

The Ontario Drinking-Water Systems Regulation  
(O. Reg. 170/03)

# Guide 3: How to collect drinking water samples

## A Guide for Owners and Operators of Non-Municipal Year-Round Residential Drinking Water Systems

Please Note: The requirements in this Guide may be subject to change given the Ministry's intention to propose technical amendments to O. Reg. 170/03 by the end of June 2005, as outlined in the Ministry's EBR Posting – "Broad Policy Proposal for the Regulation of Drinking Water Systems in Ontario". More information on this proposal can be found on the EBR Registry at <http://www.ene.gov.on.ca/envregistry/025314ep.htm>.

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*Protecting our environment.*



Ontario

**This publication is provided for information purposes only.**

This guide is the third guide of a four-guide kit designed to assist owners and operators of non-municipal year-round residential drinking water systems more fully understand their responsibilities in delivering safe, clean drinking water. However, readers are advised against using this document for compliance purposes. Reference should always be made to the text of the Drinking-Water Systems Regulation (O. Reg. 170/03) and the *Safe Drinking Water Act, 2002* to ascertain an owner/operator's specific legal requirements and to determine whether or not a system is in compliance. The Act and its regulations may be obtained from Ontario's e-laws website at [www.e-laws.gov.on.ca](http://www.e-laws.gov.on.ca).

**Drinking water samples are required for several reasons:**

- to provide a level of assurance that the drinking water supplied by your system is safe to drink;
- to meet regulatory requirements;
- to determine changes in the quality of your source water (these changes will help you operate the system efficiently in the future);
- to determine the effectiveness of the treatment process, especially disinfection;
- to provide information on the integrity of the distribution system;
- to make operational changes (for example, change the solution strength, feed pump rate, etc.);
- to document the quality of your water supply; and
- to enable you to properly respond to customer complaints.

**Remember, your test results are only as good as your sample!**

**Water Sampling and Analysis is Required by the Drinking-Water Systems Regulation (O. Reg. 170/03).**

As an owner of a non-municipal year-round residential drinking water system, you are required by the Drinking-Water Systems Regulation (O. Reg. 170/03) to ensure that drinking water samples are taken from your system and tested for certain microbiological parameters, as well as certain organic and inorganic chemical parameters.

Schedules 6 to 15 of the Drinking-Water Systems Regulation (O. Reg. 170/03) cover sampling and testing.

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### **This Guide is designed to be user-friendly.**

The right-hand, shaded column summarizes the contents of each section and highlights the basic requirements under the regulation. The left-hand side of the page contains the regulatory details needed to meet your regulatory responsibilities, as well as a reference to the appropriate section on the regulations. It is recommended that you refer to the text of the regulation itself for full compliance instructions.

## **Let's Get Started.**

As an owner/operator of a regulated non-municipal year-round residential drinking water system, you have an obligation to familiarize yourself with your regulatory requirements.

This guide provides a general overview on sample collection, handling, storage and transport. Detailed sampling instructions must be provided by the laboratory. Ensure that when contracting each laboratory to analyze your samples, you obtain specific directions on these issues from the laboratory staff. In some cases, the laboratory may also provide sample collection services as well.

Links to drinking water-related statutes, regulations and procedures, can be accessed through the Ministry's website at [www.ene.gov.on.ca](http://www.ene.gov.on.ca). See the back page of this guide for details.

### **Note, contact your laboratory for sampling instructions.**

This general sampling guidance should only be followed where detailed laboratory instructions have not been provided or are not available. Where instructions from your laboratory are inconsistent with this general guidance, you must follow the directions of the laboratory to ensure accurate test results.

### **Which laboratories must I use to perform tests?**

The laboratories that you use to test your samples must be Licenced by the Ministry of the Environment. To be Licenced, a laboratory must be accredited to test for specific parameters. While some laboratories may be Licenced to test for all the microbiological and chemical parameters required by the Regulation, others may be Licenced to test only microbiological parameters and/or only some chemical parameters. A laboratory that is not Licenced to test for a parameter can sub-contract the testing of that parameter to another laboratory that is Licenced for that parameter, but only with your consent

### **How can I find out if a laboratory is Licenced?**

1. View the list of Licenced laboratories on the Ministry's web site: <http://www.ene.gov.on.ca/envision/water/sdwa/Licencedlabs.htm> , or
2. Contact the Public Information Centre at 1-800-565-4923 or (416) 325-4000, or
3. Contact a laboratory directly and ask them what they are Licenced to test for.

