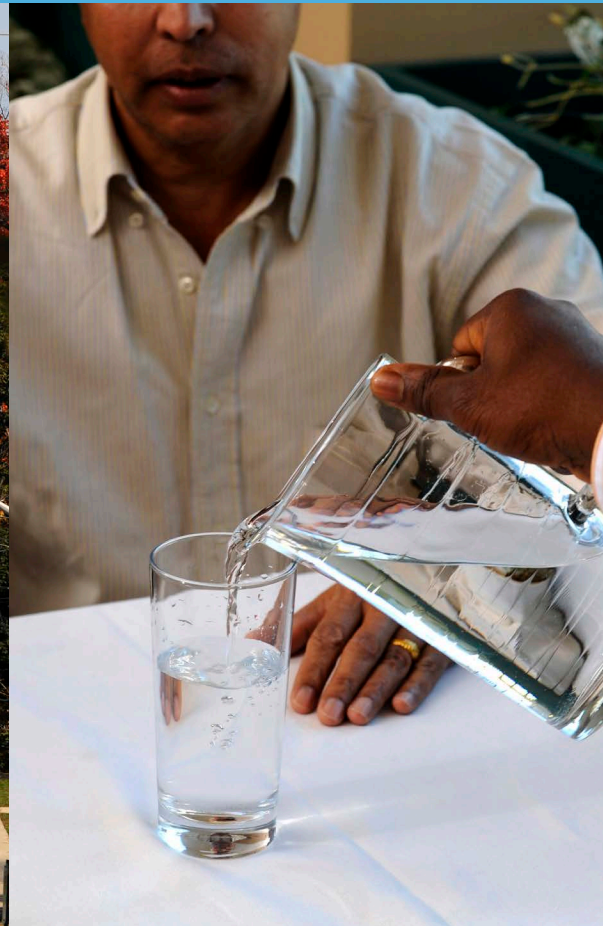


TAKING CARE OF YOUR DRINKING WATER

A GUIDE FOR MEMBERS OF MUNICIPAL COUNCILS



www.ontario.ca/drinkingwater

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- For answers to general questions, contact the Ministry of the Environment and Climate Change at 1-800-565-4923
- Legal Disclaimer – This guide should not be viewed as legal or other expert advice. For specific questions regarding the legal application of the Safe Drinking Water Act (SDWA) and its regulations, please consult a lawyer and/or review the text of the Act at www.e-laws.gov.on.ca

Sources

Much of the material in this guide has been adapted from the Ontario Municipal Water Association's 2004 handbook "Ontario Drinking Water Stewardship Responsibilities" with their permission. Information was also obtained from the following sources:

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A Message from the Chief Drinking Water Inspector of Ontario



Safeguarding drinking water, now and for our future generations, is a vitally important role. It requires leadership, vigilance and ongoing collaboration between the province and Ontario municipalities.

More than 80 per cent of Ontario's population receives their drinking water from

a municipal drinking water system. Drinking water quality and inspection results show that Ontario's municipalities are achieving strong and consistent performance levels. It is because of this dedication to excellence at the municipal level that Ontario's drinking water continues to be of the highest quality.

As good as current results are, constant attention is needed to keep our drinking water safe.

If you are a municipal councillor with decision-making responsibilities for a municipal drinking water system or have oversight of an accredited operating authority, you have a serious and unique role in protecting the people of your community. This guide will help you understand your responsibilities under the Safe Drinking Water Act, 2002 and provide you with information on how Ontario's drinking water is protected. It will help answer questions about your statutory standard of care responsibilities, and it provides some basic reference material on drinking water.

I look forward to continue working with municipalities to further improve how we protect and manage our water resources for the benefit of Ontarians.

Susan Lo
Chief Drinking Water Inspector of Ontario

A Message from Ontario's Chief Medical Officer of Health



Safe drinking water is one of the key pillars of public health in Ontario. Protection of our drinking water is a vital responsibility shared by many partners.

The Ministry of Health and Long-Term Care shares a strong commitment to excellence with the Ministry of the Environment and Climate Change by supporting Boards of Health and communities to provide safe drinking water in the province. Ontario's Boards of Health work together with municipalities in many ways to protect the public, including when your community's drinking water may not be safe for consumption.

