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
Ministry of Health and Long-Term Care
December 1, 2008

This guidance document is intended to support boards of health, and in particular, public health inspectors, in issuing directives under section 7 of the Permanent Regulation. This document is not intended to provide legal advice or to be a substitute for the professional judgment of public health inspectors. Public health inspectors should consult with legal counsel as appropriate when issuing directives to owners of Small Drinking Water Systems.

Ontario

Table of Contents

Preamble

Effective December 1, 2008, responsibility for overseeing five categories of small drinking water systems (SDWS) transferred from the Ministry of the Environment (MOE) to the Ministry of Health and Long-Term Care (MOHLTC), in accordance with Schedule D of the *Health System Improvements Act, 2007*. Two new regulations under the *Health Protection and Promotion Act*[1] (HPPA) also came into force at this time. The new regulations are O. Reg. 318/08 (Transitional – Small Drinking Water Systems)[2] (the Transitional Regulation) and O. Reg. 319/08 (Small Drinking Water Systems)[3] (the Permanent Regulation).

Under this new risk-based approach, public health inspectors (PHIs) are responsible for conducting site-specific risk assessments of every SDWS in the province. Based on the assessment, PHIs determine what owners and operators must do to keep their drinking water safe and issue a directive for each system, which may include requirements such as water testing, treatment and training. This reflects a customized approach for each SDWS depending on the level of risk, rather than "one-size-fits-all" requirements.

The Transitional Regulation carries forward the main requirements of O. Reg. 252/05 under the *Safe Drinking Water Act*. It stays in effect for each system until a PHI conducts a site-specific risk assessment on that system and issues a binding directive to the system owner, at which time the Permanent Regulation will apply to the SDWS. The Permanent Regulation sets out the new requirements that must be followed by each SDWS, such as minimum quarterly testing for Escherichia coli and total coliforms.

Following the transfer of legislative oversight, owners and operators of SDWS will continue to be responsible for keeping drinking water safe and meeting their regulatory requirements.

1 Purpose

This document is referenced in the Drinking Water Protocol[4], under the Safe Water Standard component of the Ontario Public Health Standards. Specifically, under Section 1 g) of this protocol, boards of health are required to "issue directives to owners of small drinking water systems in accordance with the most current version of the *Small Drinking Water Systems Risk Assessment Directives Guidance Document*."

The purpose of this document is to provide guidance to boards of health and, in particular, to PHIs, in developing and issuing directives to owners of SDWS in accordance with section 7 of the Permanent Regulation. The site-specific requirements outlined in the directives are in addition to the minimum requirements specified in the Permanent Regulation.

1.1 Recommended content and format of a directive to the SDWS owner

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

- Name and full address of owner (i.e., sufficient for legal service – not a PO Box)
- 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 and process for requesting such a review in accordance with Section 38 of the Permanent Regulation
- 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

2 Risk Assessment Process

The public health approach to protecting drinking water is based on assessing and identifying potential risks associated with a SDWS. Following a risk assessment, basic requirements are set to assist the owner/operator in adequately maintaining and supervising the provision of drinking water. For the purposes of the Small Drinking Water System Program and in accordance with Section 1 f) of the Drinking Water Protocol, the following minimum activities must be conducted by the PHI as part of the risk assessment process:

- Conduct a site-specific visit of the small drinking water system;
- Use the most current version of the ministry-approved risk categorization (RCat) tool in accordance with any ministry instructions relating to that version;
- Assign a risk category of “high”, “moderate” or “low” for each system;
- Assess each system’s compliance with regulations;
- Issue a written directive to the owner of each system outlining the site-specific requirements for the system following an initial risk assessment; and
- Issue a new directive or written amendment to a directive to the owner of each system outlining the site-specific requirements for the system following any subsequent routine risk assessment of the system, where deemed necessary.

As part of the risk assessment process, examples of other activities include:

- Collecting water samples, as deemed necessary;
- Reviewing the system’s past water sampling history;
- Maintaining water sampling records – if no sampling history exists; and
- Outlining the reasons for the directives.

2.1 Risk Categorization (RCat) Tool

The Risk Categorization (RCat) tool was developed by the MOHLTC specifically for site-specific risk assessments of small drinking water systems. The tool is intended to assist PHIs conduct on-site 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 will assist in identifying the security of the water source and system, and leads to risk ratings of the source of water, treatment system and distribution system. It has been designed to consider all parts of the SDWS 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

3 Water Treatment

The requirements for water treatment should be set in accordance with the findings of the risk assessment and inspection process and based on the possibility of contamination in the source water and a history of water test results.

3.1 For small 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 condition of less than 5 total coliforms per 100 millilitres and no Escherichia coli, it is normally acceptable that treatment is not provided.

3.2 For small 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/operator to:

a) Provide filtration or other treatment necessary to allow for proper functioning of the disinfection equipment or disinfection chemical; and/or
b) Provide disinfection using either disinfecting equipment or disinfection chemicals that would normally result in providing water that, when sampled and tested, have no total coliforms and no Escherichia coli.

3.3 For small 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**,** consideration should be given to requiring the owner/operator 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 contaminants or chemicals to allow for proper functioning of the disinfecting equipment or disinfection chemical; and/or
c) Provide disinfection using either disinfecting equipment or disinfection chemicals that would normally result in providing water that, when sampled and tested, have no total coliforms and no Escherichia coli.

3.4 For small drinking water systems that use a **surface water source** that may contain bacteria, viruses, cysts or oocysts, consideration should be given to requiring the owner/operator 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 contaminants or chemicals to allow for proper functioning of the disinfecting equipment or disinfection chemical; and/or
c) Provide disinfection using either disinfecting equipment or disinfection chemicals that would normally result in providing water that, when sampled and tested, have no total coliforms and no Escherichia coli.

