Guidelines for Monitoring Public Drinking Water Supplies

Part II – Registered Public Drinking Water Supplies

NOVA SCOTIA

Contents

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1. Introduction

1.1 Purpose

The purpose of these *Guidelines* is to assist an owner of a registered public drinking water supply with developing and implementing an acceptable water quality monitoring program. These *Guidelines* reflect the minimum requirements under the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations made pursuant to the Environment Act.

The objective is to ensure that consumers of water provided by a registered drinking water supply in Nova Scotia have safe drinking water. Systematic water quality monitoring, immediate notification and corrective action are essential elements to a comprehensive water supply protection program.

All owners of registered drinking water supplies shall use these *Guidelines* to develop and implement a water quality monitoring program that supports the maintenance and optimization of water system operations.

1.2 Authority

Regular Testing - Section 33 of the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations requires an owner of a public drinking water supply to regularly monitor drinking water quality for the parameters listed in the *Guidelines for Monitoring Public Drinking Water Supplies,* as well as other substances as may be required by the Minister or an Administrator. Samples are to be collected in the manner and with the frequency set out in the *Guidelines for Monitoring Public Drinking Water Supplies* or as required by the Minister or an Administrator.

Drinking water quality testing is to be completed by approved laboratories in accordance with Nova Scotia Environment's (NSE) *Policy on Acceptable Certification of Laboratories,* as amended from time to time.

Immediate Notification and Corrective Action - Section 34 of the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations requires an owner of a public drinking water supply to:

- notify the department immediately upon becoming aware of not meeting health-related drinking water quality criteria; and
- take corrective action as set out in the *Guidelines for Monitoring Public Drinking Water Supplies* or as may be required by the Minister or Administrator

Provision of Safe Drinking Water - Section 35 of the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations requires that an owner of a public drinking water supply ensure that the microbiological, physical and chemical characteristics of the public drinking water supply do not exceed the maximum acceptable concentration (MAC)[1] for substances listed in the most recent version of Health Canada's *Guidelines for Canadian Drinking Water Quality,* as amended from time to time.

1.3 Application

These *Guidelines* apply to registered public drinking water supplies. **It should be noted that these *Guidelines* are considered to be minimum requirements under the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations.** Owners of municipal drinking water systems must adhere to the *Guidelines for Monitoring Public Drinking Water Supplies: Part 1 – Municipal Drinking Water Supplies*.

2. Roles and Responsibilities

2.1 Registered Public Drinking Water Supply Owner (Owner)

An owner is responsible for delivering safe drinking water to the consumer. This responsibility includes routine monitoring of the public drinking water supply, informing the consumer and Nova Scotia Environment (NSE) if water quality fails to meet the health-related criteria set out in the most recent version of the *Guidelines for Canadian Drinking Water Quality* and for taking corrective action to restore drinking water quality. The owner is also responsible for contacting NSE as soon as he/she becomes aware of any problem that may result in unsafe water being supplied to the consumer such as equipment failure and/or malfunction.

2.2 Nova Scotia Environment (NSE)

NSE has been designated as the lead agency to take such measures as are reasonable to provide access to safe, adequate and reliable water supplies (Environment Act, Section 104(c)). To carry out this mandate, NSE registers public drinking water supplies, audits facilities, ensures water quality monitoring programs are carried out and appropriate action is taken to address any problems that may arise. When required, NSE also classifies registered public drinking water supplies and requires certified operators. When a public drinking water supply owner fails to notify consumers that a public health risk exists, NSE will cause a notification to be issued, including the issuance of water advisories (i.e. boil water, do not use, and do not consume advisories).

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1 A maximum acceptable concentration (MAC) means the health-related criteria specified for substances in the most recent version of Health Canada's *Guidelines for Canadian Drinking Water Quality*, which when present above the set concentration have known or suspected adverse effects.

2.3 Medical Officer of Health (MOH)/Environmental Health Consultant (EHC)

The MOH provides advice to the Minister of Environment, the owner, NSE and the public regarding public health concerns associated with drinking water supplies. This advice may also come from an EHC, within NSE, working in collaboration with the MOH.

2.4 Water Quality Laboratory (Lab)

The lab conducts analyses of drinking water samples following procedures defined in the latest edition of the *Standard Methods for the Examination of Water and Wastewater,* published jointly by the American Public Health Association, the American Water Works Association and the Water Environment Federation, or an alternative method acceptable to NSE. The lab also participates in quality control, quality assurance and accreditation programs, as required, to ensure accurate results. All sample analyses are to be performed by a lab acceptable to NSE in accordance with the *Policy on Acceptable Certification of Laboratories*, as amended from time to time.

3. Monitoring for Microbiological Quality

3.1 Routine Monitoring - Total Coliform and Escherichia coli (*E. coli*)

An owner shall monitor all registered public drinking water supplies for total coliform and Escherichia coli (*E. coli*) bacteria. Coliform bacteria (total or *E. coli*) are indicator organisms used to determine if drinking water is of good quality and free of microbial pathogens that can cause disease. Coliform bacteria are found in the soil and intestines of warm-blooded animals, including humans. Monitoring for total coliform and *E. coli* bacteria provides an indication of the degree of pollution impacting a drinking water supply source and its sanitary condition.

The presence of *E. coli* indicates that the source has been impacted by recent fecal contamination and therefore the water is unsafe to drink. The presence of total coliform bacteria in a non-disinfected well means that the well is prone to surface water infiltration and is therefore at risk of fecal contamination. The presence of total coliform bacteria in a disinfected system means the disinfection process has failed or has been overwhelmed. In the latter two cases, the water is considered unsafe to drink until the situation is remediated.

It is important to note that the absence of coliform bacteria does not guarantee safe water. Regular testing is required to check the safety of the water supply. Sampling should be carried out when the risk of contamination is greatest, such as during spring thaw, extended periods of heavy rain or drought, after lengthy periods of non-use or if the owner suspects any changes to the water quality.

3.1.1 Sample Frequency, Number and Location

An owner of a registered public drinking water supply shall sample the water supply quarterly (every three months) for total coliform and *E. coli* bacteria. Where a water supply is not in operation year-round, one sample is to be collected prior to start-up and then every 3-months while the facility is in operation.

NSE may alter the frequencies, locations, numbers and parameters to be monitored depending on local conditions, analytical results or changes to Health Canada's *Guidelines for Canadian Drinking Water Quality*, as amended from time to time.

3.1.2 Sample Collection and Preservation

An owner shall ensure that all samples collected for routine bacteriological monitoring are tested for the presence of total coliform and *E. coli* bacteria using methods listed in the latest edition of the *Standard Methods for the Examination of Water and Wastewater.* Routine samples may be analyzed by a presence/absence method (e.g. ColilertTM, ColisureTM, etc.).

All samples shall be collected and transported according to the standard procedures outlined in Appendix A.

The owner shall record the water supply registration number on the lab form when submitting all samples for microbiological quality analyses.

3.1.3 Reporting of Sample Results

An owner shall ensure that results of all samples collected for bacteriological analysis (total coliform and *E. coli* bacteria) are sent from the lab to the owner. An owner should record summaries of sample results with the sample date, parameter and result in a chronological and organized manner. Results shall be maintained on-site at the registered public drinking water supply for review by NSE inspection staff during an audit.

1) The owner shall maintain records of sample results, including the original lab records, for a minimum of two years from the collection date.
2) Whenever the presence of coliforms is detected (total or *E. coli*), the lab shall immediately notify the water supply owner and NSE and forward the results to NSE. The owner shall also immediately notify NSE and forward the results to NSE immediately after they receive the results from the lab. Receipt of any results sent electronically must be confirmed by telephone. If the local NSE office cannot be reached for whatever reason, the owner shall contact the after-hours number at 1-902-893-6347. The after-hours number shall be contacted outside of normal business hours: weekdays – 4:30pm to 8:30am, weekends and holidays.
3) Upon receipt of sample results indicating the presence of total coliform bacteria or *E. coli*, the owner shall comply with sections 4.0 and 5.0.

3.2 Compliance – Microbiological Parameters

An owner shall ensure that drinking water meets the bacteriological quality requirements as set out in Health Canada's *Guidelines for Canadian Drinking Water Quality*, as amended from time to time. Currently, the *Guidelines for Canadian Drinking Water Quality* requires that:

- The maximum acceptable concentration (MAC) for total coliform bacteria or *E. coli* is 0 (may be reported as absent or <1) per 100 mL.

For clarity, this means that no sample shall contain total coliform or *E. coli* bacteria. This MAC will be applied in Nova Scotia as outlined in section 4.0. When a boil water advisory is necessary (refer to section 5.1), the owner shall comply with section 5.2.

The owner is required to comply with the water advisory notification, removal process and any directives issued by NSE pursuant to section 122(A) of the Environment Act. Failure to do so may result in enforcement actions.

