessary if an abnormal result occurred.

The CRA, the CBHSS and the Quebec Ministry of the Environment and other environmental experts should discuss how to apply these regulations to the unique situation in the Cree communities. A regulation made specifically for Eeyou Istchee could be helpful.¹

¹ Some other issues a Cree regional regulation could address are:

- Quality control of Colilert testing: since the people doing the local testing are playing the role of a lab, should there be quality control measures?
- Recording and reporting of testing done at the local level (see LEA handbook; may need updating).
- Electronic recording of testing and monitoring results carried out in the communities. This would facilitate reporting of results and speed up action measures required for abnormal results.
- Is it really necessary to test for AAHB's weekly in the Cree communities?
- Could AAHB's be tested in the Cree communities?
- Could the required monthly turbidity testing from the central part of the system be done locally?
- Testing water from sources other than the community water distribution system is not required in the provincial regulation, but LEAs often test springs that are frequently used by community members. A regulation made specifically for Eeyou should address this situation.
- Define the roles of the Cree Nation Councils, local public works department, LEAs, local public health officer, CRA, regional Public Health Department of the Cree Board of Health, Ministry of the Environment, with respect to water system quality provision and monitoring.

It seems reasonable to me to send samples to an outside lab 4 times a year: what do others reading this think?

Table 1

Testing and monitoring of water quality in water distribution systems using surface or groundwater and disinfecting it (according to the new Quebec drinking water quality regulation).

	Frequency	Sampling from where	Testing where ²	Record-keeping requirements
Testing for total coliform bacteria and E. Coli	8 times per month; preferably 2 times per week	50% of samples must be from outermost limits of system; other samples anywhere in the system. Residual chloride in each sample must be measured.	Colilert; in the community.	Not defined in the regulation; defined in LEA handbook; may need to be updated. Residual chloride should be recorded along with the sample result.
Testing for AAOB's (aerobic and anaerobic heterotrophic bacteria)	4 times per month; preferably once per week	The 4 samples collected from the outermost limits.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.
Testing for turbidity	Once a month	At the system's central point.	?outside lab or in the community?	?depending on where tested.
Testing for nitrates	4 times per year; every 3 months	At the system's central point. PH of sample must be recorded at the time of sampling and sent to the lab with the sample.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.
Testing for trihalomethanes	4 times per year; every 3 months	At the system's outermost limits.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.
Testing for 17 inorganic substances	Once a year in July, August or September.	At the system's central point.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.
Monitoring for residual chlorine, water flow rate and turbidity.	Every 4 hours.	At the outlet of the treatment facility	In the community.	New regulation requires that this information be written in a registry every day and kept for 5 years.
Monitoring for pH and water temperature.	Once a day.	At the outlet of the treatment facility or of the reservoir if there is one.	In the community.	New regulation requires that this information be written in a registry every day and kept for 5 years.

² NB that the regulation requires that testing be carried out in a certified laboratory, but that the Health Canada and the Quebec Environment Ministry have trained local environment administrators and other workers in the Cree communities to test for total coliforms and E. Coli using the Colilert method.

Table 2

Testing and monitoring of water quality in water distribution systems using groundwater and not disinfecting it (according to the new Quebec drinking water quality regulation).

	Frequency	Sampling from where	Testing where ³	Record-keeping requirements
Testing for total coliform bacteria and E. Coli	8 times per month; preferably 2 times per week	50% of samples must be from outermost limits of system	Colilert; in the community.	Not defined in the regulation; defined in LEA handbook; may need to be updated.
Testing for AAHB's (aerobic and anaerobic heterotrophic bacteria)	4 times per month; preferably once per week	The 4 samples collected from the outermost limits.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.
Testing for turbidity	Once a month	At the central part of the system.	?outside lab or in the community?	?depending on where tested.
Testing for enterococcal bacteria and coliphage viruses ⁴	Once a month	At the groundwater source, before entering the pumphouse.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.
Testing for nitrates	4 times per year; every 3 months	At the central part of the system. PH of sample must be recorded at the time of sampling and sent to the lab with the sample.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.
Testing for 17 inorganic substances	Once a year in July, August or September.	At the central part of the system.	Certified lab outside the community.	Certified labs are required by regulation to keep records and submit results to the Ministry of the Environment.

