

Ministry of the Environment

Safe Drinking Water Branch

Laboratory Licensing and
Compliance Program

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April 23, 2010

MEMORANDUM

TO: Drinking Water Licensed Laboratories

FROM : Jennifer Koene
Laboratory Compliance Program Supervisor, (SDWB)
Dan Toner
Assistant Director, (LaSB)

RE: Microcystin Reporting Guidance for Licensed Laboratories

Cyanobacteria, commonly known as “blue-green algae”, are not true algae but are a type of photosynthetic bacteria commonly found in fresh water bodies throughout the world. When conditions are favourable, growth accelerates and cyanobacteria accumulate within the surface water body as a “bloom” or as a blue-green “scum” on the water’s surface. The “blooms” are a seasonal phenomenon, usually occurring in the late summer and early fall.

Several species of cyanobacteria have the ability to create toxins. These include microcystin-LR, a very potent hepatotoxin which may cause damage to the liver. Toxins are contained within the cell and are released to the water when the cell wall is broken either due to death and decomposition of the cell or from chemical dissolution or mechanical abrasion.

The Ministry of the Environment has received several drinking water licence applications for approval to employ the ELISA (Enzyme Linked Immunosorbent Assay) method for the analysis of microcystins in treated drinking water. Although the methodology can detect microcystins at low levels, it cannot identify individual microcystins (i.e. microcystin-LR) and due to additional compounds or metabolites in the sample, microcystin results may be “masked”. The ELISA methodology may be used as a screening technique (for treated water) but only if carried out in a laboratory under controlled conditions.

The Ministry’s Laboratory Services Branch is currently the only licensed laboratory to perform the analysis of microcystin-LR by Liquid Chromatography – (Electrospray Ionization) Tandem Mass Spectrometry [LC-(ESI) MS/MS].

The maximum concentration for microcystin-LR under the Ontario Drinking Water Quality Standard is 1.5 µg/L (O. Reg. 169/03, Schedule 2).

Henceforth, drinking water testing laboratories that receive Ministry licensure to employ the ELISA methodology must adhere to, adopt and document the following requirements as appropriate.

A. Private Drinking Water Samples Collected Under the SDWA

- Where a licensed laboratory analyzes a DW sample from a private citizen for microcystin using ELISA, the laboratory shall:
 - a. Report the results of the analysis to the client, **and**
 - b. Report the results of the analysis which are greater than or equal to (\geq) **1.5 µg/L** to the Local Medical Officer of Health (LMOH) and Public Health Unit (PHU).

B. Samples Collected Under Ontario Regulation 170/03

- Where a licensed laboratory analyzes a DW sample from a regulated drinking water system (DWS) for microcystin using ELISA, and the result is **less than ($<$) 1.5 µg/L**, the laboratory shall:
 - Report the result to the DWS owner/operator.
- Where a licensed laboratory analyzes a DW sample from a regulated DWS for microcystin using ELISA, and the result is **greater than or equal to (\geq) 1.5 µg/L**, the laboratory shall:
 - a. Verbally report (and document) a provisional adverse result to the Ministry's Spills Action Centre (SAC) indicating that the result is **PROVISIONAL UNTIL FURTHER NOTICE**.
 - i. Request that SAC note the result as "PROVISIONAL" in the DWIS-AWQI comments field;
 - ii. Provide SAC with all information pertaining to the sample, including DWS name and number, contact information, sample location, etc.
 - b. Verbally report (and document) a provisional result to the LMOH/ PHU indicating that the result is **PROVISIONAL UNTIL FURTHER NOTICE**.
 - c. Verbally report (and document) a provisional adverse result to the DWS owner/operator indicating that the result is **PROVISIONAL UNTIL FURTHER NOTICE**.
 - d. As soon as reasonably possible (within 24 hours), contact one of the following Laboratory Services Branch (LaSB) staff below to make arrangements for the sample to be sent to LaSB for CONFIRMATION analysis of microcystin-LR. The AWQI number, DWS name and number, contact information, sample location, etc must be included with correspondence with LaSB and accompany the sample. The **1 litre** sample must be received at LaSB within the sample hold time (21 days until extraction).

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- Where the Ministry's Laboratory Services Branch (LaSB) receives a regulated DW sample from a licensed laboratory which has been analyzed for microcystin using ELISA, and the result **was greater than or equal to (\geq) 1.5 $\mu\text{g/L}$** , the LaSB shall:
 - a. Analyze the sample(s) for microcystin-LR and report the results (with the AWQI #) to the licensed laboratory, SAC, LMOH and PHU.
 - b. Report the exceedance (as per section 18 of the SDWA) if the sample result(s) exceed the maximum concentration of **1.5 $\mu\text{g/L}$** for microcystin-LR as per O. Reg. 169/03, Schedule 2.

C. Samples Collected Under Ontario Regulations 318/08 and 319/08

- Where a licensed laboratory analyzes a DW sample from a small drinking water system (SDWS) for microcystin using ELISA, and the result **is less than ($<$) 1.5 $\mu\text{g/L}$** , the laboratory shall:
 - a. Report the result to the SDWS owner/operator.
- Where a licensed laboratory analyzes a DW sample from a SDWS for microcystin using ELISA, and the result **is greater than or equal to (\geq) 1.5 $\mu\text{g/L}$** , the laboratory shall:
 - b. Verbally report (and document) a provisional result to the PHU/LMOH indicating that the result is ***PROVISIONAL UNTIL FURTHER NOTICE***. Provide the PHU/ LMOH with all information pertaining to the sample, including SDWS name and number, contact information, sample location, etc.
 - c. Verbally report (and document) a provisional result to the SDWS owner/operator, indicating that the result is ***PROVISIONAL UNTIL FURTHER NOTICE***.
 - d. As soon as reasonably possible, contact one of the following Laboratory Services Branch (LaSB) staff below to make arrangements for the sample to be sent to LaSB for CONFIRMATION analysis of microcystin-LR. The AWQI number, DWS name and number, contact information, sample location, etc must be included with correspondence with LaSB and accompany the sample. The **1 litre** sample must be received at LaSB within the sample hold time.

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- Where the Ministry's Laboratory Services Branch (LaSB) receives a regulated DW sample from a licensed laboratory which has been analyzed for microcystin using ELISA, and the result **is greater than or equal to (\geq) 1.5 $\mu\text{g/L}$** , the LaSB shall:

- a. Analyze the sample(s) for microcystin-LR and report the results to the licensed laboratory, PHU and LMOH
- b. Report the exceedance (as per section 18 of the SDWA) if the sample result(s) exceed the maximum concentration of **1.5 µg/L** for microcystin-LR as per O. Reg. 169/03, Schedule 2.