### **Step 1: Use a Licenced Laboratory**

The laboratory or laboratories that analyze your drinking water samples, as required by the Drinking-Water Systems Regulation, must be Licenced for each specific parameter that is being tested. As of October 1, 2003, you must select a laboratory that is Licenced by the Ministry of the Environment.

Part VII of the *Safe Drinking Water Act* and O. Reg. 248/03 (Drinking-Water Testing Services) cover the licensing of laboratories.

<p><b>Must I follow instructions given to me by the laboratory?</b>          Make sure that all the people who are collecting drinking water samples from your system understand clearly that they must carefully follow the directions of the laboratory, including:</p> <ul style="list-style-type: none"> <li>• collection procedures;</li> <li>• the use of specified kinds of containers, or containers that are provided by the laboratory;</li> <li>• the labelling of samples;</li> <li>• the completion and submission of forms, including chain-of-custody forms that are provided by the laboratory. You must complete the mandatory fields in the chain-of-custody forms. Ensure that you have indicated whether or not the sample is a regulated sample;</li> <li>• methods of transporting samples, including temperature conditions that must be maintained during transportation; and</li> <li>• time periods for delivery of samples.</li> </ul>	<p><b>Step 2:          General Sample Handling</b></p> <p>As the owner of the regulated drinking water system, you are required by the Regulation to ensure that samples are collected properly. Follow the directions of the testing laboratory in collecting drinking water samples.</p>
<p><b>Where do I take distribution samples?</b>          Where the regulation states that “distribution samples” must be taken, you must ensure that these samples are representative of the whole system and taken from locations that are typical for your system. Distribution samples can be taken from distribution lines, but also can be taken from plumbing lines or fixtures where you have adequate access and where such locations are typical of your system. Distribution samples must be taken from points significantly beyond the point at which drinking water enters the distribution system or plumbing. However, for a small system (e.g., a system serving a single building), locations that are representative of the whole system may include some sampling locations that are close to the point where plumbing enters the building. These locations are acceptable.</p> <p><b>How do I identify representative sampling locations?</b>          When identifying sampling locations that are representative of the system, consideration must also be given to other characteristics that are unique to your system such as patterns of system usage, locations of storage tanks, dead-ends, stagnant lines, ageing water mains, extremities of the system, etc., especially locations where the degradation of water quality and disinfection residual are possible. The objective is to measure the quality of water being supplied to the consumer.</p>	<p><b>Step 3:          Where to Collect Samples</b></p> <p>In all cases, collect the samples from the location or point(s) stipulated in the Drinking-Water Systems Regulation (O. Reg. 170/03). This section provides guidance on taking “distribution samples” and selecting representative sampling locations.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>See Schedules 6 to 15 of the Drinking-Water Systems Regulation (O. Reg. 170/03) for information on sampling locations.</p> </div>

### **How do I collect the samples I need?**

- Always ensure a clear pathway from the source to the sample collection point by removing aerators, tap screens, hoses, filters, etc., from any tap used during sample collection.
- Always allow the water to run for at least two minutes before collecting drinking water samples.
- Always use the sampling bottles provided by the laboratory. These will be sterile bacteriological sampling bottles containing the preservative sodium thiosulphate. If these bottles have tamper-proof seals and the seal has been broken, consider the bottle contaminated and request that the laboratory provide a new bottle.
- Do not rinse sample bottles containing preservatives, as this will remove some or all of the preservative, and ruin the sample.

NOTE: The purpose of the preservative in the sampling bottles is to prevent the collected water quality from degrading so that it no longer accurately reflects the quality of the water in your system.

- Do not touch or handle the preservative. Do not touch the inside or lip of the sampling container or cap with your fingertips to avoid the possibility of sample contamination. The inside of the cap and container should not come into contact with anything other than the atmosphere and the collected sample.
- Cap the bottle immediately after sample collection.
- Fill the bottle to the shoulder, leaving an air space. Do not allow the sample to overflow the sample bottle.
- Adjust the tap flow rate to prevent splashing.
- Ask the laboratory for further instructions if necessary.