As municipal councillors with oversight responsibilities for municipal drinking water systems, you are a critical partner in providing safe drinking water to the people of Ontario. I encourage you to use this resource guide, in your paramount role, to help protect Ontario's drinking water and keep your community healthy.

Dr. David Mowat
Interim Chief Medical Officer of Health of Ontario

“Since Dr. John Snow's 1854 discovery in London, England, that drinking water could kill people by transmitting disease, the developed world has come a long way towards eliminating the transmission of water-borne disease. The Walkerton experience warns that we may have become victims of our own success, taking for granted our drinking water's safety. The keynote in the future should be vigilance. We should never be complacent about drinking water safety.”

— Justice Dennis O'Connor,
2002, Report of the Walkerton Inquiry

WHAT YOU NEED TO KNOW

about your drinking water responsibilities

Ontarians expect safe, high quality drinking water. It is a matter vital to public health. As a member of a municipal council, you have an important role to play to ensure that your community has access to safe, high quality drinking water — and you are legally obliged to do so.

HERE ARE THREE THINGS TO REMEMBER AS A MUNICIPAL COUNCILLOR:

It's Your Duty. The Safe Drinking Water Act, 2002 includes a statutory standard of care for individuals who have decision-making authority over municipal drinking water systems or who oversee the operating authority of the system. This can extend to municipal councillors. There are legal consequences for not acting as required by the standard of care, including possible fines or imprisonment. (Read more on page 9 of this guide.)

Be Informed. Ask questions. Get answers. You don't have to be an expert in drinking water operations, but you do need to be informed about them. Your decisions can have an impact on public health. Seek advice from those with expertise and act prudently on that advice. (Check your knowledge on page 14.)

Be Vigilant. Complacency can pose one of the greatest risks to drinking water systems. It is critical that you never take drinking water safety for granted or assume all is well with the drinking water systems under your care and direction. The health of your community depends on your diligent and prudent oversight of its drinking water. (Read how the actions of one municipal council impacted their community on page 11.)



“Water is unique as a local service. It is, of course, essential to human life and to the functioning of communities, (and) the consequences of a failure in the water system (are) most seriously felt by those who depend on it locally. Municipal ownership, and the ensuing responsibilities, should provide a high degree of public accountability in relation to the local water system.”

