

Operational Guideline for Manitoba Water Suppliers

Monitoring for Total Microcystins in Drinking Water

Purpose

This guideline has been developed to provide public and semi-public drinking water suppliers throughout the Province of Manitoba with information on monitoring for cyanobacterial toxins (total microcystins) in drinking water.

Algal Blooms

Cyanobacteria, also known as 'blue-green algae' are photosynthetic bacteria that can live in many types of water. Rapid, excessive cyanobacterial growth is commonly called a bloom.

Cyanobacterial toxins are produced and stored in the cells of cyanobacteria, and are released into the water as the cells rupture or die. Microcystins are the most common type of cyanobacterial toxins.

National Guideline

Health Canada's Guidelines for Canadian Drinking Water Quality – [Cyanobacterial Toxins](#) Technical Document places a maximum acceptable concentration (MAC) of 0.0015 mg/L (1.5 µg/L) for total microcystin in drinking water. This guideline is protective of the general population, including young children.

Available science suggests adults are more sensitive to the effects of microcystins than younger age groups. However, bottle-fed infants can consume more water relative to body weight. Precautionary advice for bottle-fed infants may be needed if total microcystin is detected in the treated water above 0.0004 mg/L (0.4 µg/L). Water suppliers must immediately notify the Office of Drinking Water if total microcystins are present in the raw or treated water as public notification may be required.

Impacts on Water Systems

Under some conditions, algae can impact surface drinking water supplies by:

- producing unpleasant tastes and odors,
- interfering with water treatment plant performance,
- increasing disinfection by-product precursors, and
- producing harmful toxins

Water Treatment

Water treatment processes used by most of Manitoba's large municipal surface water systems can effectively remove cyanobacteria and microcystin toxins. Water treatment processes for small water systems and semi-public water systems may not be able to remove microcystins.

Applying a pre-oxidant such as chlorine, potassium permanganate or ozonation during the bloom can cause the cyanobacterial cells to rupture or die resulting in an increase in cyanobacterial toxins, including microcystins.

Visual Inspection

Algal blooms typically develop during the warm summer months. Between late June to the end of September water suppliers must be vigilant in monitoring for algal blooms in their source waters. Not all algal blooms produce cyanobacterial toxins. The only way to know if an algal bloom contains microcystins is to test.

Starting in July, all operators with a surface water source are required to do weekly visual checks of the source water, storage pond, wet well, clarifier, filters and other in-plant raw water storage areas for signs of algae.

The best time to check for the presence of an algal bloom in the source water is early morning when conditions are calm. Algae cannot control their buoyancy during low light conditions so they will float to the surface and may collect along the shoreline.

If an algae bloom is present in the source water, operators should take and record incoming turbidity values and collect a raw water sample in a clear jar to look for evidence of algae entering the water plant. Algae can look like small clumps, filaments, fine grass clippings or a film on the surface of the water.

Operators are required to record their observations on the [Weekly Algae Monitoring Report](#) and submit the completed form to the regional drinking water officer at the beginning of October.

Operator Response

If algae are present close to the water intake, visibly entering the intake or within the water treatment plant, the operator must immediately contact the regional drinking water officer. Operators may be asked to take photos of the bloom to assist in identifying the type of algae present and assessing the public health risk. Beyond notifying the regional drinking water officer, operators can also report the bloom at https://forms.gov.mb.ca/algal_report/index.html.

Risk Assessment

Upon notification, the regional drinking water officer may gather information such as photographs, records of historic blooms, test results, treatment processes and other visual indicators that can assist in determining whether further laboratory analysis is required.

Corrective Actions

Recent studies recommend against pre-oxidation during an algae bloom. Water systems should contact their water treatment or chemical supplier or engineering consultant, and regional drinking water officer before adding or removing treatment chemicals.

During an active bloom, water system operators may need to alter process parameters to manage the potential increase of cyanobacterial toxins. It may be necessary to backwash filters more often or adjust or discontinue water treatment chemicals until the bloom is over.

Operators are encouraged to record water quality indicators such as pH, temperature, turbidity as well as process adjustments such as chemical additions and dosage changes. This historical record will help in addressing future blooms.

The regional drinking water officer may request additional action(s) including:

- increasing visual inspection frequency;
- submitting additional water samples (raw and treated);
- submitting a compliance plan on how to deal with future blooms (which may include aerating the source); or
- issuing a Drinking Water Quality Advisory or Drinking Water Avoidance Advisory (if positive microcystin results are found)

Laboratory Testing

Prior to the summer monitoring season, surface water systems should order the necessary sampling supplies from their preferred accredited laboratory, to keep on hand in order to complete immediate testing of the raw and treated water, if directed to do so by a Drinking Water Officer. When submitting water samples to the laboratory for total microcystin analysis, operators must ensure that the regional drinking water officer is copied with the results.

Surface water systems are required to collect at least one raw water sample mid-August and submit it to the laboratory for total microcystin analysis. This allows for the development of a historic data set at a time when blooms are expected to be the worst.

It is illegal to apply algaecides such as copper sulphate, or blue-stone to Manitoba surface waters.

Additional Information

Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – [Cyanobacterial Toxins](#)

Information on water treatment optimization:

EPA: [Water Treatment Optimization for Cyanotoxins](#)

[Information on Algae Control in Raw Water Storage Ponds ODW-OG-21](#)

[Weekly Algae Monitoring Report](#)

Emergency Reporting

Water System Operators must immediately notify the Office of Drinking Water of any condition that may affect the ability of the water system to produce or deliver safe drinking water. Refer to Emergency Reporting Guideline (ODW-OG-04).

Office of Drinking Water

Regional [drinking water officers](#) are available for operational and monitoring advice and to provide technical assistance.

After hours, please call the Environmental Emergency Response line at 204-944-4888 and ask for the on-call drinking water officer.

For more information related to Manitoba's drinking water and how it is regulated visit: manitoba.ca/drinkingwater.