### **How do I handle and store the samples?**

- To prevent significant changes in target bacterial populations, the samples for microbiological testing should be kept between 4 - 10 °C until they are delivered to the laboratory. (The low temperature slows growth and helps to maintain the target bacterial population at the level that existed at the time of sample collection.)
- Submit samples to the laboratory as quickly as possible after collection. The laboratory will provide you with information concerning the timeframe within which microbiological samples must be received, usually 48 hours or less.
- For transport to the laboratory, place samples in coolers or in foam pack containers with ice or ice packs. Do not pack the bottles with loose ice as this may contaminate the sample. If loose ice must be used, the ice should be encased in waterproof packaging or a sealed container.
- Do not allow samples to freeze. Some courier companies offer heated shipping in the winter months.
- Ship samples as early in the week as possible so that the laboratory receives them well before the weekend. Your samples will be ruined if they are being stored over a weekend because microbiological samples need to be received and analysis started within 48 hours of the time of collection.

### **When and how must I test for chlorine residual?**

If the system is currently using chlorination or chloramination and the sample is a distribution system sample taken for microbiological testing, you must ensure that the chlorine residual is tested at the same time as sample collection and at the same location from which the sample is collected.

Record the chlorine residual on the microbiological sample submission forms, if specific directions for recording are not provided by the laboratory.

## **Step 4: Testing for Microbiological Parameters**

This involves the analysis of certain indicator bacteria (*E. coli*, total coliforms and heterotrophic bacteria). If directions from the laboratory differ from the guidance provided in this section, please follow the directions of the laboratory.

Schedules 6, and 10 to 12 of the Drinking- Water Systems Regulation (O. Reg. 170/03) cover testing for biological parameters and the chlorine residual test.

This section applies to distribution samples taken for microbiological testing from systems that use chlorination or chloramination.

### **How do I collect the samples I need?**

- Take considerable care when collecting these samples as contamination may occur from the outside of the sample containers and other materials such as gloves. (The unstable nature of many organic compounds requires strict adherence to sampling protocols, including the use of proper sample containers and preservatives if recommended.)
- Use sampling bottles provided by the laboratory. For most organic compounds a glass container is necessary. Some organic compounds are light-sensitive and require brown glass containers or storage away from light. The laboratory will provide this direction.
- Sample volume is a major consideration when collecting organic samples; in most cases, a relatively large sample size (500 to 1000 mL) is required.

### **How do I collect the samples I need for the analysis of volatile organic compounds?**

- For samples which require analysis for volatile components (i.e., benzene, toluene, etc.), collect the samples in a manner in which no headspace (air pocket) is left in the bottle.
- To eliminate headspace, fill the container slowly to overflowing, avoiding any mixing or shaking.
- Place the cap on the bottle while the sample is overflowing, or fill sample slowly until there is a convex meniscus (dome) of water extending higher than the top of the container. Cap carefully; a small amount of sample may be lost when capped. Once capped, turn the bottle upside down. No air bubble should be present.

### **How do I handle and store the samples?**

- Submit samples to the laboratory as quickly as possible after collection, or as directed by the laboratory.
- If the samples must be stored, then keep them refrigerated.
- Ship samples as early in the week as possible because there is no guarantee that couriers will store them in a refrigerator over a weekend.
- Many organic compounds break down or undergo transformations when subjected to light or in the presence of bacteriological activity or chlorine. Light sensitive organic compounds must be collected and submitted in brown glass containers. (Be sure to get clear instructions from the laboratory[ies].)

## **Step 5: Testing for Organic Parameters**

Organic chemistry is the chemistry of carbon compounds; in general, organic parameters are compounds containing carbon. Typical chemical compounds defined as organic include pesticides, petroleum products, polychlorinated biphenyls (PCBs), phenols, chlorinated or non-chlorinated solvents, etc. Organic compounds can be liquid, solid or gaseous. Some dissolve or mix with water and others do not. If directions from the laboratory differ from the guidance provided in this section, please follow the directions of the laboratory.

Schedules 13 to 15 of the Drinking-Water Systems Regulation (O. Reg. 170/03) cover testing for organic parameters.



