

Harmful Algal Bloom Plan Guide

for Owners and Operators of Municipal Residential Drinking Water Systems

Version History

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Copies of this guide can be obtained from:

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Overview

Owners of municipal residential drinking water systems that obtain water from one or more surface water source are required, through conditions in their municipal drinking water licence, to develop and implement a harmful algal bloom plan. The plan is necessary to maintain the safety of drinking water when a harmful algal bloom occurs or is suspected in an area that may impact the operation of the drinking water system.

About the Guide

Blue-green algae are microscopic, plant-like organisms that occur naturally in ponds, rivers, lakes and streams. Blue-green algae are not normally visible in the water, but populations can rapidly increase to form a large mass or scum called a bloom when conditions are favourable.

Owners and operators of municipal residential drinking water systems are required to develop comprehensive harmful algal bloom monitoring, reporting and sampling plans to keep drinking water safe from the potential impacts of blue-green algae. This document outlines the information that must be considered when such a plan is developed or updated and provides guidance on preparing a plan based on the type of system and historic results of sampling / monitoring for harmful algal blooms.

Objective of the Plan

In the context of a municipal residential drinking water system, visual observation of the source water will typically provide the earliest indication of an algal bloom before it begins to impact raw water entering the system. Implementation of the Plan should follow precautionary principles and treat all algal blooms as harmful until sample results indicate otherwise. This approach can significantly decrease the time between identification and actions necessary to protect public health when a Harmful Algal Bloom could impact drinking water system operations.

Licence Conditions

Conditions relating to the Plan will typically be found in Schedule C of a Municipal Drinking Water Licence issued to a municipal residential drinking water system that uses surface water as a source of drinking water.

An example of typical licence conditions is included below. Please note that individual licence conditions may vary.

Example: Condition 7 in Schedule C of a Municipal Drinking Water Licence:

7.0 Harmful Algal Blooms

- 7.1** The owner shall develop and keep up to date a Harmful Algal Bloom Monitoring, Reporting and Sampling Plan (herein known as the “Plan”) that, at a minimum:
- 7.1.1 Meets the requirements set out in the Ministry document titled Harmful Algal Bloom Guide, dated <DATE>;
 - 7.1.2 Is updated within 12 months of any update to the guide described in condition 7.1.1;
 - 7.1.3 Is maintained in a format that is available onsite at the drinking water system, for inspection upon request by Ministry staff; and,
 - 7.1.4 Is implemented each year for the period identified within the Plan.
- 7.2** The owner must ensure that all relevant drinking water system staff are provided with training on the Plan each year, prior to the period described in the Plan.
- 7.3** When a Harmful Algal Bloom is suspected or occurring:
- 7.3.1 Water samples must be:
 - a) Collected at least once per week from locations identified in the Plan, or otherwise as directed by the Ministry or the medical officer of health;
 - b) Repeatedly collected until 3 consecutive samples have shown non-detection of microcystin and the algal bloom is no longer suspected or visually observed; and,
 - c) Submitted to a laboratory licensed to perform ELISA testing for total microcystin.
 - 7.3.2 The bloom must be reported to the local medical officer of health and the Ministry in accordance with procedures outlined in the Plan.

Terms and Definitions

For the purposes of a harmful algal bloom monitoring, reporting, and sampling plan:

“**CWA**” means the [Clean Water Act, 2005, S.O. 2006, c. 22](#).

“**Confirmed Bloom Event**” means a harmful algal bloom that is occurring or has occurred within the areas identified within the Plan and microcystin has been detected in a raw or treated water sample, or identification of cyanobacteria has been determined through optical probes or other analytic techniques used by the drinking water system.

“Drinking Water Works Permit” means a permit issued under Part V of the [SDWA](#) to the Owner of a municipal residential drinking water system.

“Intake Protection Zone (IPZ)” has the same meaning as in the [CWA](#).

“IPZ-1” has the same meaning as in the [2021 Technical Rules under the CWA](#), as updated from time to time.

“IPZ-2” has the same meaning as in [the 2021 Technical Rules under the CWA](#), as updated from time to time.

“Harmful Algal Bloom” or “HAB” means an overgrowth of aquatic algal bacteria that produce or have the potential to produce toxins in the surrounding water when the algal cells are damaged or die.

“Ministry” means the Ontario Ministry of the Environment, Conservation and Parks or any successor of that ministry.

“Local Ministry Office” means the district office of the Ministry for the location or address of the drinking water system as identified on Ontario.ca (<https://www.ontario.ca/page/ministry-environment-conservation-and-parks-district-locator>)

“Medical Officer of Health” has the same meaning as in the [Health Protection and Promotion Act, R.S.O. 1990, c. H.7](#)

“Municipal Drinking Water Licence” means a licence issued under Part V of the [SDWA](#) to the Owner of a municipal residential drinking water system.

“Owner” means the owner of the drinking water system, as identified in a Municipal Drinking Water Licence.

“Operating Authority” has the same meaning as in the [SDWA](#).

“SDWA” means the [Safe Drinking Water Act, 2002, S.O. 2002, c. 32](#)

“Overall Responsible Operator” has the same meaning as [O. Reg. 128/04 under the SDWA](#).