³ NB that the regulation requires that testing be carried out in a certified laboratory, but that the Health Canada and the Quebec Environment Ministry have trained local environment administrators and other workers in the Cree communities to test for total coliforms and E. Coli using the Colilert method.

⁴ This must be done if the groundwater source is considered "vulnerable" as defined in article 13 of the regulation. If this has not already been done, the evaluation of vulnerability should be carried out in each community by a firm of experts.

Appendix C

Suggestions for updating the LEA Code of Practice with respect to reporting of both normal and abnormal Colilert results

Comments from Public Health Department Cree Board of Health and Social Services of James Bay

Outside of First Nations and Inuit communities, all water testing is done by certified laboratories. According to the new Quebec regulation, these labs must report all abnormal results immediately to the water system operator (owner or person in charge of the system) and to the Environment Ministry and the Public Health Department of the regional Health Board. Normal microbiological results must be reported to the Ministry of the Environment within 10 days. For samples from the Cree communities tested in outside labs, this is what would happen.

For the samples tested locally (mainly Colilert), the LEA Code of Practice outlines procedures for reporting both normal and abnormal results.

NB that treatment plants are not required by the regulation to report to anyone outside the community the results of daily monitoring of residual chloride, flow, turbidity, ph and water temperature at the treatment plant, but these measures must be recorded daily in a register and kept for 5 years.

See table for present LEA Code of Practise guidelines and regional Public Health Department comments.

Elizabeth Robinson MD, community health physician
Jan. 14, 2002.

Table 3

Recording and reporting of results of water testing done locally

Type of result	What the LEA Code of Practice recommends.	What is actually being done.	Comments from the Public Health Department of the CBHSSJB.
General comment.	Little mention is made of the role of the water treatment plant manager or operator.		<ul style="list-style-type: none"> the water treatment plant manager and his superiors are responsible for the quality of the water. under the Quebec regulation, the person responsible for the water treatment plant is the one who is responsible for overseeing the testing of water, the issuing of boil water notices, and any remedial work needed on the water treatment system. role and responsibilities in the Cree communities need to be discussed with persons concerned.
Colilert - recording of results.	Record results in <i>Sample Register</i> and on form AQCQ-1 (p. 4-14)		<ul style="list-style-type: none"> new regulation says that residual chloride should be measured on each sample tested for bacteria; the guidelines and <i>Sample Register</i> should be modified accordingly. AQCQ-1 form not found; what is it? Why have two forms for reporting? <i>Register</i> will have to be modified to include turbidity measures and other measures required by the new Quebec regulation.
Colilert - reporting of results	A copy of the relevant pages of the <i>Sample Register</i> and the AQCQ-1 form should be sent to the Ministry of the Environment on a weekly basis (p. 4-14).	Not being done in all communities (see G. Lajoie's LEA survey and C. Muecke's report).	<ul style="list-style-type: none"> there are no recommendations regarding the reporting of normal results to the LEA's superior within the community. we feel it is important that the communities report results to an outside "watchdog" once a week; this could be the Ministry of the Environment or someone hired by the CRA specifically for this purpose.
Colilert - reporting of results.	A copy of the relevant pages of the <i>Sample Register</i> and the AQCQ-1 form should be sent to Sante publique once a month (p. 4-14).		<ul style="list-style-type: none"> "Sante publique" is written in French and is not defined! the Quebec regulation requires that <u>abnormal</u> results be sent to the regional public health department of the regional health board. It does not require that <u>normal</u> results be sent to the regional public health department. because of the particular circumstances in the Cree communities, we recommend that all Colilert results be transmitted to the regional public health department of the Cree Board of Health and Social Services every month after compilation by the Ministry of the Environment or the CRA.

