Laboratory Update *Bulletin*

Laboratory Services Branch

A newsletter for licensed drinking-water testing laboratories

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Drinking-Water Testing

The *Safe Drinking Water Act, 2002* (SWDA) and the Drinking-Water Systems Regulation (O. Reg. 170/03) came into effect on June 1, 2003 and the Drinking-Water Testing Services Regulation (O. Reg. 248/03) came fully into effect on October 1, 2003. The purpose of this update is to provide clarification on how the Ministry interprets certain sections of the Act and regulations in order that all licensed laboratories have a common understanding of the requirements, that no laboratory is mistakenly deemed out of compliance, and to ensure safe drinking water in Ontario. The following technical clarifications have been approved by the Chief Drinking Water Inspector, Drinking Water Management Division, Ministry of the Environment and as such, by way of this bulletin, shall be considered for the purpose of assessing compliance until such time that this bulletin is amended or revoked.

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1. Definition of "immediate"

Schedule 16-6 of the Drinking-Water Systems Regulation (DWSR – O. Reg. 170/03) requires that adverse water quality results be reported immediately. This section describes the mode of communication for immediately reporting an adverse water quality result but does not specify what "immediate" means.

"Immediate" for the purpose of reporting adverse drinking-water quality results as per Schedule 16-6 of the DWSR means the process of reporting the adverse result is initiated when authorized for release, **without delay from any other action** and in accordance with an MOE approved procedure.

The laboratory must have a written procedure for authorization of an adverse test result for release, which shall be inspected by MOE to ensure it is acceptable.

2. Reporting detection limits

Schedule 13-5 of the DWSR requires increased frequency of sampling if an analytical result obtained for any of the parameters listed in Schedules 23 or 24 exceeds one half of the Maximum Allowable Concentration (MAC). The MOE has set the reporting detection limit (RDL) for three organic parameters, Benzo[a]pyrene, Terbufos and Aldicarb at 50% or more of the MAC, due to the limitations of current analytical methods to achieve lower detection limits. For these parameters, a licensed laboratory must be able to achieve a method detection limit (MDL) at least equal to the RDL. A positive result above their MDL would trigger increased frequency of sampling, but a result equal to their MDL would not.

3. The definition of a drinking-water test

Section 63 of the SDWA prohibits the testing of drinking water unless the tests are conducted by licensed laboratories. However, this section only applies to **drinking-water** tests. Tests carried out on water that is not drinking water are not legally required to be conducted by a licensed laboratory, although the Ministry does recommend the use of licensed laboratories for all testing.

A drinking-water test is defined in the SDWA as "a test for the purposes of this Act to assist in the determination of the quality of any waters in respect of a drinking-water system, and includes a prescribed test." Therefore, in order to determine whether a test needs to be carried out by a licensed laboratory, the two key considerations are whether the test is:

(a) for the **purposes of the SDWA**, and
(b) to assist in the determination of the quality of any waters **with respect to a drinking-water system.**

The purposes of the SDWA are set out in section 1 of the Act. Paragraph 2 is particularly relevant. Section 1 states:

> The purposes of this Act are as follows:
>
> 1. To recognize that the people of Ontario are entitled to expect their drinking water to be safe.
>
> 2. To provide for the protection of human health and the prevention of drinking-water health hazards through the control and regulation of drinking-water systems and drinking-water testing.

The Ministry interpretation of the meaning of drinking-water tests is set out below with respect to three situations – raw water tests, tests conducted in plumbing, and home water testing services, but the rational may apply to other situations.

(a) Raw water tests

"Waters" is a separately defined term in the SDWA. The definition of waters includes raw waters, so a raw water test can be a drinking-water test where the test is for the purposes of the SDWA.

The Ministry considers that following types of raw water tests as a test for the purposes of the SDWA:

i) It is a test required by the regulations:

Routine testing (e.g. **Schedule** 10-4 of the DWSR)

Raw water characterization tests (e.g. subsection 5-4(1), paragraph 3(ii) of the DWSR)*

** Note that data generated for this purpose are NOT required for upload to the Ministry's Drinking Water Information System (MOE-DWIS)*

ii) The sample is taken anywhere in the drinking-water system by or pursuant to the owner or operating authority (e.g. the intake pipe, just before treatment)

iii) The water is otherwise clearly intended for human consumption (e.g. drinking-water system that does not currently provide treatment)

iv) The raw water supply is being tested for whether it is fit for human consumption:

A raw water supply being tested after a chemical spill to determine whether the drinking-water system should be shut down and/or raw water characterization tests conducted pursuant to an application for an approval