4. Corrective Actions to be Taken for Responding to the Presence of Bacteria

4.1 Immediate Notification & Boil Water Advisory Issuance

An owner of a registered water supply shall contact NSE immediately by telephone, upon notification from the lab of any sample result indicating the presence of total coliform or *E. coli* bacteria. If the owner is not able to speak with a person from the NSE office directly, the owner shall call the after-hours number at 1-902-893-6347. Receipt of any results sent electronically from the owner to NSE must be confirmed with NSE by telephone. A flowchart to assist owners respond to the presence of total coliform bacteria or *E. coli* is found in Appendix G.

The owner shall immediately initiate a boil water advisory, in accordance with sections 5.1 and 5.2, until satisfactory bacteriological quality is restored.

4.2 Confirmation Sample and Corrective Actions

The owner shall collect a confirmation sample immediately upon receiving notification of the sample results from the lab. If a confirmation sample cannot be collected within 24 hours (e.g. weekend, holiday, etc.), the owner shall immediately notify NSE with a proposed sample date.

a) If the confirmation sample indicates the presence of total coliforms or *E. coli*, the owner shall investigate the cause of the contamination:

   i. If the source of supply is groundwater and there are no obvious signs of well construction issues, the owner shall refer to section 4.2.1 for additional corrective actions.

ii. If the source of supply is groundwater and there are obvious signs of well construction issues, the owner shall refer to section 4.2.2 for additional corrective actions.

iii. If the source of supply is surface water, the owner shall refer to section 4.2.3 for additional corrective actions.

b) If the confirmation sample indicates the absence of total coliform or *E. coli* bacteria, the boil advisory will be removed by NSE in accordance with section 5.3 after two samples separated by a minimum of 24 hours show the absence of total coliform and *E. coli* bacteria. Once the boil advisory is removed, the owner may return to routine sampling.

4.2.1 No Obvious Signs of Well Construction Issues

Where there are no obvious signs of well construction issues, the owner shall immediately disinfect the well following NSE's "*Disinfection of Water Wells by Chlorination*" procedure found in Appendix L.

Following disinfection and water flushing procedures, the owner shall collect a confirmation sample after at least 5 days to ensure that no chlorine residual remains in the well. A sample may be collected within 5 days of disinfection if the owner is able to confirm the absence of a chlorine residual in the source water using a chlorine test kit.

It is critical that there is no remaining chlorine residual prior to collecting the confirmation sample from a well that is normally untreated (e.g. does not have a continuous chlorination system). A checklist to assist owners determine if their water supply is at increased risk of microbiological contamination is found in Appendix I.

a) Positive Repeat Sample Following Disinfection

If the confirmation sample result indicates the presence of total coliform or *E. coli* bacteria following disinfection, the owner shall immediately seek the expertise of a person qualified under the Well Construction Regulations (e.g. well driller/digger) and shall submit a corrective action plan acceptable to NSE (refer to section 4.3). A form to assist qualified persons complete their investigation of the water supply is found in Appendix J. Any upgrading of the well to address deficiencies must meet the requirements of the current Well Construction Regulations.

If the well is confirmed to be constructed properly and contamination persists, the owner shall seek the advice of a water treatment specialist, engineer or licensed hydrogeologist and submit a corrective action plan acceptable to NSE (refer to section 4.3).

b) Negative Repeat Sample Following Disinfection

If the confirmation sample result indicates the absence of total coliform or *E. coli* bacteria following disinfection, the owner shall collect a second confirmation sample. The second sample must be collected a minimum of 24 hours after the first confirmation sample was collected. If the second sample indicates the absence of total coliform or *E. coli* bacteria, the boil advisory will be removed by NSE and the owner may return to routine sampling.

4.2.2 Obvious Well Construction Issues

Where there are obvious signs of well construction issues, the owner shall immediately seek the expertise of a person qualified under the Well Construction Regulations and submit a corrective action plan acceptable to NSE (refer to section 4.3). A form to assist qualified persons complete their investigation of the water supply is found in Appendix J. Any upgrading of the well to address deficiencies must meet the requirements of the current Well Construction Regulations.

Once corrective actions have been implemented, the owner is required to collect two samples separated by a minimum of 24-hours to confirm the absence of total coliforms or *E. coli*.

a) Positive Repeat Samples Following Well Repairs

   If either of the two samples are positive for total coliforms or *E. coli*, the owner shall immediately seek the expertise of a qualified person (water quality specialist, engineer or licensed hydrogeologist) and submit a corrective action plan acceptable to NSE (refer to section 4.3).

b) Negative Repeat Samples Following Well Repairs

   If both samples confirm the absence of total coliform or *E. coli* bacteria the boil advisory will be removed by NSE, and the owner may return to routine sampling.

4.2.3 Surface Water Supplies

If water is obtained from a surface water supply (e.g. lake, river stream), the owner shall immediately seek the expertise of a water quality specialist or engineer to determine whether existing treatment is effective and/or if additional treatment is required to treat for bacterial contamination. The owner shall also submit a corrective action plan acceptable to NSE (refer to section 4.3).

Once corrective actions have been implemented, the owner is required to collect two samples separated by a minimum of 24-hours to confirm the absence of total coliforms or *E. coli*.

Note: Due to the heightened potential for contamination, springs and sandpoints will be treated as surface water supplies.

a) Positive Repeat Samples Following Corrective Action

   If either of the two samples are positive for total coliforms or *E. coli*, the owner shall consult with a water quality specialist or engineer and re-submit a corrective action plan acceptable to NSE (refer to section 4.3).

b) Negative Repeat Samples Following Corrective Action

   If both samples confirm the absence of total coliforms or *E. coli*, the boil advisory will be removed by NSE, and the owner may return to routine sampling.

NOTE: All public water supplies registered under the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations made pursuant to the Environment Act that derive their supply from surface water sources shall be filtered and disinfected.

4.3 Developing a Corrective Action Plan

The owner is required to submit a corrective action plan acceptable to NSE under the following circumstances:

- There are obvious signs of well construction issues;
- The source is surface water and any confirmation sample(s) indicate the presence of total coliforms or *E. coli*;
- Positive total coliforms or *E. coli* sample results following well disinfection; or
- The supply has been under repeat boil water advisories.

The action plan shall be prepared by a professional (e.g. well driller, water quality specialist, engineer, licensed hydrogeologist, etc.) however, it is ultimately the responsibility of the owner to ensure that it is complete and received by NSE within 30 calendar days of the initial bacteriological notification unless otherwise advised by NSE. The plan shall include, at a minimum, the following information:

a) Determine the source of the contamination;

b) Select a corrective action(s) to remove the source of contamination, provide treatment or switch to an acceptable alternate potable water supply. When an alternate water supply is recommended, it is important to ensure the microbiological safety of the supply before use;

c) Provide a schedule for implementation;

d) Provide any water quality data received.

The proposed action plan must be acceptable to NSE. The acceptance of the proposed action plan does not preclude the owner from having to take additional corrective measures if the proposed action plan is unsuccessful at remediating the problem.

Where corrective measures have failed to remediate water quality, the owner shall re-submit a new corrective action plan. On-going problems related to the presence of total coliform or *E. coli* bacteria shall require treatment pursuant to Section 34 of the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations.

5. Boil Water Advisories

5.1 Deficiencies that Require a Boil Water Advisory

1) Presence of total coliforms or *E. coli*.

2) Lack of disinfection, where required.

3) Ineffective disinfection, where required, due to high turbidity or high chlorine demand.

4) Suspected cross-connection or negative pressure.

5) Other circumstances which in the opinion of NSE or the MOH constitutes a risk to public health (e.g. *Giardia*, *Cryptosporidium* contamination, etc.).

6) Evidence of an outbreak of waterborne illness as determined by the MOH (the risk to young children, elderly and immuno-compromised people is considered in the decision).

7) A serious incident of raw water contamination.

5.2 Boil Water Advisory Protocol and Communication Plan

5.2.1 Initiating the Advisory

Where one or more of the conditions described in Section 5.1 exist, the owner shall initiate a boil water advisory and contact NSE immediately.

Alternatively, if NSE is aware of a potential serious health risk, NSE will advise the water supply owner to initiate a boil water advisory.

During the advisory, there should be frequent communication between NSE and the system owner.

5.2.2 Procedure for Notification

1) The owner shall ensure that proper signage is posted to inform consumers of the advisory. For registered public drinking water supplies that are comprised of a single building, signage shall be posted at each faucet, at a minimum. For registered public drinking water supplies that are comprised of multiple units, notices shall be delivered to each unit and signage shall be posted in conspicuous locations to ensure visibility by all consumers. Signage, acceptable to NSE, is provided in the registered public drinking water supply owner's binder and in Appendix D.

2) If the owner fails to notify consumers, NSE will take appropriate steps to notify the consumers.

3) Signage is to be posted for the duration of the boil water advisory.

5.2.3 Instructions for Boiling and Disinfecting Tap Water

During an advisory it is essential that all water to be used for the following activities be boiled for a minimum of 1 minute after it reaches a rolling boil:

- Drinking;
- Preparing infant formulas;
- Preparing juices and ice cubes;
- Washing fruits and vegetables;
- Cooking;
- Dental hygiene; or
- Any other use that may result in human consumption.

