

Small Drinking Water Systems (SDWS) Risk Assessment Directives Guidance Document

**This Document is in Support of the Safe
Water Program, Drinking Water
Protocol**

**Environmental Health Branch
Public Health Division
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Introduction

A. Purpose

The purpose of this document is to provide guidance to boards of health in developing and issuing directives to owners and operators of small drinking water systems (SDWS) in accordance with section 7 of O. Reg. 319/08 (Small Drinking Water Systems) under the *Health Protection and Promotion Act*. Directives are issued after site-specific assessments are completed and outline the requirements that apply to that particular drinking water system.

B. Recommended content and format of a directive notification to the owner or operator

The **content** of a directive notification may include the following sections:

- Name and full address of owner
- Location and legal description of the small drinking water system
- Reason(s) for the directive(s)
- Risk level category
- Notice of the right for a review by the local medical officer of health
- Notice of penalty for non-compliance
- Date and location of service
- Signature of public health inspector

The directive notification could be organised in the following **format**:

- Part 1 – Risk Assessment Process
- Part 2 – Treatment Equipment
- Part 3 – Sampling and Testing
- Part 4 – Operational Checks
- Part 5 – Posting of Warning Signage
- Part 6 – Records
- Part 7 – Operator Training

Introduction

This document provides guidance to public health inspectors (PHI) in respect of the process to use in determining the most appropriate requirements to be placed in a directive based on the results of a site-specific risk assessment. The findings from the site-specific risk assessment, the inspection and the sampling process should be used to set case-by-case requirements in addition to the minimum requirements specified in regulation. These additional minimum requirements are to be provided to the operator as directives.

Part 1 – Risk Assessment Process

The public health approach to protecting drinking water is based on assessing and identifying potential risks associated with a small drinking water system. Following a risk assessment, basic requirements are set to assist the operator to adequately maintain and supervise the provision of drinking water. For the purposes of the Small Drinking Water System Program at a minimum the following activities must be conducted:

- an on-site visit to the premises to conduct a visual inspection of the small drinking water system and components, property and surrounding area
- the administration of the risk categorization (RCat) tool
- collecting water samples
- a review of the system's past water sampling history
- identification of any risks associated with the system
- the assignment of a risk category
- determination of requirements
- reasons for directives

Risk Categorization (RCat) Tool

The Risk Categorization (RCat) tool was developed by the Ministry of Health and Long-Term Care (MOHLTC) specifically for site specific risk assessments of small drinking water systems. The tool helps PHIs conduct onsite risk assessments for the purposes of determining whether SDWS are operating in a manner which provides safe water. The RCat tool comprises a series of questions which leads to risk ratings of the source of water, treatment system and distribution system. It has been designed to consider all parts of the small drinking water system from source water to consumer, using a multiple barrier approach to protect drinking water.

The ratings are used to assign one of following risk categories for the system as a whole:

- High = Significant level of risk
- Moderate = Medium level of risk
- Low = Negligible level of risk

Part 2 – Treatment Equipment

Water Treatment

The suggested recommendations for water treatment should be based on the possibility of contamination in the source water and a history of water test results.

1. For drinking water systems that provide drinking water that is derived from a **secure ground water source**, and where the water sampling and testing results indicate a

normal condition of less than 5 total coliforms per 100 millilitres and no *Escherichia coli* it is normally acceptable that treatment is not provided.