— Justice Dennis O'Connor, 2002, Report of the Walkerton Inquiry

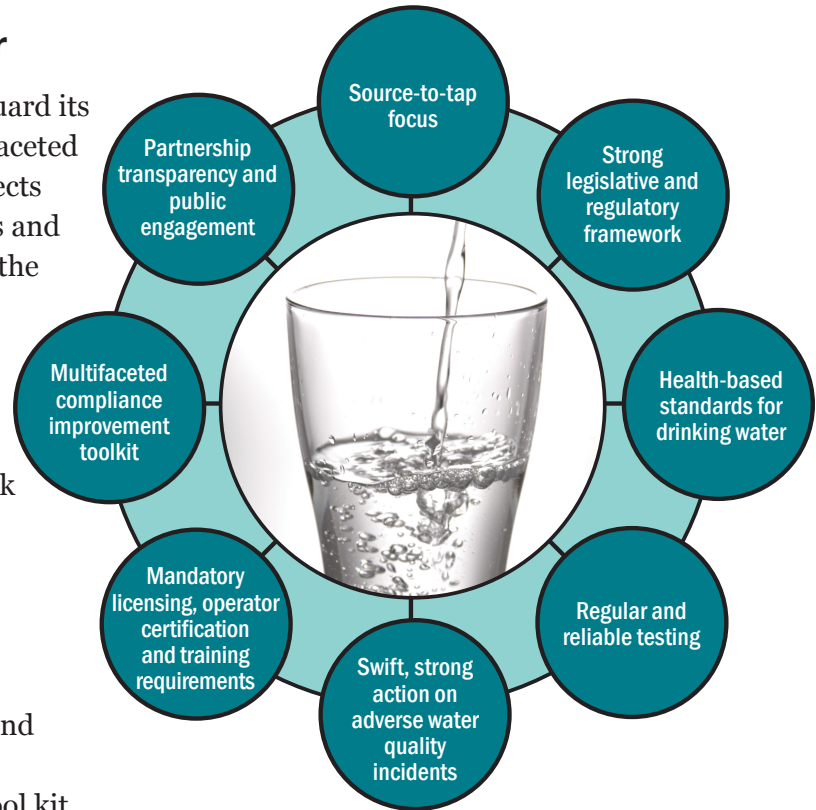
UNDERSTANDING YOUR RESPONSIBILITIES FOR OVERSEEING DRINKING WATER

Protecting Ontario's Drinking Water

Ontario has a comprehensive safety net to safeguard its drinking water from source to tap. It is a multi-faceted approach that helps prevent contamination, detects and solves water quality problems, enforces laws and regulations and increases people's awareness of the importance of safe, high quality drinking water.

Ontario's drinking water protection safety net has eight components:

- A source-to-tap focus
- A strong legislative and regulatory framework
- Regulated health-based standards for drinking water
- Regular and reliable testing
- Swift, strong action on adverse water quality incidents
- Mandatory licensing, operator certification and training requirements
- A multi-faceted, compliance improvement tool kit
- Partnership, transparency and public engagement

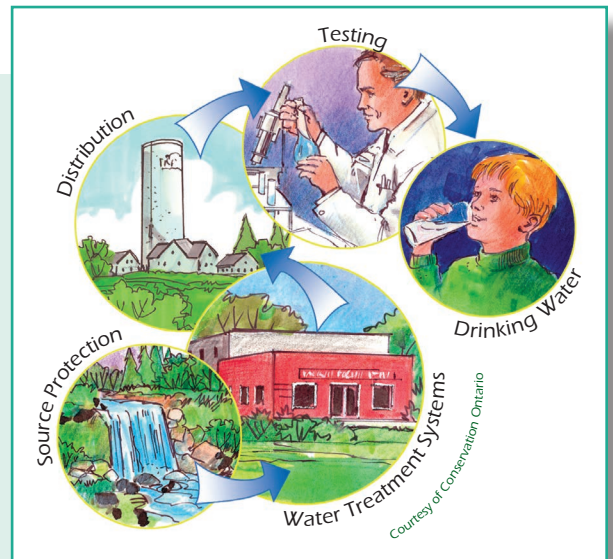


What is our Multi-Faceted Approach?

Our multi-faceted approach is an integrated system of procedures, processes and tools that collectively prevent or reduce the contamination of drinking water from source to consumer in order to reduce risks to public health.

The multiple barriers include:

- **Source protection** to keep the raw water as clean as possible in order to lower the risk that hazards are present.
- **Treatment** to remove and/or neutralize hazards.
- Maintenance of the integrity of the **distribution system** to prevent recontamination after treatment.
- **Monitoring programs** to detect and act on system problems that could impair drinking water safety and to verify the performance of the system components and finished drinking water quality.
- Effective **management systems** including automatic control systems, well-developed responses and operating practices that are the ultimate means for protecting the safety of drinking water systems.



(Source: Ontario Ministry of the Environment, 2007, Implementing Quality Management: A Guide for Ontario's Drinking Water Systems)

A Legislative and Regulatory Framework for Protecting Water

Strong legislative and regulatory measures are key components of Ontario’s drinking water safety net. This guide focuses on the Safe Drinking Water Act, 2002 (SDWA or the act), which provides a legislative framework for all municipal drinking water systems, as well as some non-municipal systems. The SDWA provides a consistent set of province-wide standards and rules to ensure access to safe, high quality, reliable drinking water.

The Safe Drinking Water Act, 2002 – An Overview

The SDWA recognizes that the people of Ontario are entitled to expect their drinking water to be safe. It provides for the protection of human health and prevents drinking water health hazards through the control and regulation of drinking water systems and drinking water

Peer to Peer

“As a Councillor, ensuring the best quality of drinking water for our community may be the most important thing we do.”

— Councillor Jack Miller, City of Belleville

testing. In a municipal context, a drinking water system includes all collection, treatment and storage facilities and distribution pipes usually up to customer property lines but does not include plumbing.

The SDWA and its associated regulations specify the requirements for drinking water systems, testing services, certification of system operators and drinking water quality analysts. It also sets quality standards and mechanisms for compliance and enforcement.