Detailed instructions for boiling and disinfecting tap water during a boil water advisory are included in Appendix B. Instructions for businesses, institutions, manufacturing plants or health care facilities that may have special requirements when a boil water advisory is in effect are provided in Appendix C.

5.3 Removing a Boil Water Advisory

A boil water advisory can only be removed by NSE. Under normal circumstances the boil water advisory will be removed when the following criteria are met:

1) When corrective action has been taken to address the root cause of the contamination (e.g. improvements to well construction, installation or repairs to treatment system where applicable, etc.), and
2) When the *Guidelines for Canadian Drinking Water Quality* for bacteriological quality are met for 2 consecutive sets of samples separated by a minimum of 24 hours. These samples shall be collected, at a minimum, from the sample locations that showed a presence of total coliform or *E. coli* bacteria.

If the advisory is not issued due to the presence of bacteria, NSE may alter the process for removing the advisory so that two samples for bacteria separated by a minimum of 24 hours are not required to lift the advisory. Prior to lifting the advisory, NSE must be satisfied that altering the process will not result in a risk to public health.

After a boil water advisory is removed, an inspector from NSE will conduct a 30-day follow-up sample.

6. Monitoring for Chemical and Physical Quality

6.1 Routine Monitoring – General Chemical and Physical Parameters

The owner shall monitor for general chemical and physical quality. The parameters to be monitored are shown in Table 1 and include inorganic and physical parameters. Not all parameters have health-based objectives outlined in the *Guidelines for Canadian Drinking Water Quality;* some parameters have aesthetic objectives and some parameters have no guideline values but provide important water quality characterization information.

The following parameters are considered to be minimum requirements. Surface water supplied systems are required to conduct additional monitoring as outlined in section 6.2.

Table 1. General Chemical and Physical Parameters

Alkalinity	Colour	pH
Aluminum	Conductivity	Potassium
Ammonia	Copper	Selenium
Antimony	Fluoride	Sodium
Arsenic	Hardness	Strontium
Barium	Iron	Sulphate
Boron	Lead	Total Dissolved Solids
Cadmium	Magnesium	Total Organic Carbon
Calcium	Manganese	Turbidity
Chloride	Nitrate	Uranium
Chromium	Nitrite	Zinc

If there is reason to suspect the presence of other substances not listed in Table 1, NSE may direct an owner to monitor for these substances to ensure that their concentrations are below the acceptable limits as defined in the *Guidelines for Canadian Drinking Water Quality*, latest edition.

6.1.1 Sample Frequency, Number and Location

Surface water supplies shall be monitored at least annually and groundwater supplies shall be monitored at least once every two years. If a treatment device is in place to remove any chemical or physical substances, two samples shall be collected; one sample from the raw water source and one sample from a point after treatment. Sampling locations shall be chosen to be representative of the system and the same sample points shall be used during each sampling event.

In many cases, it may be necessary to sample more frequently to obtain an accurate representation of the water quality of the supply.

NSE may alter the frequencies, locations, numbers and parameters to be monitored depending on local conditions, analytical results or changes to the *Guidelines for Canadian Drinking Water Quality*.

6.1.2 Sample Collection and Preservation

An owner shall collect samples for chemical and physical quality in accordance with the instructions provided by the water testing laboratory.

The owner shall record the water supply registration number on the lab form when submitting all samples for chemical and physical quality analyses.

6.1.3 Reporting of Sample Results

An owner shall ensure that the results of samples for chemical and physical quality are sent from the lab to the owner. Results should be recorded with the sample date, parameter and concentration in a chronological and organized manner. Results shall be maintained on-site at the registered public drinking water supply for review by inspection staff during an audit.

1) The owner shall maintain records of sample results, including the original lab records, for a minimum of ten years from the date of collection.
2) Whenever a sample exceeds a maximum acceptable concentration (MAC), the lab shall immediately notify NSE and forward the results to NSE. Upon receipt of sample results exceeding a MAC, the owner shall immediately notify the local NSE office by telephone and forward a copy of the results to NSE. All results sent electronically from the owner must be confirmed with NSE by telephone. If the owner is not able to speak with a person from the NSE office directly, the owner shall call the after-hours number at 1-902-893-6347. The after-hours number shall be contacted outside of normal business hours: weekdays – 4:30pm to 8:30am, weekends and holidays
3) Upon receipt of sample results indicating a MAC is exceeded, the owner shall comply with section 7.2. NSE may require the owner to take special precautions to ensure the protection of public health while awaiting the confirmation sample results from the lab.
4) If the confirmation sample result confirms the exceedance of the MAC, the owner, in consultation with NSE, shall take corrective action as outlined in section 7.3.
5) If a "do not use" or "do not consume" advisory is required as determined by NSE and the MOH (refer to section 8.0), the owner shall comply with section 8.1.

Where a treatment device is installed to remove any chemical or physical substances, section 6.1.1 of these *Guidelines* require that two samples be collected when sampling, one sample from the raw water source and one sample from a point after treatment. The requirement to test the raw and treated water does not apply to groundwater supplies that only disinfect to meet bacteriological guidelines for total coliform bacteria and *E. coli*.

6.2 Surface Water Supplies – Additional Monitoring Requirements

An owner of a surface water (e.g. lake, river, stream etc.) supplied system is required to undertake additional monitoring due to the presence of contaminants unique to these types of sources.

6.2.1 Disinfection By-Products (Trihalomethanes and Halo-acetic Acids)

The *Guidelines for Canadian Drinking Water Quality* have established a MAC for two of the most common disinfection by-products (DBPs): trihalomethanes (THMs) and haloacetic acids (HAAs). These compounds form when naturally occurring organic matter found in surface water sources (e.g. river, lake, spring, stream etc.) reacts with chlorine. Chronic (long-term) exposure to elevated concentrations of THMs and HAAs can pose a health risk.

As such, non-transient[2] registered drinking water systems relying on the use of surface water and using chlorine as a disinfectant, are required to sample for THMs and HAAs quarterly (every three months) from the furthest point in their system. The four quarterly samples should be averaged and then compared to the MAC. If the averaged result exceeds the MAC, the owner shall notify NSE immediately and take corrective action as outlined in section 7.

6.2.2 Cyanobacterial Toxins

Cyanobacteria, commonly referred to as blue-green algae, are capable of producing toxins that can cause negative health effects in humans. To be protective of public health, owners of surface water supplies shall visually monitor the source water at the intake weekly between May and October. Additional locations for visual inspection can include banks and shorelines.

Early visual signs of a bloom may include water that appears unusually cloudy or the presence of what appears to be fine grass clippings. Colours can range from grey, tan to olive, blue-green to bright blue and red. As the bloom develops, the water may take on a "pea soup" or "spilled paint" appearance. A fresh bloom can smell like newly mown grass; older decaying blooms may smell like rotting garbage.

If an algal bloom is suspected or confirmed visually, the owner shall notify NSE immediately. If a water advisory is issued, the owner shall collect one raw water sample for total microcystins[3] once there are no longer visual signs of a bloom present in the source water and submit the results to NSE. The sample shall be collected from a location inside the building/intake prior to treatment and not directly from the lake if possible.

6.3 Daily Operational Monitoring

An owner using a chemical disinfection system shall monitor daily for the disinfectant residual. Where a chlorine disinfection system is being used, the goal for free chlorine residual should be a minimum 0.2 mg/L at the furthest tap in the system. Higher chlorine residuals may be required by NSE depending on other characteristics of the system but should not exceed 4 mg/L at any time.

Daily disinfection residuals shall be recorded with the sample date and concentration in a chronological and organized manner. Results shall be maintained on-site at the registered public drinking water supply for review by inspection staff during an audit.

6.4 Compliance – Chemical, Physical and Radiological Parameters

Any public drinking water supply in which the level of a substance is confirmed to exceed a MAC, upon sampling, is out of compliance with the health-related criteria specified in the most recent version of Health Canada's *Guidelines for Canadian Drinking Water Quality.* The water supply owner, in consultation with NSE, shall take corrective action as outlined in section 7.

The owner is required to comply with the water advisory notification and removal process, if an advisory is required by NSE, and any directives issued by NSE pursuant to section 122(A) of the Environment Act. Failure to do so may result in enforcement actions.

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2 Non-Transient means a public drinking water supply that provides water to at least 25 of the same persons at least 6 months of the year.

3 Microcystins are a toxin produced by some cyanobacteria for which there is a maximum acceptable concentration for drinking water in the *Guidelines for Canadian Drinking Water Quality*. Only a few specialized laboratories conduct this analysis. Contact NSE for a list of accredited labs.

7. Corrective Actions to be Taken when a Sample Exceeds a Health-Related Chemical Parameter (MAC)

7.1 Notification

The owner shall contact NSE immediately, by telephone, upon receipt of any sample result indicating the exceedance of a health-related chemical parameter (MAC). Results sent electronically from the owner to NSE, must be confirmed with NSE, by telephone. If the owner is not able to speak with a person from the NSE office directly, the owner shall call the after-hours number at 1-902-893-6347. The after-hours number shall be contacted outside of normal business hours: weekdays – 4:30pm to 8:30am, weekends and holidays.