3.5 Despite section 3.2 to 3.4, where all or part of the water system provides water intended to become drinking water through use of point of entry or point of use treatment equipment, consideration should be given to requiring the owner/operator 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 no total coliforms and no Escherichia coli; and/or

   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 contaminants or chemicals to allow for proper functioning of the disinfecting equipment or disinfection chemical.

3.6 For small drinking water systems that provide water through distribution piping, it is recommended that the owner/operator 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 Permanent 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.

3.7 Despite section 3.6, where a distribution system serves less then 10 connections, consideration should be given to not requiring secondary disinfection if:

a) access to the system is sufficiently restricted and the risk to the users of the system is acceptable; and

b) sampling is done at a frequency in accordance with **Tables 1** and **2.**

3.8 For small drinking water systems that use **other sources** (e.g., hauled water), treatment requirements should align with the security of the system and contents of water in accordance with sections 3.1 to 3.4.

4 Sampling and Testing

4.1 Sampling and Testing Requirements for Primary Parameters – Bacteriological

This section provides suggested recommendations to assist in determining the required scheduling of sampling and testing for bacteria (total coliforms and Escherichia 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:

- History of water sampling results;
- 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 RCat tool

4.2 Sampling History

Where there is a new small drinking water system or where a system has less than one year's history of sampling and testing, it is recommended that the owner/operator be required to take samples at the minimum rate of one sample per month or at a frequency greater than one sample per month as indicated by **Table 1** and **2**.

Table 1: Frequency of bacterial sampling for Escherichia 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	One sample every three months
	Yes	One sample every three months
Medium	No	One sample monthly
	Yes	One sample every two months
High	No	One sample every week
	Yes	One sample every two weeks

[*] *For single-use facilities or where water is only distributed through a protected distribution system (i.e., a low risk system where the interior piping or works only or piping or works are encased in conduit or otherwise protected and can be considered equivalent to plumbing as it conveys drinking water from one building to another).*

4.3 Sampling Requirements for Distribution Systems

Table 2 is 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 unprotected distribution systems, by level of risk
(*This is a listing of suggested recommendations)*

Recommendation applies to	Secondary Treatment	Number and frequency of sampling		
		Low Risk	Moderate Risk	High Risk
2 – 10 connections[†]	Yes or no[§]	One sample monthly	One sample monthly	One sample monthly
11 – 100 connections	Yes	One sample monthly	One sample monthly	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 monthly	One sample from the treated water supply and one sample for every 100 connections or part thereof from the distribution system ***every two weeks***	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 2**.*
[†] *"**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.

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 than 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.

4.4 Sampling and Testing Requirements for Secondary Parameters – Chemical or Radiological

For any water supply where a chemical or radiological agent is suspected (e.g., 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 of 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.

5 Operational Checks

Where filtration is to be required, it is recommended that turbidity should be tested at a frequency of once every 48 hours or adjusted in accordance with the risk level and configuration of the system.

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 frequency of once every 24 hours or adjusted in accordance with the risk level and configuration of the system.

6 Posting of Warning Signage

Subsection 7 (6) of the Permanent Regulation provides that directives may require the posting and maintenance of warning signs. The PHI 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. Consideration should be given to requiring the owner/operator to conduct routine checks to confirm signs are still posted and in a good state of repair that they may be easily read.

Note that under subsection 4 (3) of the Permanent Regulation, where a directive includes a requirement to post a warning sign, the owner and operator of the SDWS will be automatically exempted from a number of requirements under the Permanent Regulation (e.g. requirements related to treatment and record keeping), unless the directive specifies otherwise.

7 Records

Subsection 7 (6) of the Permanent Regulation requires that when a directive notification is issued requesting records of maintenance and operational tests, the document should also specify the recording of such tests.

In addition to records required to be made available for inspection in accordance with sections 10 and 11 of the Permanent Regulation, the PHI can go over and above the minimum requirements where required to address local needs.

8 Training

All operators must 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 of 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 3 and **4** are to be used together to determine appropriate level of training required by operator.

Table 3 provides minimum recommendations of core competencies used to determine the operators' ability to adequately operate the small drinking water systems for which they are responsible. This should be used with **Table 4** to determine training requirements.

Table 3: 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	n/a	yes	yes	yes	n/a

treatment equipment					
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 4 provides minimum recommendations to determine training requirements for operators of small drinking water systems.

Table 4: Suggested recommendations to determine training requirements

Minimum required system configurations[§]	**Training Requirements**				
	Educational material	**Other training***	**MOE trained person** (or approved agents)		
			Basic operator	**Limited site-specific operator**	**Maintenance of Certification**
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, point of entry (serving **< 10**)	**X**	**X**			
Distribution only, secondary disinfection, chlorine (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**	**X**

[§] Where filtration is required for chemical or radiological parameters, PHI should determine if additional training is required for the adequate operation of the system.

**PHIs may require other training programs as appropriate to provide owners/operators with the required knowledge to operate their SDWS (e.g., courses offered/recommended by a manufacturer of treatment devices or by the local health unit; MOE correspondence courses offered through local community colleges or professional associations).*

Appendix A – References

1. *Health Protection and Promotion Act*, R.S.O. 1990, c. H.7. Available from http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm

2. O. Reg. 318/08. Available from: www.search.e-laws.gov.on.ca/en/isysquery/566fb2e2-9025-481d-8fc5-433daf9c2dfb/2/frame/?search=browseStatutes&context= s

3. O. Reg. 319/08. Available from: www.search.e-laws.gov.on.ca/en/isysquery/566fb2e2-9025-481d-8fc5-433daf9c2dfb/1/frame/?search=browseStatutes&context=

4. *Drinking Water Protocol, 2008 (or as current)*