### **What inorganic parameters must I sample for?**

These tests include nutrients (nitrate, nitrite), ions (such as fluoride or sodium), and the metals group (including commonly known elements, such as iron, copper, lead, mercury and manganese). For the most part, these tests are performed on drinking water samples to assess the overall quality of the water.

### **How do I collect the samples I need?**

- Use the sampling bottles provided by the laboratory. If the bottle contains a preservative, do not touch or handle the preservative. Do not rinse the containers, as this will remove some or all of the preservative, reducing the accuracy of the test results. Do not allow the sample bottle to overflow or the preservative will be diluted. Ask the laboratory for further instructions, if necessary.
- In some cases, such as when strong acid is used to preserve the sample, the laboratory may direct you to add the preservative after taking the sample. It is very important that you follow this direction if provided. It will make a difference to the accuracy of the results.
- Fill all sampling bottles to the shoulder.
- In general, inorganic compounds are sampled in plastic containers, although glass containers may be used for some tests such as mercury.

### **How do I handle and store the samples?**

- Submit samples to the laboratory as quickly as possible after collection. Pay close attention to the holding times as they differ significantly between different inorganic parameters (e.g. Nitrate and Nitrite require 7 days; Iron requires 60 days).
- If the samples must be stored, then keep them refrigerated.
- Ship samples as early in the week as possible because there is no guarantee couriers will store them in a refrigerator over a weekend.

## **Step 6: Testing for Inorganic Parameters**

Laboratories generally require one or more bottles for what they term general chemistry testing and a separate bottle for metals testing (because a preservative is required to stabilize the metals in the sample). If directions from the laboratory differ from the guidance provided in this section, please follow the directions of the laboratory.

Schedules 13 to 15 of the Drinking-Water Systems Regulation (O. Reg. 170/03) cover testing for inorganic parameters.

<p><b>What information must be recorded when I collect samples?</b>  Record the date and time the sample was taken.  Note: The recording of the time when the sample was taken is very critical when microbiological samples are collected because holding times differ significantly between parameters.</p> <p>Record the location where the sample was taken, and the name of the person who took the samples that are required by the Drinking-Water Systems Regulation.</p> <p>In addition, the laboratory must provide you with chain-of-custody forms which must be filled out and submitted to the laboratory with the samples. Ensure that the mandatory fields in the chain-of-custody forms are complete and that you have indicated whether or not the sample is a regulated sample. It is critical that drinking water samples are collected as specified by the laboratory. Otherwise, inaccurate analyses may create false positive results and unnecessary notifications and corrective actions.</p> <p><b>How long must sampling records be kept?</b>  These records must be kept for at least 5 years if the records relate to microbiological samples, and for at least 15 years if the records relate to chemical samples.</p>	<p><b>Step 7:  Records and Record Keeping</b></p> <p>According to the Drinking-Water System Regulation (O. Reg. 170/03), written records must be compiled during sampling, and chain-of-custody forms must be completed and submitted to the laboratory with the samples. The owner/operator of the treatment system must keep sampling records for a specified period of time.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Section 13 of the Drinking-Water Systems Regulation (O. Reg. 170/03) covers records and record keeping.</p> </div>
<p>See the Ministry’s document “Practices for the Collection and Handling of Drinking Water Samples”, which is available on the Ministry’s website at <a href="http://www.ene.gov.on.ca">www.ene.gov.on.ca</a>.</p> <p>To be clear about your specific legal requirements, you must refer to the text of the Drinking-Water Systems Regulation (O.Reg.170/03) and the <i>Safe Drinking Water Act</i>, 2002. You can access these at <a href="http://www.ene.gov.on.ca">www.ene.gov.on.ca</a> under the section entitled Water, or by calling our Public Information Centre at 1-800-565-4923.</p>	<p><b>Step 8:  Finding More Information</b></p> <p>The Ministry of the Environment has prepared more detailed information on collecting and handling drinking water samples.</p>

**This is the third guide in a four-guide kit.**

The Ontario Ministry of the Environment has prepared a series of guides for regulated non-municipal year-round residential drinking water systems. If you do not have a copy of the relevant guide, please contact the nearest Ministry office for a copy, download an electronic version from the Ministry's website at [www.ene.gov.on.ca](http://www.ene.gov.on.ca), or call our Public Information Centre at 1-800-565-4923. See the back page of this guide for other sources of information.