A flowchart to assist owners respond to an exceedance of a health-related chemical parameter is found in Appendix H.

7.2 Confirmation Sample

The owner shall collect a confirmation sample for the parameter immediately upon receiving notification of the sample results from the lab. If a confirmation sample cannot be collected within 24 hours (e.g. weekend, holiday, etc.), the owner shall immediately notify NSE with a proposed sample date. NSE, in consultation with the MOH, may require the owner to take special precautions to ensure the protection of public health while awaiting the sample results from the lab.

a) Confirmation sample is below the MAC

   If the confirmation sample indicates the MAC is not exceeded for the parameter of concern, the owner may return to routine sampling unless indicated otherwise by NSE who may require additional samples be taken to further evaluate the need for corrective action.

b) Confirmation sample exceeds the MAC

   If the confirmation sample indicates that the MAC is exceeded for the parameter of concern, the owner shall notify NSE by telephone immediately after receiving the results from the lab. If the owner is not able to speak with a person from the NSE office directly, the owner shall call the after-hours number at 1-902-893-6347. The after-hours number shall be contacted outside of normal business hours: weekdays – 4:30pm to 8:30am, weekends and holidays. NSE will determine the need to issue a do not consume/do not use advisory. If an advisory is deemed necessary, NSE shall inform the owner and the owner shall issue the advisory in accordance with section 8.

Additionally, the owner shall seek the expertise of a water quality specialist, engineer or hydrogeologist and shall submit a corrective action plan acceptable to NSE as outlined in section 7.3.

7.3 Developing a Corrective Action Plan

If the confirmation sample exceeds the MAC, the owner shall seek expertise from a water quality specialist, an engineer or a licensed hydrogeologist and submit a corrective action plan to NSE outlining measures that will be taken to restore water quality. A form to assist with the preparation of the action plan is found in Appendix K. The action plan shall be prepared by a professional (e.g. water quality specialist, engineer, licensed hydrogeologist, etc.) however it is ultimately the responsibility of the owner to ensure that it is complete and received by NSE within 30 calendar days from when the water supply owner was notified by the lab that the confirmation sample confirmed the MAC exceedance. The plan shall include, at a minimum, the following information:

a) Determine why the water exceeds the MAC;

b) Select a corrective action(s) to remove the source of contamination, provide treatment or switch to an acceptable alternate potable water supply. When an alternate water supply is recommended, it is important to ensure the microbiological safety of the supply before use;

c) Provide a schedule for implementation;

d) Provide any water quality data received.

After implementing the corrective action(s), a water sample must be collected by the owner to demonstrate that the corrective action(s) has successfully reduced the concentration to below the MAC given in the most recent version of the *Guidelines for Canadian Drinking Water Quality.*

If the water sample indicates that the corrective action(s) was not effective to reduce the concentration to below the MAC, the owner shall be required to submit a new corrective action plan acceptable to NSE.

8. Do Not Consume and Do Not Use Advisories

A “do not consume” or “do not- use” advisory is issued in situations where there is a potential or confirmed incident of contamination (natural or man-made) and the contaminant of concern may not be removed or inactivated by boiling; when there is a significant risk from ingestion, dermal contact, or inhalation of the contaminant; or when an unknown or unexpected chemical contaminant is detected in the drinking water system.

A “do not consume” or “do not use” advisory is issued in the following circumstances:

a) The occurrence of an event that may have or has caused massive contamination to the drinking water supply (e.g. oil spill in source water);

b) Exceedance of the maximum acceptable concentration for a chemical contaminant with an acute health effect from short-term exposure;

c) The presence of a chemical contaminant with no established guideline but which may pose a health risk from short-term exposure;

d) Circumstances in the opinion of NSE, in consultation with the MOH, constitute a risk to public health.

A "**do not consume**" advisory is issued where exposure to the contaminant is only a concern through ingestion. This advisory is issued to advise the public to avoid using the water for drinking; preparing food, beverages, or ice cubes; washing fruits and vegetables; dishwashing; oral hygiene and/or any other use that may result in human consumption. Boiling the water will not remove the contaminant.

A "**do not use**" advisory is issued where dermal or inhalation exposure to the contaminant could affect the skin, eyes, and/or nose. This advisory is issued to advise the public to avoid the water for all domestic purposes including all uses identified for a "do not consume" advisory as well as activities such as showering and bathing. Boiling the water will not remove the contaminant.

8.1 Do Not Consume or Do Not Use Advisory Protocol and Signage

8.1.1 Initiating the Advisory

Where one or more of the conditions described in section 8.0 exist, the owner shall contact NSE immediately to determine the need for the issuance of an advisory. NSE will advise the owner of the type of advisory required.

Alternatively, if NSE is aware of a potential serious health risk, NSE will advise the water supply owner to initiate the advisory.

During the advisory, there should be frequent communication between NSE and the system owner.

8.1.2 Procedure for Notification of the Do Not Consume or Do Not Use Advisory

1) The owner shall ensure that proper signage is posted to inform consumers of the "do not consume" or "do not use advisory". For registered public drinking water supplies that are comprised of a single building, signage shall be posted at each faucet, at a minimum. For registered public drinking water supplies that are comprised of multiple units, notices shall be delivered to each unit and signage shall be posted in conspicuous locations to ensure visibility by all consumers. Signage, acceptable to NSE, is provided in Appendix E and Appendix F.

2) If the owner fails to notify the consumers, NSE will take appropriate steps to notify the consumers.

3) Signage is to be posted for the duration of the advisory.

8.2 Removing the Do Not Consume or Do Not Use Advisory

NSE will remove the “do not consume” or “do not use” advisory in consultation with the MOH when a risk to public health no longer exists. Under normal circumstances, the advisory will be removed when the event that prompted the issuance of the advisory is resolved and this is confirmed through sampling, where appropriate.

The advisory will be removed when one or more of the following is confirmed, as appropriate for the situation:

a) Where there is evidence that the quality of the source water shows no contamination and the drinking water is safe for drinking and other uses;

b) Where there is evidence that the source of the hazardous contaminant has been removed and the distribution system has been thoroughly flushed. Plumbing systems internal to buildings should also be flushed;

c) If the advisory was due to a chemical spill impacting the source of the drinking water supply, when the spill has been cleaned up and a sample(s) has been collected to confirm this;

d) When failures with the treatment process/distribution system have been addressed and operational parameters/samples can confirm this;

e) Once appropriate treatment has been installed to remove or reduce the level of the contaminant and a sample has been collected to confirm this.

After a water advisory is removed, an inspector from NSE will conduct a 30-day follow-up sample.

Appendix A

Sample Collection and Preservation - Microbiological Quality

Container

- Use a sterilized sample bottle containing sodium thiosulfate preservative (a chlorine neutralizer). Bottles are available from some local NSE offices, water quality laboratories, and from some hospitals. A list of approved laboratories is available on our website.
- Keep sample containers clean and free from contamination before and after collecting the sample. Do NOT open them prior to collecting the sample.
- Examine the sample bottle for cracks, a missing seal, or other signs that its sterility may be compromised. If any of these indications are found, discard the bottle and use a suitable one.
- Label the bottle with the water supply owner's name, location of the water source and/or sampling location, date, time, and the facility's registration number.

Disinfect the faucet

- If possible, remove the faucet aerator and disinfect the tap: use 70% isopropyl alcohol or, if the faucet is metal, hold a lighter to the faucet for at least 10 seconds to kill any bacteria that might contaminate the sample.

Flush the System

- Inspect the outside of the faucet. If water leaks around the outside of the faucet, select a different sampling site.
- Remove any aerators, strainers, attachments, or purification devices from the tap.
- If necessary, remove debris and sterilize the faucet outlet, for example by swabbing with a disinfecting wipe.
- DO NOT take samples from a flexible hose or garden hose or outside hose bib. Sample from the cold-water faucets only.
- Allow the water to run for 5 minutes before collection. This will help to remove stagnant water from the system.

Collect the Sample

- If there is a chlorine disinfection treatment unit, measure and record chlorine residual. Normally free chlorine residual is measured; however, total chlorine residuals may be required on occasion. In either case, the chlorine residual should be recorded on the lab requisition form and be marked “F” or “T” to indicate free or total chlorine residual, respectively.
- Before taking the sample, reduce the tap flow rate to approximately the width of a pencil before taking the sample. The flow rate should be low enough to ensure that no splashing occurs as the container is filled. Do not adjust the flow rate while taking the sample. At sampling points where water runs continuously, do not adjust flow rate.
- While holding the sample container at the base, remove the seal around the cap before attempting to open the bottle.
- Remove the cap with the free hand. Be careful NOT TO TOUCH the inside of the bottle cap or bottle lip. Continue to hold the cap in one hand with the inside facing down while the bottle is being filled. Do NOT touch the interior of the cap or lay it down. Do NOT breathe on the bottle or cap.
- Do NOT rinse the bottle.
- Fill the bottle to the fill line. Do NOT allow the bottle to overflow. Carefully replace the cap and shake well to ensure the preservative is dissolved.
- Complete the laboratory requisition form. Include all required information: registration number, sampling location, date, time, etc. and who took the sample. All water samples are to be analysed for total coliform and *E. coli*.