How the Pieces Fit Together

To learn more about how various acts and regulations create multiple safeguards to protect drinking water, download Conservation Ontario’s brochure entitled “How Ontario’s Drinking Water is Protected” from their website at: <http://goo.gl/wQtPW4>

The Big Picture

There are approximately 660 municipal residential drinking water systems registered with the Ministry of the Environment and Climate Change (MOECC) that supply drinking water to more than 80 per cent of the homes in Ontario. In recent testing, approximately 530,000 drinking water test results were submitted to MOECC by laboratories licensed to perform these tests for municipal drinking water systems. Over 99 per cent of these drinking water tests met the province’s rigorous, health-based drinking water quality standards.



Photo courtesy of Halton Region

Key Sections of the SDWA for Municipal Councillors



Section 11: Duties of Owners and Operating Authorities

Section 11 of the SDWA describes the legal responsibilities of owners and operating authorities of regulated drinking water systems. It is important for you to understand the scope of your municipality or operating authority's day-to-day responsibilities.

Owners and operators are responsible for ensuring their drinking water systems:

- provide water that meets all prescribed drinking water quality standards
- operate in accordance with the act and its regulations, and are kept in a fit state of repair
- are appropriately staffed and supervised by qualified persons
- comply with all sampling, testing and monitoring requirements
- meet all reporting requirements

Examples of actions required of owners and operators under Section 11:

- Sampling and testing of drinking water with a frequency appropriate to the type, size and users of the system in accordance with the act and corresponding regulations
- Using an accredited and licensed laboratory for drinking water testing services
- Reporting of adverse test results that exceed any of the standards in the Ontario Drinking Water Quality Standards Regulation, both verbally and in writing, to the local medical officer of health and MOECC
- Obtaining a drinking water licence for a municipal residential drinking water system from the MOECC, which includes a financial plan
- Ensuring the drinking water system is operated by an accredited operating authority
- Hiring certified operators or trained persons appropriate to the class of the system
- Preparing an annual report to inform the public on the state of the municipality's drinking water and the system providing it, and an annual summary report for the owners of the drinking water system

Who is the “owner” of a municipal drinking water system under the SDWA? Who is the “operator”?

The “owner” of a municipal drinking water system is often the municipality as a corporate entity. Members of municipal councils and municipal officials who provide oversight to this corporate entity also provide oversight or exercise decision-making authority in respect of the drinking water systems it owns. They are responsible for having policies, management tools and processes in place so that the municipality meets all its legislative and regulatory requirements under the SDWA.

The “operator” or operating authority of a municipal drinking water system is the person or entity that is given responsibility by the owner for the day-to-day operations of the drinking water system, its management, maintenance or alteration. A municipality may take on this operational role through its own staff or it may choose to contract it out to a third party. (e.g. by hiring an accredited operating authority). The statutory standard of care continues to apply to municipalities that contract out this role to a third party.



Section 19: Your Duty and Liability – Statutory Standard of Care

“Given that the safety of drinking water is essential for public health, those who discharge the oversight responsibilities of the municipality should be held to a statutory standard of care.” — Justice Dennis O’Connor, 2002, Report of the Walkerton Inquiry

This is one of the many important recommendations that came out of the Walkerton Inquiry reports in 2002. Section 19 of the SDWA responds directly to this recommendation.

Section 19 of the SDWA expressly extends legal responsibility to people with decision-making authority over municipal drinking water systems and those that oversee the accredited operating authority for the system. It requires that they exercise the level of care, diligence and skill with regard to a municipal drinking water system that a reasonably prudent person would be expected to exercise in a similar situation and that they exercise this due diligence honestly, competently and with integrity.

Meeting your statutory standard of care responsibilities

Meeting the statutory standard of care is the responsibility of:

- the owner of the municipal drinking water system
- if the system is owned by a municipality, every person who oversees the accredited operating authority or exercises decision-making authority over the system – **potentially including but not limited to members of municipal councils**
- if the municipal drinking water system is owned by a corporation other than a municipality, every officer and director of the corporation

It is important that members of municipal council and municipal officials with decision-making authority over the drinking water system and oversight responsibilities over the accredited operating authority understand that they are personally liable, even if the drinking water system is operated by a corporate entity other than the municipality.

Section 14 (3) of the SDWA specifically notes that an owner is not relieved of their duty to comply with Section 19, even if there is an agreement to delegate the operations of the drinking water system to someone else.

