

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 in Drinking Water](#) 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 considered to be 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 asked to do weekly visual checks of the source water; 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 and collect a raw water sample in a clear jar to look for evidence of algae entering the water plant such as small clumps, filaments or fine grass clippings or a film on the surface of the water.

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

Field Test Kits

Field test kits for determining the presence or absence of total microcystin in the raw and finished water are recommended for use in Manitoba water supplies to determine the presence of microcystins.

Water suppliers with historic algal blooms are encouraged to purchase field test kits. Having field test kits available to rapidly screen for the presence of microcystins in the raw and finished water may eliminate the need for emergency laboratory testing and reduce overall monitoring costs.

Note: Finished water test strips are used after the final treatment process prior to the addition of chlorine or other disinfectant. If a sample location is not available, the chlorine must be neutralized before using the finished water test strip.



Operator Response

If algae are present close to the water intake or visible entering or within the water treatment plant, the operator must contact the regional drinking water officer immediately. Operators will be asked to take photos of the bloom to assist in identifying the type of algae present and assessing the public health risk. Operators can also report the bloom at <http://www.manitoba.ca/beaches>.

Where operators have raw and finished field test kits available, operators must test the raw source water every three days until the bloom has passed and once more three days after. If a raw water test strip is positive, test the finished water and contact the regional drinking water officer.

If either the raw or finished test strip is inconclusive; for example, a control line is not visible, operators should contact the regional drinking water officer. Operators may be required to collect and submit water samples for laboratory analysis.

Risk Assessment

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

Corrective Actions

If the result of the finished water test strip is positive, operators should immediately collect a raw and treated water sample and submit to the laboratory for total microcystin analysis. Indicate *EMERGENCY* on the sample submission form to expedite analysis of the treated water sample only; the raw water sample can be analyzed normally.

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 and 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;
- purchasing a field test kit;
- 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
- public notification

Laboratory Testing

Laboratory testing is normally done if a microcystin test strip (raw or treated) is positive. When submitting water samples to the laboratory for total microcystin analysis, operators must ensure that the regional drinking water officer is copied on the results.

In the absence of bloom-related laboratory testing, water systems should collect at least one raw water sample mid-August and submit it to the laboratory for total microcystin analysis. Water systems that have confirmed algae in their source water should collect a raw and treated water sample at this time. 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](#)

[Monthly Algae Monitoring Report](#)

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.