Storage and Transport

- Samples shall be kept in a refrigerator or cooler with ice packs to maintain a temperature below 10°C until delivered to the lab. Samples should not be frozen.
- Transport the sample to the laboratory as soon as possible and within 24 hours of collection. Check ahead with the lab about day and/or time deadlines for sample acceptance to ensure meeting the 24-hour criterion.

Appendix B

Instructions for Boiling and Disinfecting Tap Water During a Boil Advisory

During an advisory, it is essential that all water to be used for the following activities be boiled for at least one minute after it reaches a rolling boil:

- Drinking;
- Preparing infant formulas;
- Preparing juices and ice cubes;
- Washing fruits and vegetables;
- Cooking;
- Dental hygiene; or
- Any other activity that may result in human consumption.

Holding water at a rolling boil for at least 1 minute will inactivate all waterborne pathogenic micro-organisms. Water can be boiled either in a pot or kettle on a stove, an electric kettle without an automatic shut-off or in a microwave oven. If water is boiled in a microwave, it is advisable to include a glass rod or wooden or plastic stir stick in the container.

Under most circumstances it is not necessary to boil water used for other household purposes. Adults, adolescents and older children may shower, bathe or wash using tap water but should avoid swallowing the water. Toddlers and infants should be sponge bathed. In non-outbreak situations, dishes and laundry may be washed in tap water, either by hand or by machine.

In the event of a waterborne outbreak as declared by the Medical Officer of Health, it may be necessary to advise the public to take additional precautions. In this situation, hands can continue to be washed with tap water utilizing proper handwashing technique, followed by the use of an alcohol-based hand sanitizer containing more than 60% alcohol. Alcohol based hand sanitizers should be rubbed into all areas of the hands until hands are dry. Hands should not be towel dried. If dishes are washed by hand they should be washed and rinsed in hot tap water, soaked in a dilute solution of household bleach (20 mL of unscented bleach in 10 L of water) for one minute and air dried. Alternatively, dishwashers with a hot water (final rinse temp 82°C) or sanitizing cycle will disinfect dishes. During an outbreak, it is advisable to provide pets with boiled water that has been cooled as they can transmit waterborne disease organisms to humans.

Additional instructions for businesses, institutions, manufacturing plants or health care facilities that may have special requirements when a boil water advisory is in effect are provided in Appendix C.

Appendix C

Users That Must Take Particular Precautions During A Boil Advisory

a) Commercial Establishments (Restaurants, Hotels, etc.)

- All water that is to be provided directly to customers for drinking purposes must be treated by boiling the tap water for at least 1 minute, after it reaches a rolling boil, and then storing the water in clean, covered containers until used for serving. An alternative to this would be using commercially available "bottled water" from a supplier who is a member of the Canadian Bottled Water Association (CBWA) or the International Bottled Water Association (IBWA). Commercial coffee machines that achieve boiling temperatures as part of their design are exempt (see Notes).
- All foods (e.g. fruits and vegetables) that need washing are to be rinsed or soaked in tap water that has been boiled for at least 1 minute, after it reaches a rolling boil. An alternative to this would be using commercially available "bottled water" from a supplier who is a member of the Canadian Bottled Water Association (CBWA) or the International Bottled Water Association (IBWA).
- Tap water used as an ingredient in any food product that will be "ready to eat" without cooking (e.g. drink mixes, pudding, jellos, etc.) must be boiled for at least 1 minute, after it reaches a rolling boil. An alternative to this would be using commercially available "bottled water" from a supplier who is a member of the Canadian Bottled Water Association (CBWA) or the International Bottled Water Association (IBWA).
- Ensure that food handlers wash and rinse hands in water that has been treated with chlorine bleach.
- It is not necessary for bakeries to boil water that is part of a recipe or ingredient in a product that is to be baked. Water for other uses must be boiled.
- Disconnect ice machines and discard any ice and crushed ice products that has been made from this ice. All ice used during the boil water advisory must originate from tap water that has been boiled for at least 1 minute, after it reaches a rolling boil, or from a commercial ice supply distributor. Ice machines at the establishment must be emptied and not used for the duration of the boil water advisory. Lines to ice machines must be disinfected prior to reuse.
- All soft drink beverage lines connected directly to tap water for mixing must be disconnected for the duration of the boil water advisory. Use bottled water or canned beverages exclusively. Lines to soft drink canisters must be disinfected prior to reuse.
- Disconnect water vending machines unless the water is treated by an approved method. Disinfect lines prior to reuse.
- Disconnect vegetable spraying/sprinkler supplies. Disinfect lines prior to reuse.
- Commercial dishwashers that use hot water 82°C or above are considered satisfactory. Beverage glass washers that utilize a "cold" water rinse must not be used unless the rinse water can be changed to use hot water 82°C or above. For manually washed dishes, it is important that the sanitizer concentration be a minimum of 100 parts per million of chlorine. It is also important that dishes are allowed to air dry. Do not rinse with tap water.

- Use boiled water in all other uses in the kitchen such as washing and sanitizing cutting boards, counter tops, etc.
- All employees reporting that they are suffering from a diarrheal illness must be excluded from work and should be tested by their family doctor. They are not to return to work until symptoms have subsided. Good hand washing should be emphasized for all staff.

Notes: Commercial coffee brewers generally operate at a brew temperature of 88°C - 90°C with this temperature being maintained in the water tank. Brewing is achieved by displacement of the hot water with cold water within the tank. The temperature attained by the hot water will control bacterial and protozoic organisms of concern during a boil water advisory. The temperature of the water should be verified using a metal stem probe thermometer by running a full cycle of the brewer with water, taking the temperature at a point below the funnel when the decanter is half full. The temperature at this point should be 72°C or higher.

The decanter used for filling the brewer with water should not be used for receiving the coffee before being washed and sanitized.

This exemption is not applicable to non-commercial or domestic type coffee brewers as there may be wide variations of temperatures in these machines.

Upon rescinding of a boil water advisory:

- Re-start and flush any water-using fixture or piece of equipment in accordance with the manufacturer's specifications. This may vary from fixture to fixture. Consult your facility engineer and/or manufacturer when restarting the equipment.
- Managers of large buildings with water-holding reservoirs should consult with their facility engineer about draining the reservoir.
- Follow the directions of your water utility or, as general guidance, run cold water faucets and drinking fountains for 3 minutes each.
- Run water softeners through a regeneration cycle.
- Drain and refill hot water heaters if set at a low temperature (below 64.2°C) taking all necessary precautions to avoid electrical shocks.
- Consult your facility engineer regarding pool and/or whirlpool operations.

b) Food Production

- **Dairy Plants -** The contaminated water must not contact products following the pasteurization procedure and water used in clean-in-place procedures and in cleaning of product related equipment must be properly chlorinated.
- **Bottling Plants -** Pre-superchlorination and chlorine removal must be a part of production procedure.
- **Ice Making -** It is prohibited to make ice for domestic purposes or for cooling or preservation of food for the duration of the boil water advisory unless the water has undergone proper treatment to inactivate microbial pathogens.

c) Hospitals, Clinics, Long Term Care Facilities, Nursing Homes, etc.

- Boil water or use an acceptable alternate potable water supply in all applications of tap water intended for human consumption or treatment procedures where a risk of infection is possible. **Assess all water usage in consultation with infection control personnel.**
- Patients and employees should not consume tap water that has not been disinfected, ice or drinks made with tap water that has not been disinfected, or raw foods rinsed with tap water that has not been disinfected.
- Disconnect ice machines and discard any ice and crushed ice products that have been made from this ice. All ice used during the boil water advisory must originate from tap water that has been boiled for at least 1 minute, after it reaches a rolling boil, or from a commercial ice supply distributor. Ice machines at the establishment must be emptied and not used for the duration of the boil water advisory. Lines to ice machines must be disinfected prior to reuse.
- For other food preparation and hand washing guidance, refer to the information provided under paragraph a) "commercial establishments".
- Disinfect water by:
    - Boiling at a rapid, rolling boil for 1 minute; or
    - Filtering through a reverse osmosis filter, an "absolute 1 micron" filter.
- An alternate to this would be using commercially available "bottled water" from a supplier who is a member of the Canadian Bottled Water Association (CBWA) or the International Bottled Water Association (IBWA).
- All employees reporting that they are suffering from a diarrheal illness must be excluded from work and should be tested by their family doctor. They are not to return to work until symptoms have subsided. Good hand washing should be emphasized for all staff.
- Restrict burn patients and patients with open sores or wounds from whirlpool treatments.
- Monitor patients closely for signs and symptoms of gastrointestinal illness.
- Sanitize dishes by washing in dishwashing machines that have a hot water cycle at 82°C or above. For manually washed dishes, it is important that the sanitizer concentration be a minimal of 100 parts per million of chlorine. It is also important that dishes are allowed to air dry. Do not rinse with tap water.