The owner is still obligated to:

- ensure the operating authority is carrying out its responsibilities according to the act
- in cases where it is not, to take reasonable steps to ensure they do

Examples of actions required of owners and operators under Section 14 (3):

- Being aware of the established procedure for communication with the operating authority, including how information is expected to be shared with municipal councillors, and assessing the effectiveness of this procedure
- Holding regular meetings with the operating authority, especially in cases where there may be reason to believe the operating authority is not carrying out its responsibilities

Since Ontario municipalities manage and govern municipal drinking water systems in a variety of ways, the people who are subject to the statutory standard of care within their corporation will also vary across the province, and would depend on specific facts related to individual situations.

Peer to Peer

“This guide makes it clear what our fiduciary and legal responsibilities are and provides the necessary questions to ask which allows us to become thoroughly knowledgeable on this aspect of our responsibilities. I encourage all elected and appointed officials to take the time to digest the information in this guide and put it to good use.”

— Former Mayor Michael Power, Municipality of Greenstone and Past-President Association of Municipalities of Ontario

Complete wording of Section 19, Safe Drinking Water Act, 2002

19. (1) Each of the persons listed in subsection (2) shall,
- (a) exercise the level of care, diligence and skill in respect of a municipal drinking-water system that a reasonably prudent person would be expected to exercise in a similar situation; and
 - (b) act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the municipal drinking water system. 2002, c. 32, s. 19 (1).

Same

- (2) The following are the persons listed for the purposes of subsection (1):

- 1. The owner of the municipal drinking water system.
- 2. If the municipal drinking-water system is owned by a corporation other than a municipality, every officer and director of the corporation.
- 3. If the system is owned by a municipality, every person who, on behalf of the municipality, oversees the accredited operating authority of the system or exercises decision-making authority over the system. 2002, c. 32, s. 19 (2).

Offence

- (3) Every person under a duty described in subsection (1) who fails to carry out that duty is guilty of an offence. 2002, c. 32, s. 19 (3).

Same

- (4) A person may be convicted of an offence under this section in respect of a municipal drinking-water system whether or not the owner of the system is prosecuted or convicted. 2002, c. 32, s. 19 (4).

Reliance on experts

- (5) A person shall not be considered to have failed to carry out a duty described in subsection (1) in any circumstance in which the person relies in good faith on a report of an engineer, lawyer, accountant or other person whose professional qualifications lend credibility to the report. 2002, c. 32, s. 19 (5).

Note:

For a copy of the Safe Drinking Water Act, 2002 and its related regulations, go to the Ontario e-laws website at www.e-laws.gov.on.ca.



Maintaining an Appropriate Level of Care

Standard of care is a well-known concept within Ontario legislation.

For example, the Business Corporations Act requires that every director and officer of a corporation act honestly and in good faith with a view to the best interests of the corporation and exercise the care, diligence and skill that a reasonably prudent person would in comparable circumstances.

Statutory standards of care address the need to provide diligent oversight. What is considered to be an appropriate level of care will vary from one situation to another. As a municipal councillor, it

is important to educate yourself on this statutory requirement and to gain an understanding of the operation of drinking water systems in your community to help you meet the standard of care requirements.

You are not expected to be an expert in the areas of drinking water treatment and distribution. Section 19 allows for a person to rely in good faith on a report of an engineer, lawyer, accountant or other person whose professional qualifications lend credibility to the report.



North Battleford: Council Decisions with Serious Consequences

In Spring 2001, nearly 6,000 residents of this Saskatchewan city of 13,000 fell victim to an outbreak of cryptosporidiosis, an illness caused by a parasite in human and animal waste, which entered the local drinking water supply. Symptoms included diarrhea, abdominal cramps, fever, nausea and headaches.

In an article on the subsequent Commission of Inquiry, the Canadian Environmental Law Association noted:

“... what became clear was that the people of North Battleford were let down. Their municipality, carrying a bulging contingency fund, refused to spend money on upgrading their decrepit water treatment plant. Their provincial government, although aware the plant was in poor condition, hadn’t inspected it in the ten years prior to the outbreak... plant employees, who had been working without a supervisor for over four months, were unable to heed the warning signs of a potential drinking water problem.”