2. For drinking water systems that use a **ground water source** that may contain bacteria and viruses but is not likely to contain cysts or oocysts, consideration should be given to requiring the owner to:
 - a) Provide filtration or other treatment necessary to allow for proper functioning of the disinfection equipment or disinfection chemical;
 - b) Provide disinfection using either disinfecting equipment or disinfection chemicals that would normally result in providing water that, when sampled and tested, have 0 total coliforms per 100 millilitres and no *Escherichia coli*.
3. For drinking water systems that use a **ground water source** that may contain bacteria, viruses, cysts or oocysts and **surface water** is suspected of entering the well, the owner be required to:
 - a) Provide filtration that is designed to be capable of achieving at all times at least 99 per cent removal or inactivation of *Cryptosporidium* oocysts, at least 99.9 per cent removal or inactivation of *Giardia* cysts and at least 99.99 per cent removal or inactivation of viruses;
 - b) Provide filtration or other treatment as necessary to remove water content or chemicals to allow for proper functioning of the disinfecting equipment or disinfection chemical;
 - c) Provide disinfection using either disinfecting equipment or disinfection chemicals that would normally result in providing water that, when sampled and tested, have 0 total coliforms per 100 millilitres and no *Escherichia coli*.
4. For drinking water systems that use a **surface water source** that may contain bacteria, viruses, cysts or oocysts the owner be required to:
 - a) Provide filtration that is designed to be capable of achieving at all times at least 99 per cent removal or inactivation of *Cryptosporidium* oocysts, at least 99.9 per cent removal or inactivation of *Giardia* cysts and at least 99.99 per cent removal or inactivation of viruses;
 - b) Provide filtration or other treatment necessary to allow for proper functioning of the disinfection equipment or disinfection chemical;
 - c) Provide disinfection using either disinfecting equipment or disinfection chemicals that would normally result in providing water that, when sampled and tested, have 0 total coliforms per 100 millilitres and no *Escherichia coli*.
5. For systems other than those systems mentioned in recommendations 2, 3 and 4 where the water system provides water intended to become drinking water through use of point of entry or point of use treatment equipment, it is recommended that the owner or operator be required to:
 - a) Filter and disinfect as necessary to ensure that the water being treated by the point of entry or point of use treatment equipment will be capable of providing

water that when sampled and tested will have less than 0 total coliforms per 100 millilitres and no *Escherichia coli*;

This may include: the provision of filtration that is designed to be capable of achieving at all times at least 99 per cent removal or inactivation of *Cryptosporidium* oocysts, at least 99.9 per cent removal or inactivation of *Giardia* cysts and at least 99.99 per cent removal or inactivation of viruses;

- b) Provide filtration or other treatment as necessary to remove water content or chemicals to allow for proper functioning of the disinfecting equipment or disinfection chemical.
6. For drinking water systems that provide water through distribution piping it is recommended that the owner be directed to have the water treated with a disinfectant that would provide a residual of that disinfectant. This in accordance with the requirements for secondary disinfection in the regulation if distribution is not through piping that is plumbing or a protected distribution system or where point of entry or point of use treatment is appropriately provided.
 7. Despite recommendation 6, where a distribution system serves less than 10 connections, consideration should be given to not requiring secondary disinfection if:
 - a) access to the system is sufficiently restricted
 - b) the risk to the users of the system is acceptable and
 - c) sampling is done at a frequency in accordance with **Tables 1 and 2, 3 or 4.**

Part 3 – Sampling and Testing

Sampling and Testing Requirements for Primary Parameters – Bacteriological

This section provides suggested recommendations to assist in determining the scheduling of sampling and testing for bacteria (total coliforms and *E. coli*) to be included in a directive notification where the entire system is not posted. In making determinations with regard to scheduling of sampling the following factors should be taken into account:

- whether the drinking water is provided with treatment,
- whether the drinking water source and the distribution system is protected or unprotected, and
- the risks identified through use of the risk categorization (RCat) tool

Sampling History

Where there is a new drinking water system or where a system has less than one year's history of sampling and testing it is recommended that they be required to take samples at the minimum rate of one sample per month or at any level greater than one sample

per month as indicated by **Table 1** and **2, 3, or 4**. These samples are in addition to the regular sampling program recommended by the public health inspector.