Notes: Renal dialysis units are routinely treated with water using reverse osmosis. This is considered an acceptable treatment process for publicly supplied water under a boil water advisory.

Upon rescinding of a boil water advisory:

- Re-start and flush any water-using fixture or piece of equipment in accordance with the manufacturer's specifications. This may vary from fixture to fixture. Consult your facility engineer and/or manufacturer when restarting the equipment.
- Managers of large buildings with water-holding reservoirs should consult with their facility engineer about draining the reservoir.

- Follow the directions of your water utility or, as general guidance, run cold water faucets and drinking fountains for 3 minutes each.
- Run water softeners through a regeneration cycle.
- Drain and refill hot water heaters if set at a low temperature (below 64.2°C) taking all necessary precautions to avoid electrical shocks.
- Resume usual bathing practices and care for patients with breaks in the skin.
- Consult your facility engineer regarding pool and/or whirlpool operations.

d) Day Care Facilities

- Day care facilities in areas where a boil water advisory is in effect should be contacted and advised to use boiled or disinfected water for drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables and for all hand washing and dental hygiene.
- Children and employees should not consume tap water that has not been disinfected, ice or drinks made with tap water that has not been disinfected, or raw foods rinsed with tap water that has not been disinfected.
- Disinfect water by:
    - Boiling at a rapid, rolling boil for 1 minute; or
    - Filtering through a reverse osmosis filter, an “absolute 1 micron” filter.
- An alternate to this would be using commercially available “bottled water” from a supplier who is a member of the Canadian Bottled Water Association (CBWA) or the International Bottled Water Association (IBWA).
- All employees reporting that they are suffering from a diarrheal illness must be excluded from work and should be tested by their family doctor. They are not to return to work until symptoms have subsided. Good hand washing should be emphasized for all staff.
- Sanitize dishes by washing in dishwashing machines that have a hot water cycle at 82°C or above. For manually washed dishes, it is important that the sanitizer concentration be a minimum of 100 parts per million of chlorine. It is important that dishes be allowed to air dry. Do not rinse with tap water.

Upon rescinding of a boil water advisory:

- Re-start and flush any water-using fixture or piece of equipment in accordance with the manufacturer’s specifications. This may vary from fixture to fixture. Consult your facility engineer and/or manufacturer when restarting the equipment.
- Managers of large buildings with water-holding reservoirs should consult with their facility engineer about draining the reservoir.

- Follow the directions of your water utility or, as general guidance, run cold water faucets and drinking fountains for 3 minutes each if they have not been used in the last 24 hours.
- Run water softeners through a regeneration cycle.
- Drain and refill hot water heaters if set at a low temperature (below 64.2°C) taking all necessary precautions to avoid electrical shocks.

e) Dental Offices

- Dentists, in areas where a boil water advisory is in effect, should be contacted and advised to use boiled or bottled water for patients to drink or rinse and for all hand washing.
- It is also recommended that the high/low speed turbines run dry and a hand syringe of boiled water or sterile saline be used for cooling/rinsing the tooth and/or oral tissues.
- Regular hand piece maintenance (i.e. boiling and sterilizing) should continue per the manufacturer's instructions.
- To avoid any potential risk of contamination from the water supply that could occur from and during inadvertent use of dentist equipment with contaminated water during the advisory, dentists are advised to turn off the water supply to their dental units and sinks. If this is not possible, covering or taping the controls or outlets may be indicated (e.g. triplex syringe, water dispenser, cavitron, etc.).

f) Water Vending Outlets (Includes Wine and Beer Vending)

Assess each system individually.

Appendix D Boil Water Advisory Signage

BACTERIAL CONTAMINATION

NOTICE / AVIS

BOIL BEFORE CONSUMPTION

Due to water quality problems and the possibility of unsafe water, consumers are advised to boil the water for at least one minute, after it reaches a rolling boil, before using the water for any purpose that may result in consumption such as drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables, cooking, or dental hygiene, etc. This is to be done until further notice.

FAIRE BOUILLIR AVANT DE CONSOMMER

En raison de problèmes de contamination, l'eau prévue pour la consommation doit être bouillie pour au moins une minute. Ceci inclut l'utilisation d'eau pour la nourriture, les préparations pour nourrissons, le jus ou les glaçons, le nettoyage et la cuisson des fruits et légumes, l'hygiène dentaire ou toute autre activité pouvant entraîner la consommation.

CONTAMINATION BACTÉRIENNE

Appendix E Do Not Consume Water Advisory Signage

CHEMICAL CONTAMINATION

NOTICE / AVIS

DO NOT CONSUME

Due to water quality problems and the possibility of unsafe water, consumers are advised not to use their water for any purpose that may result in consumption such as drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables, cooking, dental hygiene or any other activity that may result in human consumption. This is to be done until further notice. Boiling the water will not remove the contaminant.

NE PAS CONSOMMER L'EAU

En raison de problèmes de contamination, la consommation d'eau est présentement interdite. Ceci inclut l'utilisation d'eau pour la nourriture, les préparations pour nourrissons, le jus ou les glaçons, le nettoyage et la cuisson des fruits et légumes, l'hygiène dentaire ou toute autre activité pouvant entraîner la consommation. L'ébullition ne peut pas éliminer le contaminant.

CONTAMINATION CHIMIQUE

Appendix F Do Not Use Water Advisory Signage

CHEMICAL CONTAMINATION

NOTICE / AVIS

DO NOT USE

Due to water quality problems and the possibility of unsafe water, consumers are advised not to use their water for any purpose that may result in consumption such as drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables, cooking and dental hygiene, etc. Residents are also advised not to use the water for showering or bathing. This is to be done until further notice. Boiling the water will not remove the contaminant.

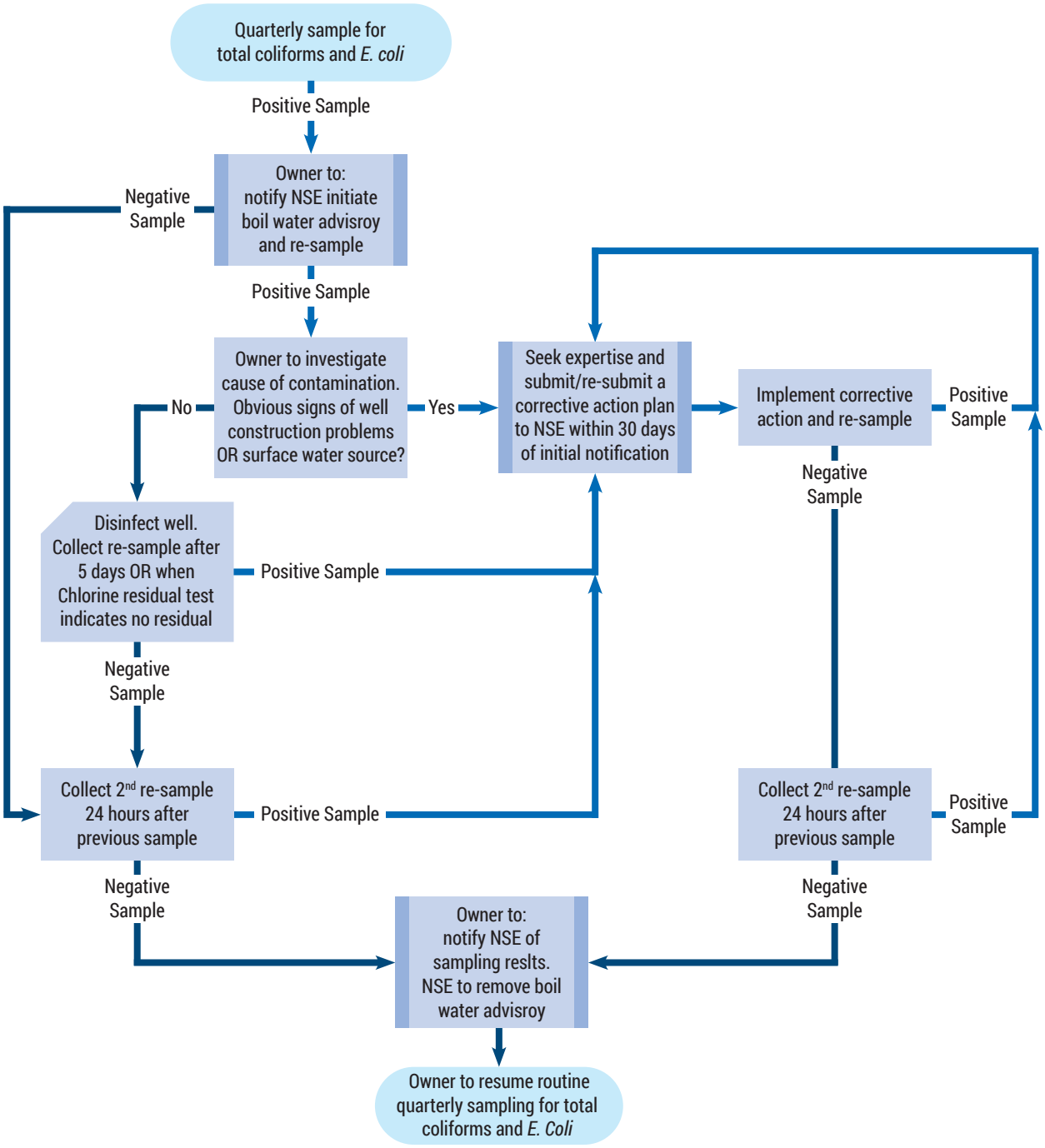
NE PAS UTILISER L'EAU

En raison de problèmes de contamination, la consommation d'eau est présentement interdite. Ceci inclut l'utilisation d'eau pour la nourriture, les préparations pour nourrissons, le jus ou les glaçons, le nettoyage et la cuisson des fruits et légumes, l'hygiène dentaire ou toute autre activité pouvant entraîner la consommation. L'ébullition ne peut pas éliminer le contaminant.