Other tests of raw water would not be considered drinking-water tests and therefore would not have to be conducted at a licensed lab. Some examples include:

i) Any test for environmental purposes (*E. coli* testing at a beach; testing for fish habitat purposes)

ii) Preliminary tests (e.g. **initial** testing to begin to consider whether an aquifer might be suitable as a source of water).

iii) Testing requested on behalf of a Professional Engineer for the purpose of determining the effectiveness of the water treatment technology/process/optimization (i.e. particle size)

(b) Testing of drinking water in plumbing

The testing of drinking water from plumbing may or may not be considered a drinking-water test depending upon the purpose of the test. If the purpose of the test is to determine the quality of the water in the drinking-water system, and the plumbing is simply being used as a means of obtaining the water, then the test would be considered for the purpose of the SDWA and would need to be conducted by a licensed laboratory. On the other hand, if the purpose of the test is to determine the quality of the water in the plumbing only, then it would not be considered for the purposes of the SDWA and would not need to be conducted by a licensed laboratory.

An example of the former situation are drinking-water tests conducted by the owner or operating authority of a drinking-water system in order to comply with the sampling and testing requirements of the DWSR. Whereas some owners and operating authorities obtain samples from fire hydrants or other public locations, some may obtain their samples from plumbing (e.g. a residence) connected to the system.

An example of the latter situation are drinking-water tests for lead conducted to determine whether the plumbing in an individual's home is causing elevated levels of lead, although the drinking-water system is delivering drinking water that meets the Ontario Drinking-Water Quality Standards to the property line.

A factor to consider in determining whether the purpose of a test is to determine the quality of the drinking water from the drinking-water system is whether the sample is being tested for a drinking-water quality standard that can only relate to the treatment process. For example, Trihalomethanes (THMs) are substances that may be created through the chlorination process of the drinking-water system. THMs are not created in plumbing. Testing for

THMs would almost always be considered a test to determine the quality of water being supplied by the drinking-water system, and therefore be considered a test for the purposes of the SDWA. These tests would need to be provided by a licensed drinking-water testing laboratory, regardless of whether the sample is taken from plumbing or directly from the distribution system.

(c) Home testing services

Businesses that offer home water sampling and testing services may or may not require a drinking-water testing licence depending upon the purpose of the testing being provided. The same rationale as set out above for the testing of drinking-water in plumbing would apply – if the purpose is to determine the quality of the drinking water supplied by the drinking-water system connected to the plumbing, then that test would be for the purposes of the SDWA and the business would require a licence under Part VII of the Act. Conversely, if the testing provided by the business is to determine the quality of the water in the plumbing only, then it would not be considered for the purposes of the SDWA and would not need to be conducted by a licensed laboratory.

Similarly, tests that are not related to the purposes of the SDWA – the protection of human health and the prevention of drinking-water health hazards through the control and regulation of drinking-water systems and drinking-water testing – do not require a license. Therefore, tests for purely aesthetic or operational parameters may be conducted without a licence (see Table 1). Many home testing services limit the types of tests they offer to aesthetic parameters.

4. Regulated operational parameter testing (chlorine, chloramine, turbidity)

There are certain sampling and testing obligations that require the owner or operating authority to ensure that operational parameters such as chlorine residual and turbidity are tested immediately after a sample is taken (for example, subsections 6-3(1), 7-2(3)(a) and 7-3(1) of DWSR). In these cases, the use of the term immediately means that an owner or operating authority cannot rely upon the perishability limits for these parameters – 15 minutes for chlorine residual and 48 hours for turbidity – to provide guidance as to the length of time the owner or operating authority may take to have the tests conducted by a licensed laboratory.

Where there is a requirement that a sample be tested immediately for chlorine residual or turbidity, the owner or operating authority should ensure that the test is performed in the field by a certified operator, water quality analyst or trained person (depending on the regulation schedule) using appropriate field testing equipment, immediately following sample collection. The owner or operating authority may only submit samples to a licensed lab to meet immediate operational parameter testing requirements where the lab is located at the same place as where the sample was taken.