The City of North Battleford subsequently faced class-action lawsuits totaling millions of dollars. The first settlement was an out-of-court agreement awarding \$3.2 million to some 700 claimants.

(Source: www.cela.ca and www.cbc.ca)

Enforcing the Statutory Standard of Care

As a municipal councillor, you need to be aware that not meeting your statutory standard of care responsibilities comes with serious consequences. Section 19 provides the province with an enforcement option when needed.

A provincial officer has the authority to lay a provincial offence charge against a person to whom the standard applies. The range of penalties includes maximum fines of up to \$4 million for a first offence and provision for imprisonment for up to five years. No minimum penalties are established. Actual penalties would be decided by the courts depending on the severity and consequences of the offence.

It is important to note the difference between the provision of the Municipal Act, 2001, that limits the personal liability of members of municipal councils and officials, and the

Peer to Peer

“There is no greater responsibility imposed upon an elected municipal official than the diligent, conscientious oversight of a municipal water treatment or distribution system.”

— Former Councillor Ken Graham, Town of Smiths Falls

standard of care imposed under the SDWA. Under sections 448-450 of the Municipal Act, 2001, municipal council members and officials have relief from personal civil liability when they have acted in good faith. However, despite that protection, municipal councillors and officials that are subject to the duty imposed by Section 19 of the SDWA could be penalized if a prosecution is commenced and a court determines they have failed to carry out the duty imposed under that section.

Peer to Peer

“As mayor, it is vitally important that the standard of care is put in place and that municipal elected officials are aware of their responsibilities in ensuring that the public has safe and secure drinking water.” — Former Mayor Delbert Shewfelt, Town of Goderich

Some Questions and Answers on the SDWA Statutory Standard of Care

If drinking water operations are contracted out, am I still responsible for the statutory standard of care?

If you oversee the accredited operating authority or exercise decision-making authority of the drinking water system, you remain responsible for meeting the standard of care even though your municipality has contracted out operations to an operating authority. (For more details see page 9 on Section 14 (3) of the SDWA.)

If something goes wrong, will I be held responsible?

The standard of care related to drinking water is to ensure that decision-makers are doing their due diligence to protect public health when making decisions about drinking water systems and providing oversight of the accredited operating authority. The circumstances and your actions - what you did or didn't do, what questions you asked, what steps were taken to address identified risks or problems with your drinking water system - will all be important in determining whether you met your standard of care and if you should be held responsible.

What can happen to someone who breaches the standard of care?

Justice O'Connor made it clear that the standard of care is all about ensuring responsible actions are taken to protect human health. Given the seriousness of this duty to your community, those whose actions fall below the standard of care, fail to protect the public and cause harm to human health could face significant penalties, including fines and imprisonment.

Who determines if the standard of care has been breached?

When an incident occurs that may constitute a breach of the standard of care, the MOECC will initiate a response that may include an investigation and gathering of evidence to determine if charges should be laid. In a case where charges are laid, it is up to the courts to determine if an offence has been committed and if penalties or fines will be imposed. This procedure is followed in any potentially serious breach of MOECC statutes.



ACTIONS YOU CAN TAKE

The following are some actions you can take to be better informed about your drinking water oversight responsibilities. Look for more of these suggested *Actions You Can Take* boxes throughout this guide.

- Consider taking the Standard of Care training offered by the Walkerton Clean Water Centre. Get course details and session offerings at www.wcwc.ca or by phoning toll free 1-866-515-0550.
- Learn about drinking water safety and its link to public health. Speak to water system and public health staff to learn more.
- Become familiar with your municipal drinking water system. Ask your water manager to give a presentation to council and/or arrange a tour of your drinking water facilities.
- Review the reports of the Walkerton Inquiry, specifically sections related to municipal government (Chapter 7 in Report I, Chapters 10 and 11 in Report II). The reports are available online at www.attorneygeneral.jus.gov.on.ca/english/about/pubs/walkerton/.
- Become further acquainted with drinking water legislation and regulations, available on the Ontario Government e-Laws website at www.e-laws.gov.on.ca. Search or browse current consolidated law to find what you are looking for. To search, enter the title, or any part of the title, of the law you wish to find (for example, “Safe Drinking Water Act”, “Ontario Water Resources Act” or “Clean Water Act”). If you don’t know any part of the title of the law, enter a word or phrase that you think might be in the text of the law.