CONTAMINATION CHIMIQUE

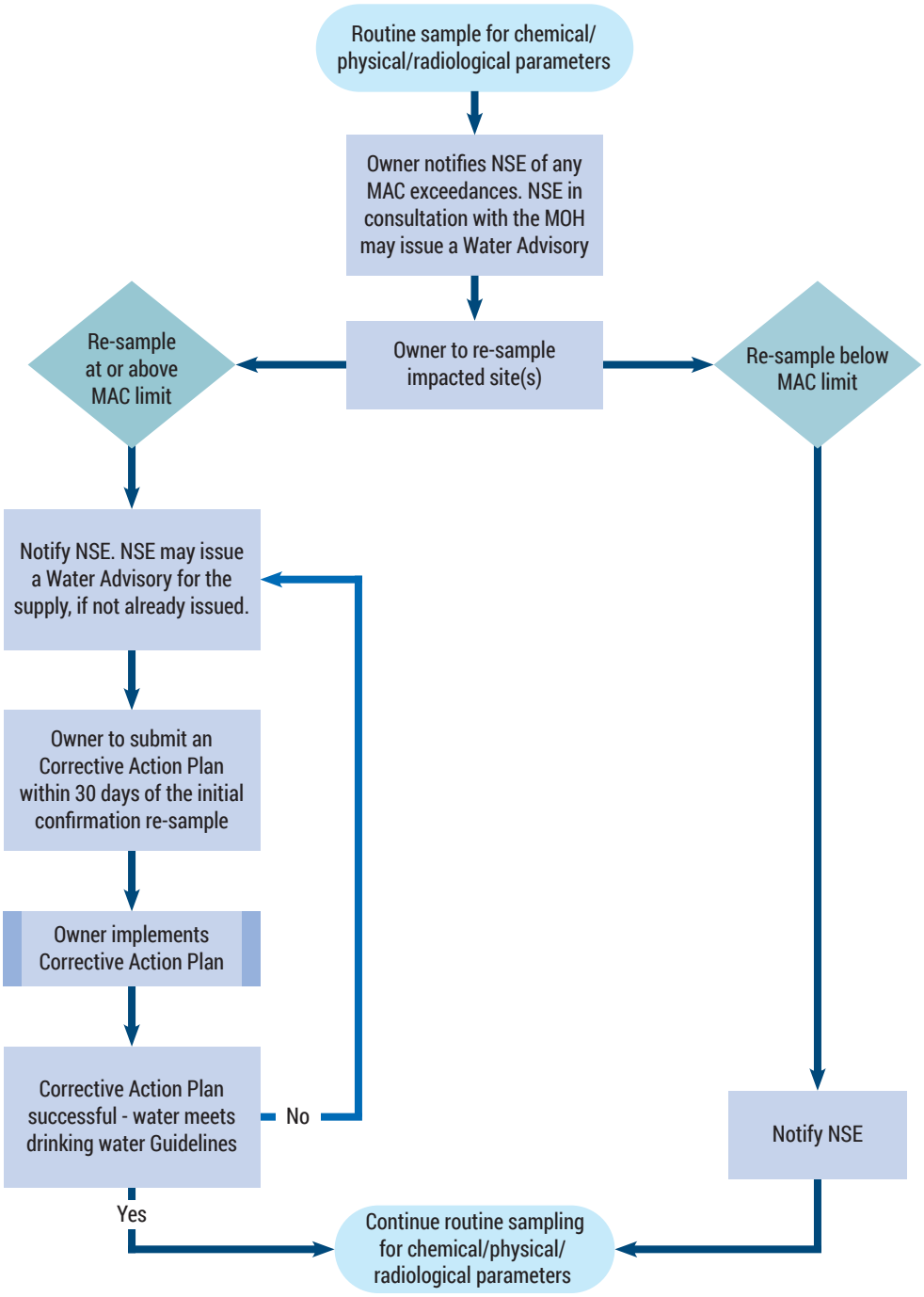
Appendix G

Summary Operational Procedures for Registered Supplies Presence of Bacteria (Total Coliforms or *E. coli*)



Appendix H

Summary Operational Procedures for Registered Supplies Chemical/Physical/Radiological Exceedance



Appendix I

Risk Identification Checklist
for Microbiological Contamination

NOVA SCOTIA

Well characteristics

Type of Well (Dug or Drilled, if other please describe):

_____

Age of Well (if known): _____ Well Log # (If known): _____

Well conditions –obvious signs of well construction problems

- ❑ Well cap is secure, vermin-proof, and waterproof
- ❑ Gaskets are in place and in good condition to seal all openings into the well
- ❑ No visible cracks observed (well cap, screen, casing, crocks)
- ❑ Screen is in place in the well vent
- ❑ Casing of a drilled well or crock of a dug well is at least 152 mm above ground
- ❑ Dug well concrete cap is at least 75 mm thick and is sealed on top of crocks
- ❑ Dug well is not rock lined (visible components)
- ❑ The ground is mounded around well head to direct water flow away from the well

Location Factors for Potential Microbiological Contamination

Location of well head:

- ❑ Not buried
- ❑ Not in basement
- ❑ No other locations of concern.
  Otherwise describe (near roof drain, in driveway etc.): _____
- ❑ No other wells on site or nearby.
  Otherwise describe (in use, abandoned, decommissioned, etc.): _____

On-site septic system:

- ❑ Dug well is greater than 30 m from on-site septic system
- ❑ Drilled well is greater than 15 m from on-site septic system
- ❑ No visible signs of a malfunctioning on-septic system nearby
- ❑ Dug or drilled well is not hydraulically downgradient of a nearby on-site septic system

Distance to closest watercourse, ditch or other surface water runoff location:

- ❑ Greater than 60 meters

Risk Identification Checklist
for Microbiological Contamination

NOVA SCOTIA

Land use:

- ❑ Well is not located adjacent to areas of agricultural activities
- ❑ Livestock are not present at the property, or adjacent properties, or if present do not have access near the well head (within 15 m of drilled wells or 30 m of dug wells)
- ❑ Pets are not present at the property, or adjacent properties, or if present do not have access near the well head (within 5 m)
- ❑ Manure fertilizer has not been recently applied to home gardens or lawn in the vicinity of the well head

If a box above is not checked, this indicates a condition or factor exists that may be a source of microbiological contamination Additional on-site septic system investigations should be conducted by an On-site Septic System Qualified Person or P.Eng. Additional investigations related to well conditions, well location or hydrogeological factors should be conducted by a Well Digger or Well Driller holding a relevant Certificate of Qualification, or a Professional Hydrogeologist (P.Geo or P.Eng).

Appendix J

Qualified Persons Report
Water Supply Investigation

NOVA SCOTIA

Qualified Person

Qualified Person: _____ Date: _____

Company Name: _____

Company Address: _____

Telephone: _____ License Number: _____

Well Owner

Well Owner Name: _____

Street Address: _____

Mailing Address: _____ Telephone: _____

Details

1. General Description of User/Owner's Complaint:

   _____

   _____

   _____

2. Present Water Source

   ❑ Drilled Well ❑ Well Point

   ❑ Dug Well ❑ Other (specify) _____

3. General

   (a) When was well constructed? (Provide well log if available) _____

   (b) By whom was well constructed? _____

   (c) For whom was well constructed? _____

   (d) Has water ever been tested for bacteria? ❑ Yes ❑ No

   If yes, by whom? (owner, inspector, etc.) _____

   Approximate date tested _____

   (e) Has water ever been tested for chemical quality? ❑ Yes ❑ No

   If yes, by whom? _____

   Approximate date of testing _____

   (f) Static water level in well _____

(g) Have any water shortages or changes in water quality been experienced recently? ❑ Yes ❑ No

If yes, describe _____

(h) Any other problems with the water supply?