Table 1: Frequency of bacterial sampling for E. coli and total coliforms for all small drinking water systems with a testing history
(This is a listing of suggested recommendations)

Risk Category	Treatment Provided	Frequency of sampling water after being treated or otherwise directed for consumption
Low	No	Every three months
	Yes	Every three months
Medium	No	Every month
	Yes	Every two months
High	No	Every week
	Yes	Every two weeks

Sampling Requirements for Distribution Systems

Tables 2, 3 or 4 are to be used in addition to **Table 1** to provide recommended sampling requirements for small drinking water systems with unprotected distribution systems.

Table 2
Sampling frequency for systems within un-protected distribution systems – low risk
(This is a listing of suggested recommendations)

Recommendation applies to	Secondary Treatment	Number and frequency of sampling
2 – 10 connections	Yes or no [§]	One sample monthly
11 – 100 connections	Yes	One sample monthly
≥101 connections	Yes	One sample from the treated water supply and one sample for every 100 connections or part thereof from the distribution system monthly

[§] For systems that distribute water to **2 - 10 connections** that do not require the provision of secondary treatment other than for systems using point of entry treatment the sampling frequency is to be the greater of **Table 1** or sampling frequency in **Table 2**.

Table 3
Sampling frequency for systems within un-protected distribution systems – moderate risk
(This is a listing of suggested recommendations)

Recommendation applies to	Secondary Treatment	Number and frequency of sampling
2 – 10 connections	Yes or no [§]	One sample monthly
11 – 100 connections	Yes	One sample monthly
≥101 connections	Yes	One sample from the treated water supply and one sample for every 100 connections or part thereof from the distribution system every two weeks

[§] For systems that distribute water to **2 - 10 connections** that do not require the provision of secondary treatment other than for systems using point of entry treatment the sampling frequency is to be the greater of **Table 1** or sampling frequency in **Table 3**.

Table 4
Sampling frequency for systems within un-protected distribution systems – high risk
(The following is a listing of suggested recommendations)

Recommendation applies to	Secondary Treatment	Number and frequency of sampling
2 – 10 connections	Yes or no [§]	One sample monthly
11 – 100 connections	Yes	One sample every two weeks
≥101 connections	Yes	One sample from the treated water supply and one sample for every 100 connections or part thereof from the distribution system every week

[§] For systems that distribute water to **2 - 10 connections** that do not require the provision of secondary treatment other than for systems using point of entry treatment the sampling frequency is to be the greater of **Table 1** or sampling frequency in **Table 4**.

Other factors to consider:

For systems that distribute water where there is an exemption for the provision of secondary treatment due to the use of point of entry or point of use treatment **Table 1** may not be necessary. It is recommended that sampling should be required to be done in a rotational pattern with no post treatment site sampled a second time until all other post treatment sites have been sampled.

Where there is less or equal to 100 connections, it is recommended that samples be required to be taken at a location where the sampling point would be representative of the majority of the water in the distribution system.

Where there is greater than 100 connections, it is recommended that samples be required to be taken at a location where the sampling point would be representative of the majority of the water within each 100 connections or part thereof.

Sampling and Testing Requirements for Secondary Parameters – Chemical or Radiological

For any water supply where a chemical or radiological agent is suspected, (soil content, nearby chemical storage, chemical spill) it is recommended that consideration be given to requiring testing for the suspected chemical or radiological agent.

However, where testing results indicate that the level of chemical or radiological agent is below the limits in the Ontario Drinking Water Quality Standards or otherwise deemed acceptable, and where the contaminants are naturally occurring and not expected to increase, it is recommended that no further sampling be required

Where contaminants are identified and have the potential to fluctuate in a manner that may cause an increased risk to the health the users, a required schedule for regular sampling and testing should be considered. This information should provide enough surveillance data to monitor any potential increased risk to the users of the water supply.

Part 4 – Operational Checks

Where filtration is to be required it is recommended that turbidity should be tested at a minimum frequency of at least 48 hours and not more than 96 hours after the most recent test.