Table 3 (cont'd)

Type of result	What the LEA Code of Practice recommends.	What is actually being done.	Comments from the Public Health Department of the CBHSSJB.
Colilert - interpretation of results and action.	Interpretation of “safe” is explained on pages 4-13 and 4-14. Safe = no E. Coli and no more than 10 total coliforms and no more than one sample with <u>any</u> total coliforms in one month.		<ul style="list-style-type: none"> new Quebec regulation states that a boil water notice¹ should be issued immediately if there are any E. Coli, but that the presence of total coliforms, even over 10, does not necessarily require a BWN. 4 samples a day for 2 days must be tested for coliforms and residual chloride following any test with 10 or more coliforms or E. Coli or if 2 samples within a 30-day period contain any coliforms. the presence of total coliforms suggests a problem with the distribution system and the system should be checked.
Colilert - interpretation of results and action.	Where a sample is found to be contaminated, the <i>Contamination Report</i> should be filled out (p.4-14).		<ul style="list-style-type: none"> does “contaminated” mean the presence of <u>any</u> coliforms or E. Coli, or does it mean not “safe” as defined on p. 4-13? the definitions of “safe” and “contaminated” should be made more precise. a report should be filled out for when the water is not “safe” according to the definition on p. 4-13 (this is in conformity with the new regulation).
Colilert - if the water is “contaminated”.	The LEA or designated person should immediately inform persons responsible for key community resources and all the residents of the community... that the drinking water is unsafe unless boiled for 5 minutes (p. 4-15).	<ul style="list-style-type: none"> community residents who do not speak Cree may not find out, because the main communication channel seems to be the radio. BWNs may be issued without any positive tests, just as a precaution if some work is being done on the system. 	<ul style="list-style-type: none"> according to the new regulation, the BWN only needs to be issued if there is E. Coli in the water. We should discuss if the indication for BWN should be wider in the Cree communities. water only needs to be boiled for <u>one</u> minute in order to be safe. key community resources are defined in detail in the new regulation.
Colilert - if the water is “contaminated”	The LEA should also advise the Ministry of the Environment and “Sante publique” immediately that a boiling water notice has been issued.		<ul style="list-style-type: none"> the LEA should advise the Ministry of the Environment and the regional Public Health Department of the Cree Board of Health if the water is not “safe” (as defined above) and not just if a boiling water notice has been issued. the regional Public Health Department has prepared an info sheet on who should be contacted.
Colilert - contamination.	<i>Contamination Report</i> (JA 4-4) should be filled out.		<ul style="list-style-type: none"> the design of this report seems excellent. the guidelines mention that the report should be filled out if one of the samples “fails the Colilert test” – what does this mean exactly? space should be provided on the report for recording residual chloride in addition to coliforms in each sample.

¹ According to the new regulation, the persons or groups who must be informed are: all users of parts of the system which are contaminated; and childcare centres, schools, hospitals, clinics, youth centres, group homes and old folks' homes. All these establishments, as well as restaurants, hotels, community centres and arenas, must close all drinking fountains and put up notices at each tap, until the water has been retested and found safe again.

Appendix D

Mini-bibliography on Boil Water Notices

1. Guidance for Issuing and Rescinding Boil Water Advisories. This is an addition to: Guidelines for Canadian Drinking Water Quality – (1996).
www.hc-sc.gc.ca/ehp/ehd/catalogue/bch_pubs/dwgsup_doc/boil-water-advisories.pdf
2. How to use water safely during a “boil water advisory”
www.gov.on.ca/health/english/pub/foodsafety/watersafety.html
Three page document for the public, from the Government of Ontario.
3. A Boil Water Advisory or a Boil Water Notice. By : Denise Hoffman, Linda Heaton, Kim Henken and Jenny Cocanougher. University of Kentucky, April 1999.
From the Internet – 1 page. Makes a distinction between an « advisory » and a « notice ». An advisory is more preventive, whereas a notice is issued when tests show contamination.
4. Suggested Procedures for Dental Offices During Boil-Water Advisories.
www.cdc.gov/nccdphp/oh/ic-fs-boilwater.htm
Several pages, very detailed.
5. Protocole de gestion de l’eau contaminée. “Ordre des dentistes”, Septembre 2001.

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