“Operator-in-Charge” has the same meaning as [O. Reg. 128/04 under the SDWA](#).

“Plan” means a HAB monitoring, reporting and sampling plan required through conditions in a Municipal Drinking Water Licence.

“Suspected or Occurring” means, in the context of a HAB:

- An algal bloom has been observed by the owner or operating authority in an area defined within the Plan;

- The owner or operating authority has received any form of notification related to an algal bloom from the Ministry, a Medical Officer of Health, or the public; and/or,
- There is a Confirmed Bloom Event.

Note: where a term defined within this guide conflicts with a term defined in the Municipal Drinking Water Licence for the system, the definition within the licence takes precedence.

Additional Information

Additional information about HABs and the Municipal Drinking Water Licence conditions that require a Plan to be prepared and implemented can be obtained by contacting the Client Services and Permissions Branch of the Environmental Assessment and Permissions Division of the Ministry of the Environment, Conservation and Parks at MDWLP@Ontario.ca or 416-314-4300.

Plan Requirements

1.0 Annual Implementation Period

The Plan must define an implementation period for the monitoring, reporting and sampling described within Plan that at a minimum:

- a) Covers the period from June 1 to October 31;
- b) Covers any period before June 1 or after October 31 where HABs have historically been observed in source water for the drinking water system; and,
- c) Covers any other period(s) as directed by the Ministry or Medical Officer of Health; and,
- d) Is reviewed at the end of each implementation period and adjusted where necessary based on observations within that period.

What does it mean?

The implementation period for the Plan is intended to cover the time where a HAB is likely to occur. Generally, this means the warmer months from June to October, however this could vary if HABs have historically been observed in the source water for the drinking water system before June or after October. Consideration should be given to implementing the Plan earlier or continuing the Plan later than the defined implementation period when there are unseasonable warm temperatures, and the risk of a bloom is increased.

The period covered by the plan should be adjusted based on available information for HABs. This includes any historic:

- Results from visual observations / sampling; and,
- Suspected or Occurring HABs outside the standard period of June 1 to October 31 in areas defined for visual observation in the Plan.

The annual review is necessary to ensure that timing for the Plan is adjusted, where necessary, before the next implementation period.

2.0 Visual Observation

The Plan must contain details relating to visual monitoring for HABs:

- a) at or near the source water intake(s) described in the drinking water works permit for the system;
- b) where the intake has an IPZ in a source protection plan, within IPZ-1 or within a circle that has a radius, measured from the intake, equal to the distance from the intake to the farthest edge of IPZ-2;
- c) at or near the shoreline, in areas where the intake is in proximity to the shore; and,
- d) any other area(s) outside of those described above where historic algal blooms have provided an early indication that an HAB may occur.

What does it mean?

Direct observation of the source water is required to identify the presence of a bloom before it impacts the source water for the drinking water system. If an algal bloom is visually observed, a HAB should be considered Suspected or Occurring until sampling results indicate otherwise.

Visual observation should be informed by other sections of the Plan. For example, the procedures documented in your Plan may consider:

- variation in the frequency or location(s) of visual observation when samples are being collected and tested;
- information available from other sources that can supplement visual information collected by the Owner or Operating Authority, including visual observations undertaken by neighboring municipalities or real-time mapping of algal blooms in the source water;
- technologically assisted visual observation using video cameras or other optical imaging equipment, where procedures for alternative visual checks have been documented and will be implemented in the case of equipment malfunction.

Where there is no source protection plan in place, the Plan should identify areas at or near the intake where observed blooms are likely to impact the drinking water system. This will depend on the source water body, location of the intake(s) and the characteristics of the source water body. At a minimum it should include a monitoring area where HABs have historically been observed within 2km of the intake; however, the current and speed of water flow may increase the 2km monitoring distance especially in the upstream location.

3.0 Proactive Sampling

The Plan must include pro-active weekly sampling and testing during the annual implementation period for the Plan, where:

- a) The source of water for the drinking water system has a history of persistent or reoccurring HABs;
- b) Historic sample results have consistently identified microcystin in raw water when algal blooms are not observed;
- c) If directed by the Local Ministry Office or local Medical Officer of Health

What does it mean?

Proactive weekly sampling is required when visual observation alone is not sufficient to identify a bloom or when HABs have historically occurred in the source water for the system. It's important to note that proactive sampling is intended to supplement, not replace, visual observation. As a best practice, sampling and visual observation should be considered together as part of a comprehensive strategy to identify HABs that may impact drinking water system operations.

It is not necessary to undertake proactive sampling at all the locations identified in the sampling plan prepared to meet the requirements in section 5.0 (Sampling Plan). At a minimum, pro-active samples should be collected from raw water entering the drinking water system. As a best practice, key locations should be identified that can provide an early indication of a HAB. For example, proactive sampling in areas where HABs have historically been observed can help provide early indication that a bloom is occurring.

Where proactive sampling indicates a Confirmed Bloom Event, sampling is required in accordance with conditions in the Municipal Drinking Water Licence and the sampling plan prepared to meet the requirements in section 5.0 (Sampling Plan) shall be implemented.