WHAT SHOULD I BE ASKING?

When decisions come before your council relating to drinking water, you want to understand the impacts on your community and public health. While every situation will be different, the following are some preliminary questions you might want to ask:

- | | |
|--|--|
| <input type="checkbox"/> What are the risks to public health? | <input type="checkbox"/> How are we managing our drinking water infrastructure? Do we have an asset management plan for our water infrastructure? |
| <input type="checkbox"/> Are there any areas of risk that council needs to address? | <input type="checkbox"/> Are there any emerging issues related to our drinking water that council should be aware of? |
| <input type="checkbox"/> What checks and balances are in place to ensure the continued safety of our drinking water? | <input type="checkbox"/> If there is a drinking water emergency, what is our emergency management plan? What is the role of council in a drinking water emergency? |
| <input type="checkbox"/> Are we meeting our legislative and regulatory requirements? | <input type="checkbox"/> Have staff taken required training and upgrading? |
| <input type="checkbox"/> What is the public health impact or long-term cost of deferring this decision? | |
| <input type="checkbox"/> Will this decision affect our drinking water sources or create new risks to drinking water sources? | |
| <input type="checkbox"/> How will this decision impact our community’s demand for water? | |



CHECK YOUR KNOWLEDGE

Ask yourself these questions to check your current level of knowledge about your drinking water system and oversight responsibilities.

- Have I had a tour of our drinking water facility?
- Am I familiar with our municipal drinking water systems including:
 - a. the water source?
 - b. the physical condition of major infrastructure?
 - c. the background and experience of senior staff?, and
 - d. the approvals that have been granted for ownership and operation of the facilities?
- Am I acquainted with the drinking water legislation and regulations?
- Do I know basic information about drinking water safety and the operation of water works facilities?
- Do I understand the requirements to meet minimum standards for drinking water?
- Do I know how to set the overall policy direction for the municipal drinking water system?
- Do I understand the different roles and responsibilities of those who have decision-making authority – municipal councillors, senior management, other municipal officials?
- Am I assured that competent senior management has been hired? Do they conduct regular performance appraisals of staff?
- Is there adequate staff in place to operate and maintain the system? How are new operators trained?
- Was our last inspection rating from the Ministry of the Environment and Climate Change 100 per cent? If no, why not?
- Am I aware of the risks currently facing our water sources, drinking water facilities and infrastructure? What are the plans to address these risks?
- If there is an emergency with the drinking water system, what procedures are followed? How will I be notified? How will the public be notified?
- Am I aware of my municipality's responsibilities in implementing our source protection plan?
- How and when do I ask for annual reports on the drinking water system from senior management?
- What should I look for in the annual report? What questions must it answer?
- What should I do if a report identifies declining water quality?
- Do I know that appropriate steps are being taken to resolve any issues? Do I know when outside expertise is needed?
- Are our drinking water systems periodically audited? How often? What should I do when I receive audit results for consideration?
- Do I know if our drinking water systems are financially sustainable for the future? Are there financial plans in place?
- Am I familiar with the requirements of keeping our municipal drinking water license valid, such as renewal timelines?

If there are any questions you can't answer, review them with municipal staff.

Training on the Safe Drinking Water Act: Standard of Care is available through the Walkerton Clean Water Centre. Visit the Centre's website at www.wcwc.ca to view its course catalogue.

OVERVIEW OF DRINKING WATER MANAGEMENT TOPICS

Organizational and Governance Models

Many different management and operating models are available for municipal consideration. Currently, most water services in Ontario are provided through municipal departments, with oversight provided directly by municipal councils.

Some municipalities hire external contractors to operate their drinking water system, whereas others own and operate their systems.

Regional municipalities have upper-tier and lower-tier governance structures, with the lower-tier municipality often owning and operating their own drinking water systems. There are also models for area water systems in Ontario in which systems cross municipal boundaries. These systems are governed by boards representing their municipal owners.

Municipalities may also create:

- Municipal Service Boards whose members are appointed by council and could include council members, private citizens or both
- Corporations for water utilities, similar to those for natural gas or electricity distribution

“The purpose of the quality management approach in the context of drinking water is to protect public health by achieving consistent good practice in managing and operating a water system.”