Where a requirement for primary or secondary disinfection is to be placed on a system, it is recommended that the chlorine residual should be tested at a minimum frequency of at least 24 hours and not more than 72 hours after the most recent test.

Part 5 – Posting of Warning Signage

O. Reg. 319/08 (Small Drinking Water Systems) under the *Health Protection and Promotion Act*, subsection 7 (6), allows public health inspectors to issue directives requiring the posting and maintaining of warning signs. The public health inspector should direct the appropriate placement and desired content for such signage in accordance with posting of the entire small drinking water system or at specific service connections.

Part 6 – Records

O. Reg. 319/08 (Small Drinking Water Systems) under the *Health Protection and Promotion Act*, subsection 7 (6) allows public health inspectors to issue directives requiring the maintenance of records relating to the operation of the system. The public

health inspector should also consider whether specifying the manner in which such records should be created is appropriate.

Part 7 – Training

All operators should be trained in the operation of the system for which they are in charge so as to be aware of their responsibilities to the users and the regulations and to be capable of maintaining the provision of safe water to the users under normal operational conditions.

Training at a minimum should include awareness of normal operation of the system in order to respond appropriately to an adverse test result or other conditions that may affect the safety of the water.

Tables 5 and 6 are to be used together to determine appropriate level of training required by operator.

Table 5 provides minimum recommendations of core competencies used to determine operators’ ability to adequately operate the small drinking water systems for which they are responsible. This should be used with Table 6 to determine training requirements.

Table 5
Suggested recommendations for determining operator competency

	Groundwater (no treatment required)	UV light only	Filtration and chemical disinfection	Distribution system (secondary disinfection)	Signage
Knowledge of general protection requirements (Issues may include source water protection issues, potential of system failure, notification of users)	yes	yes	yes	yes	Yes
Knowledge of procedures to respond to adverse result or adverse observation	yes	yes	yes	yes	Yes
Knowledge of proper sampling techniques and lab submission process	yes	yes	yes	yes	n/a
Ability to operate and understand the functioning of the treatment equipment	n/a	yes	yes	yes	n/a
Ability to maintain the operation of the equipment to at least manufacturer’s recommended instructions	n/a	If not supported by a service company with appropriately trained staff			n/a

Table 6 provides minimum recommendations determine training requirements for operators of small drinking water systems.

Table 6					
Suggested recommendations to determine training requirements					
<i>(The following is a listing of suggested recommendations)</i>					
Minimum required system configurations [§]	Training Requirements				
	Handout	Other approved training	MOE trained person (or approved agents)		
			Basic operator	Limited site-specific operator	Certified operator
No treatment required or non-chlorinated treatment (serving protected, posted or point of entry only distribution systems) e.g., UV light	X				
Primary chemical disinfection (no filtration provided for cysts or oocysts removal)	X	X			
Distribution only, no further treatment required (serving ≤ 10)	X	X			
Distribution only, secondary disinfection, chlorine (serving < 10)	X		X		
Distribution only, secondary disinfection, point of entry (serving < 10)	X	X			
Filtration with primary or secondary disinfection (Protected distribution or system 2 - 10)	X		X		
Distribution only, secondary disinfection (serving > 10)	X			X	
Filtration with primary or secondary disinfection (distribution system > 10)	X				X

§ Where filtration is required for secondary parameters, PHI should determine if additional training is required for the adequate operation of the system.

Glossary

“Protected distribution system” means the interior piping or works only or piping or works encased in conduit or otherwise protected and can be considered equivalent to interior piping or works as it conveys drinking water from one building to another.

“Un-protected distribution system” means the piping or works that extends beyond one building where the piping or works is not encased in conduit or otherwise protected and there exists a potential for contamination due to degradation or damage.

“Number of connections” means the number of drinking water access points either single or grouped.

“Access points” means,

- a) Single access point refers to a single stand alone access point which may have one or more spouts, such as a drinking water fountain or tap or a trailer park site hook-up.
- b) Grouped access point refers to a system of plumbing within a single building.