_____

_____

(i) Provide a description of water system. (e.g. type of pump, pressure tank, pressure switch setting, treatment units and previous changes or repairs to the system)

_____

_____

_____

_____

_____

(j) Depth of intake (pump setting) in well _____

(k) If the pump and associated piping have been removed from the well, measure any zones of iron/manganese staining indicating seasonal high and low water levels

_____

_____

(l) Size and type of water storage tank _____

4. If Dug Well:

(a) Depth of well _____

(b) Diameter of well _____

(c) Well yield at time of construction _____

(d) Construction of well:

❑ Well crocks on top of rock ❑ Rock lined well only

❑ Well crocks only ❑ Other (specify) _____

(e) Are joints between crocks sealed? _____

(f) Does well have cover? _____

If so, specify type (e.g. wooden, concrete) _____

(g) How far above ground surface is top of well? _____

(h) Does well have concrete apron? _____

(i) How much water used so far today? _____

5. If Well Point: (a) Diameter _____
   (b) Depth _____

6. If Drilled Well: (a) Well depth _____
   (b) Well diameter _____
   (c) Well yield at time of construction _____
   (d) Depth of casing _____
   (e) Does the well have a pitless adapter/sanitary seal? _____
   (f) Does the well have a vent? _____
   (g) Where is the vent located? _____
   (h) Is top of the well above ground, in a separate building, underground or in home?
   _____
   (i) Any problems in the last five years which required repair by the well contractor?
   ❑ Yes ❑ No
   If yes, specify problem(s)
   _____
   _____
   _____
   _____

7. On-site Sewage Disposal System:

   (a) Provide details on the system construction and installation date.

   _____
   _____
   _____
   _____
   _____

   (b) Has the system been properly maintained?

   _____
   _____
   _____
   _____
   _____

(c) Are there any obvious signs the system may be malfunctioning?

(d) What is the distance to the well from the septic tank and disposal field?

(e) Is the well up gradient or down gradient of the on-site sewage disposal system?

8. Pump Testing

Provide draw down and recovery records (and pumping rate) if a pump test has been conducted. Pumping should continue for a minimum of 1 hour if possible, even if the water level stabilizes prior to that time, and a recovery period of 1 hour should be used. Prior to start of pump test at least three static water level measurements (0, 5, and 10 minutes) must be recorded to verify true static level. Also indicate location of measuring point.

9. Summary of water quality/well yield investigation (e.g. is the problem attributable to the well construction, pumping equipment or the on-site sewage disposal system?)

10. **Qualified Person Recommendations** (attach well log/sketch if available)

I certify the information contained in this report is accurate and true to the best of my knowledge, information and belief.

Qualified Persons Signature _____ Date: _____

Well Owners Signature _____ Date: _____

Action Plan Checklist

for Registered Public Drinking Water Supplies – Chemical/Physical/Radiological Exceedance

NOVA SCOTIA

Appendix K

Supply information

Supply Name: _____ Registration #: _____

Location: _____ Contact Person: _____

Contaminant Information (Attach lab results)

Parameter (list)	1)	2)	3)
Guideline - MAC (mg/L)			
Sample 1 - Initial Result (mg/L)			
Sample 2 - Confirmation Sample Result (mg/L)			

Identify Cause (Check)

- ❑ Contaminant source near the water supply (e.g. oil spill septic, etc.) Describe _____
- ❑ Naturally occurring contaminant
- ❑ Well construction problem Describe _____
- ❑ Other Describe _____

Corrective Action (Check)

- ❑ Remediate contaminant source Describe _____
- ❑ Well construction modifications Describe _____
- ❑ Water treatment Describe _____
- ❑ Switch to another source Describe _____
- ❑ Other Describe _____

Schedule

Date the action plan will be completed by: _____

Post - Corrective Action Sample (attach lab results)

Post corrective action sample to be collected for: (List parameters) Date sample will be collected: _____

_____

_____

* If the confirmation re-sample exceeds the MAC, an action plan is required.

Appendix L

Disinfection of Water Wells by Chlorination

Chlorination, or “shock chlorination”, is the process of flushing your well and water system with a chlorine solution to Kill bacteria and other microorganisms. Disinfection by chlorination is usually recommended if a water sample from the well has tested positive for bacteria. It is an effective method to eliminate a “one-time” case of bacterial contamination; however, if there is an on-going problem related to faulty well construction or contaminated groundwater, disinfection is only a temporary fix and the problem should be investigated and corrected at the source.

How do I disinfect my well?

It may take up to 24 hours to complete the disinfection process. Before you begin, make sure you store enough water to meet your household needs during this period. If you have a water softener or other treatment units, check with your treatment dealer whether disinfection could adversely affect the unit or not.

Step 1

Mix the amount of liquid bleach shown in Table 1-1 for your well in 1 O to 20 litres (2 to 5 gallons) of water. Use common, unscented household bleach that does not contain detergent or other additives such as fabric-guard. Chlorine can be dangerous if not used properly. Always follow the directions on the label for safe storage, handling and use.

Step 2

Remove the well cap and pour the mixed chlorine solution into the well. If the well is buried with the old type of well seal top, either expose the top of the well, remove the well seal and pour the solution directly into the well, or pour the solution through a clean funnel into the air vent or siphon through the vent (flush the air line with clean water after chlorination).

Step 3

Open one faucet in the system and let the water run until the chlorine odour is detected. Turn this faucet off. Repeat at each faucet in the system in turn, one at a time, until all faucets have been completed (include inside and outside faucets, cold and hot water, dishwashers, toilets, baths, showers, sin Ks, etc.).

Step 4

If possible, connect a garden hose to a nearby tap and place the other end in the well. Tum on the tap and allow the water to circulate for about one hour to ensure that the chlorine is thoroughly mixed in the well. During this process, add additional chlorine solution if the chlorine odour is not strong. Note that although recirculation is desirable if possible, it may not be appropriate in wells with screens, gravel packs, heavy iron buildup, soft or caving zones, and other less common conditions. If you have any concerns, contact your local Department of Environment and Labour Office or a certified contractor for information.

Step 5

Seal the top of the well and let the system sit idle for about 12 hours, preferably overnight. Do not leave chlorine for more than 24 hours as it may affect some pump parts.

Step 6

After this time, flush the system by discharging the chlorinated water through an outside tap until the chlorine odour has completely disappeared. Pump at a low rate, in the order of 10 litres per minute (2 gallons per minute) or less. This procedure may take several hours, or longer. IF you have a low yield well, you may have to allow the well to recover between pumping periods. During the flushing process, do not discharge the chlorinated water to a natural water body (such as streams or lakes, etc.) or to areas Where it can harm desired vegetation (e.g., vegetable gardens, landscaped areas, etc.). Do not discharge this water into the on-site sewage disposal system.

Sampling after Disinfection

After disinfection, sample the water for total coliform and *E. coli* bacteria to confirm that the water is safe to drink. Wait about 5 days after disinfection before sampling. While waiting for the results, any water for human consumption should be boiled (rolling boil) for at least 1 minute, or use an alternative source.

IF the sample result indicates that both coliform bacteria and *E. coli* are absent, confirm that disinfection has been effective by 2 additional samples, one in the next 2 to 4 weeks, another after 3 to 4 months. To check the safely of your water over the long term, continue to monitor bacterial quality at least twice a year, or more often if you suspect any changes in your water quality.

IF the sample result indicates either coliform bacteria and/or *E. coli* present, it is recommended that the well owner seek advice from the Department of Environment and Labour or a certified professional. In the meantime, continue to use boiled water or an alternative source for human consumption activities.

Final Notes

You may experience some temporary inconveniences as a result of the disinfection process such as dirty or discoloured water, staining, or sedimentation problems. However, the water should clear with time. In some cases, a few days may be necessary. Do not use the water for aquariums or pets durinQ this time. Check with your physician about other uses of the water, such as bathing. if you have allergies or other medical concerns.

Note that under some conditions, such as biofilm buildup in a well, more than one disinfection may be required.

If you have any questions about disinfecting your well, contact your local Department of the Environment district office.

Table 1-1

Depth of water in well		Amount of unscented household bleach[1]	
		Drilled Well	Dug Well
metres	feet	Casing Diameter 15 cm (6 inches)[2]	Casing Diameter 92 cm (36 inches)[2]
1	3	40 mL	1.5 L
3	10	120 mL	4.5 L
5	15	200 mL	7.5 L
10	30	400 mL	15.0 L
30	100	1.2 L	
50	150	2.0 L	
100	300	4.0 L	

Notes :

[1] Assumes liquid bleaeh with approximately 5.2% hypochlorite. This will produce about 100 mg/L of chlorine solution when mixed with the water in the well.

[2] For wells with other casing diameters, contact your local Department of Environment and Labour Office

Example Calculation for a Drilled Well

Measurement

Well diameter = 150 mm (6 in)

Well depth = 60 m (200 ft)

Depth to water from surface = 10 m (30 ft)

Calculations

Depth of water in well = 60 - 10 = 50 m

or depth of water in well = 200 - 30 = 170 ft

From Table 1-1, required volume of bleach to get 100 mg/L solution is about 2 litres

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