4.0 Reporting

The Plan must contain details relating to reporting a HAB that is Suspected or Occurring to the:

- a) Overall Responsible Operator(s) and/or the Operator(s)-in-Charge if the bloom has been observed by a duty operator; and,
- b) any requirements for reporting included in a municipal drinking water licence, drinking water works permit or other direction issued for the drinking water system by the Ministry.

What does it mean?

Conditions in a Municipal Drinking Water Licence typically require reporting to your local Medical Officer of Health and the Ministry. Reports submitted to the Ministry should be sent to the Local Ministry Office and the Ministry's Spills Action Centre. Reporting should align with the expectations of your local Medical Officer of Health and the Local Ministry Office. Any specific reporting instructions they provide should be incorporated into the Plan. For example, if this is an area with frequent blooms the plan may only require verbal notification once, at the beginning of a suspected and/or Confirmed Bloom Event. Written notifications and updates should follow the verbal notification.

The Plan should, at a minimum, include procedures that describe how the report is made, what information it will contain, and the timeframe for reporting. Specific scenarios for notification should be included, for example, if microcystin is confirmed to be present through raw water sampling, the Plan should include how Confirmed Bloom Events will be reported.

It is not necessary to contact the party who notified you of a bloom, but parties beyond those listed in the requirements should be notified based on agreements described in the Plan or where required by your local Medical Officer of Health or the Local Ministry Office.

Please note that any drinking water sample (collected from the treated water or distribution system) that exceeds 0.0015 mg/L Total Microcystin will be reported as a provisional Adverse Water Quality Incident by the laboratory performing the analysis in accordance with conditions in their testing licence. The HAB Plan is not intended to include treated water sample reporting requirements which are already established through Ontario Regulation 170/03 and the Safe Drinking Water Act.

5.0 Sampling Plan

The Plan must contain details about sampling that will be undertaken when a HAB is Suspected or Occurring, including at a minimum:

- a) identification of the sample location(s), including samples from:
 - raw water, collected prior to any treatment;
 - treated water, collected at the point of entry into the distribution system; and,
 - at or near the shoreline, in areas where the intake is in proximity to the shore
- b) sample frequency, including any triggers that may increase the frequency of sampling;
- c) any requirements for sampling included in a municipal drinking water licence, drinking water works permit or other direction issued for the drinking water system by the Ministry.

What does it mean?

When a HAB is Suspected or Occurring, conditions in a Municipal Drinking Water Licence typically require samples to be collected at least once per week from locations identified in the Plan and for sampling to continue until 3 consecutive samples have shown non-detection of microcystin.

More frequent sampling should be considered if you:

- are monitoring microcystin levels in raw or treated water to determine whether additional actions are necessary to protect public health;
- are monitoring microcystin levels in treated water to ensure that levels remain below the Ontario Drinking Water Quality Standards;
- have observed changes in the bloom that indicate it may be more directly impacting the system than it was when the most recent sample was collected;

As a best practice, the Plan should consider all aspects of sampling, including:

- instructions from the licensed laboratory for collection, storage, and handling of samples;
- details about packaging, transporting, and delivering the samples to a laboratory licensed to perform the required testing;
- information about how sample results are received and evaluated; and,
- instructions for communicating any necessary information about the sample results to staff operating the drinking water system.

Implementation of the Plan

Compliance & Ministry Inspection

When evaluating compliance with the Municipal Drinking Water Licence conditions and requirements outlined in this guide, Ministry staff will generally be looking for:

1. **Training Records**

The Owner and/or Operating Authority must train all relevant drinking water system staff on the Plan prior to the beginning of each annual implementation period for the Plan. Up-to-date records documenting staff training on the HAB monitoring, reporting, and sampling procedures must be maintained and made available upon request from the Ministry.

2. **Visual Observation Records**

Records relating to visual observations as outlined in the Plan should be maintained and made available upon request from the Ministry. As a best practice, details about how and where observations are documented should be included within the Plan.

3. **Sample Records**

When samples have been collected, information about the sampling location, date and results are required to be maintained and made available upon request from the Ministry. This includes pro-active samples (where required) and samples collected when a HAB is Suspected or Occurring.

4. **Reporting Records**

Records relating to reporting are required to be maintained and made available upon request from the Ministry (i.e., reporting to the local Medical Officer of Health and the Ministry). This could include written documentation of a verbal notification or a copy of any written correspondence. Records must include reporting of suspected blooms and Confirmed Bloom Events.

5. **Review and Update of the Plan**

Conditions in the Municipal Drinking Water Licence require the Plan to be kept up to date. This means a review should be completed at regular intervals (i.e., once every year). Records of the review must be maintained and should be made available upon request from the Ministry. It is also important that appropriate version control is applied to the Plan, and that any updates are communicated to relevant staff (i.e., as part of annual training).

Additional Resources

- Blue-Green Algae (<https://www.ontario.ca/page/blue-green-algae>)
- AWWA Resources of Cyanobacteria / Cyanotoxin
(<https://www.awwa.org/Resources-Tools/Resource-Topics/Source-Water-Protection/Cyanobacteria-Cyanotoxins>)