**Guide 1, Does the Regulation Apply to Me?**

**Guide 2, Meeting my responsibilities under O. Reg. 170/03.**

- Non-Municipal Year-Round Residential Systems

**Guide 3, How to Collect Drinking Water Samples**

**Guide 4, Glossary of Terms**

Note: reference should always be made to the text of the Drinking-Water Systems Regulation (O. Reg. 170/03), the *Safe Drinking Water Act*, 2002, and the other related regulations and procedures to ascertain an owner/operator's specific legal requirements.

## Where Do I Go From Here?

The Resource Package for Regulated Non-Municipal Year-Round Residential Drinking Water Systems contains a number of Guides that, together, are designed as a support tool to help owners and operators of regulated systems deliver safe, clean drinking water. Titles in this Kite will help you:

- determine whether the system you own or operate is regulated under O. Reg. 170/03;
- provide more detailed information on non-municipal year-round residential drinking water systems;
- show you how to collect samples and have them analyzed; and
- provide definitions of key technical and water management terms.

If you do not have a copy of the relevant guide, please contact the nearest Ministry office for a copy, or download an electronic version from the Ministry's website at [www.ene.gov.on.ca](http://www.ene.gov.on.ca). See the back cover of this guide for details.

## How do I obtain the documents and contact information I need?

<p><b>How can I obtain a copy of the <i>Drinking-Water Systems Regulation</i> and additional information on my regulatory responsibilities?</b></p>	<p>Visit the Ministry website at <a href="http://www.ene.gov.on.ca">www.ene.gov.on.ca</a>, click on “Water” then scroll down the page and click on “Drinking-Water Systems Regulation – Information Page” (<a href="http://www.ene.gov.on.ca/envision/water/sdwa/dwsr.htm">http://www.ene.gov.on.ca/envision/water/sdwa/dwsr.htm</a>). This will take you to a full page of links to key documents, technical updates, laboratory licensing information, legislation and regulations, forms, general information and related documents. Or contact the Ministry’s Public Information Office toll-free at 1-800-565-4923, or at 416-325-4000 in Toronto.</p>
<p><b>How do I find a Licenced laboratory for analyzing my drinking water samples?</b></p>	<p>Check the Ministry website for a list of laboratories Licenced to perform drinking water testing under the <i>Safe Drinking Water Act</i>, available at: <a href="http://www.ene.gov.on.ca/envision/water/sdwa/Licensedlabs.htm">http://www.ene.gov.on.ca/envision/water/sdwa/Licensedlabs.htm</a>. You can also call the Ministry of the Environment Laboratory Licensing Administrator at 416-235-6370.</p>
<p><b>How do I contact the Local Medical Officer of Health or the Public Health Unit for my community?</b></p>	<p>Check the “Blue Pages”, under the heading “Health”, in your local telephone directory for the listing of your public health unit. You can also visit the website of the Ministry of Health and Long-Term Care (MOHLTC) at <a href="http://www.health.gov.on.ca">www.health.gov.on.ca</a>, or call the MOHLTC info-line at 1-800-268-1154, or 416-314-5518 in Toronto.</p>
<p><b>Where can I find the nearest local or regional office of the Ministry of the Environment?</b></p>	<p>Check the “Blue Pages”, under the heading “Environment”, in your local telephone directory. You can also visit the Ministry website at <a href="http://www.ene.gov.on.ca">www.ene.gov.on.ca</a> and look under the heading “About the Ministry” on the home page. Or contact the Ministry’s Public Information Office toll-free at 1-800-565-4923, or at 416-325-4000 in Toronto.</p>
<p><b>Where can I find more information on training and certification of system operators?</b></p>	<p>Contact the Ontario Environmental Training Consortium (OETC) through its website at <a href="http://www.oetc.on.ca">www.oetc.on.ca</a>, or by telephone at 905-796-2851. For more information, the new Certification of Drinking-Water System Operators and Water Quality Analysts Regulation (O. Reg. 128/04) is available at: <a href="http://www.e-laws.gov.on.ca/DBLaws/Regs/English/040128_e.htm">http://www.e-laws.gov.on.ca/DBLaws/Regs/English/040128_e.htm</a>.</p>