Table 1

Aesthetic/Operational Parameters (Non-Health Related)

Parameter	Concentration (mg/L unless otherwise stated)	Aesthetic/Operational Parameter
Alkalinity	30-500	OG
Aluminum	0.10	OG
Chloride	250	AO
Colour	5 TCU	AO
Copper	1.0	AO
Dissolved Organic Carbon	5.0	AO
Ethylbenzene	0.0024	AO
Hardness (as $CaCO_3$)	80-10	OG
Iron	0.30	AO
Manganese	0.05	AO
Methane	3 L/m^3	AO
Odour	Inoffensive	AO
Organic Nitrogen	0.15	OG
pH	6.5-8.5 (no units)	OG
Sodium	a	AO
Sulphate	500 b	AO
Sulphide	0.05	AO
Taste	Inoffensive	AO
Temperature	15 degrees C	AO
Toluene	0.024	AO
Total Dissolved Solids	500	AO
Xylenes	0.30	AO
Zinc	5.0	AO

Abbreviations: AC - Aesthetic Concentration
OG - Operational Guideline Concentration
TCU - True Colour Units

There may be circumstances where the owner or operating authority chooses to forward a grab sample of water to an appropriately licenced lab for the analysis of free chlorine residual or turbidity for purposes other than to fulfill monitoring requirements under the regulation. In these situations, the sample could be analyzed by the lab within the perishability requirements. Results of these tests must be reported to the owner or operating authority but DO NOT need to be reported to the Ministry through the Spills Action Centre (SAC) or the Drinking Water Information System (DWIS).

5. Testing and reporting of aggregated parameters

The SDWA requires that licensed laboratories hired to perform regulated drinking-water analyses are required to report all of their regulated data to DWIS within 28 days of data approval.

In the case where aggregated parameter data are to be reported to DWIS, the Ministry requires that the "total" sum of the aggregate be reported, not individual parameters. Laboratories licensed and hired to perform the analyses of various aggregated parameters (i.e. Aldrin + Dieldrin, DDT + metabolites, etc.) must be licensed to analyze ALL parameters of that specific aggregated test.

For example, a laboratory is licensed for and has been hired by a drinking-water system (DWS) to analyze Aldrin + Dieldrin. The laboratory is notified that the Standards Council of Canada (SCC) has suspended them for Aldrin but not Dieldrin. The laboratory must now seek DWS permission to sub-contract out the Aldrin analyses to another licensed laboratory. One laboratory performs the Aldrin analyses while another performs the Dieldrin analyses. In this case, neither testing laboratory is able to report the aggregated parameter sum.

In order for laboratories to meet their reporting obligations, the SDWA requires that the "total" analyses be done at one laboratory licensed to test all of the aggregated parameters, otherwise, all labs involved will be found in non-compliance.

6. Reporting adverse water quality to the Medical Officer of Health/Health Unit

Laboratories are reminded of their regulatory responsibility to report all indicators of adverse water quality to the appropriate Medical Officer of Health or Health Unit.

Under O. Reg. 170/03, Schedule 16, s.16-6(3)(a), the laboratory is required to give an immediate report to:

> a medical officer of health, by speaking with a person at the office of the medical officer or if the office is closed, by speaking with a person at the on-call system of the health unit.

There is no requirement that the laboratory speak directly with the medical officer of health. Once the laboratory has provided their report to the on-call system, there is no further obligation on the laboratory to follow-up to ensure that their call was transferred to the medical officer of health. Leaving a message with the on-call person is sufficient to satisfy the requirements of immediately reporting to a person. Note that the message must specify the adverse test result or observation that requires the report.

7. Uncertainty and reporting adverse test results

Estimation of the analytical uncertainty of a measurement is a requirement of ISO/IEC FDIS 17025:1999 – *General Requirements for the Competence of Testing and Calibration Laboratories* (March 2000) and must be available if requested by the client. However, uncertainty does not provide a basis for not reporting adverse test results. The reported result must be reported where the reported result qualifies as an adverse test result.

The following is provided as a hypothetical example:

The standard for a parameter expressed as a maximum concentration in milligrams per Litre is 50 mg/L. Table 2 presents four possible situations of results reported along with uncertainty at 95% confidence levels, and the required course of action.

Table 2

	Result (mg/L)	**Interpretation**	**Reporting Adverse Test Result under O. Reg 170/03**
CASE 1	44 ± 4	Measured result is within the limits even when extended upwards by uncertainty interval.	Do not report exceedance
CASE 2	48 ± 4	The measured result is less than the limit by a margin less than half the uncertainty interval. Results indicate that compliance is more probable than non-compliance.	Do not report exceedance
CASE 3	52 ± 4	The measured result is more than the limit by a margin less than half the uncertainty interval. It is not possible to state non-compliance based on 95% confidence interval. Results indicate that non-compliance is more probable than compliance.	Report exceedance
CASE 4	56 ± 4	The measured result is beyond the limit even when extended downwards by uncertainty interval.	Report exceedance