“It is fundamental for municipalities to have a management and operating structure for their water system that enables them to provide safe water. I am making two important recommendations to assist in this regard. First, I recommend that municipalities be required to have an agency...to operate their systems. The agency should be accredited...The municipality must also submit an operational plan to the [Ministry of the Environment and Climate Change] for their water system(s). Second, I recommend that those responsible for exercising the municipality’s oversight responsibilities be held to a statutory standard duty of care. I note that, for municipalities, the first recommendation will be a significant step in satisfying the second.”

— Justice Dennis O’Connor, 2002, Report of the Walkerton Inquiry

My municipality is considering either a Municipal Service Board or a Municipal Services Corporation model to govern our drinking water functions. Would s. 19 of the SDWA still apply to these alternative ownership models?

Yes. The standard of care provision in the Safe Drinking Water Act, 2002 would continue to apply in either the Municipal Service Board or the Municipal Services Corporation model since the standard applies to municipal drinking water systems owned by either a municipality or other corporation.



Municipal Licensing: *Helping you protect your drinking water*

In Ontario, all municipal drinking water systems that provide water to residences in a community must have a licence from MOECC. The ministry's Municipal Drinking Water Licensing Program requires owners and operators of drinking water systems to incorporate the concepts of quality management into system operation and management.

As of September 2012, all municipal residential drinking water systems have received their

licenses as part of the Municipal Drinking Water Licensing Program.

For a drinking water system to receive or renew its licence, the owner and operator must have in place:

- a drinking water works permit
- an accepted operational plan (see next section for more details)
- an accredited operating authority
- a financial plan
- a permit to take water

The Operational Plan and You – *Setting an Overall Policy*

The **operational plan** sets out a framework to develop a Quality Management System (QMS) that is specific and relevant to your drinking water system.

Part of your drinking water system's operational plan will document a QMS policy. This policy is the backbone of the quality management system. The policy must include commitments to:

- the maintenance and continual improvement of the QMS
- provide safe drinking water to the consumer
- comply with applicable legislation and regulations

Your operating authority must get the owner's written endorsement of the drinking water system's operational plan, including this policy. As a municipal councillor, your council may be asked to endorse the policy and its commitments. If your municipality has already completed this policy endorsement step, obtain a copy from your municipal staff.

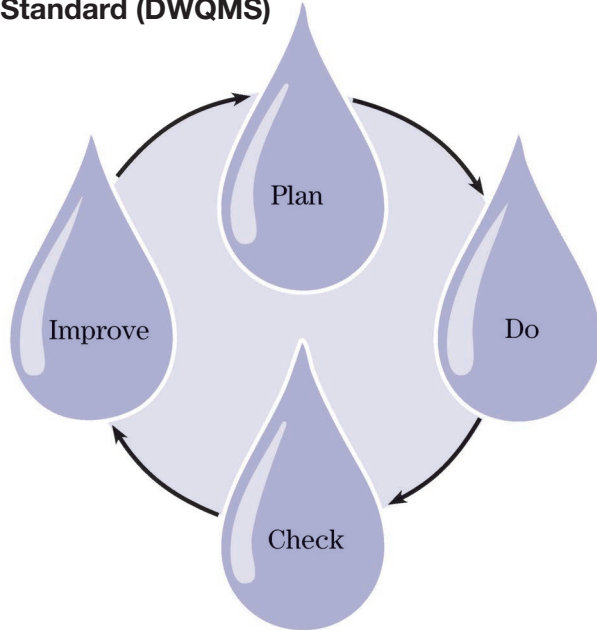
In addition to the QMS policy, the operational plan will also include:

- basic key information about every drinking water system your municipality owns
- a process for ongoing **risk assessment**
- a description of organizational structures (roles, responsibilities, authority)

- a procedure for an annual review of the adequacy of the **infrastructure** needed to operate and maintain the drinking water system, plus a commitment for the operating authority to **communicate review findings** to you
- a procedure for sharing sampling, testing and monitoring reports about the safety of your drinking water
- an outline of the system owner's responsibilities during **emergency situations**
- a commitment to **continual improvement** through **corrective action**
- a procedure for conducting a management review every 12 months which evaluates the suitability, adequacy and effectiveness of the QMS against the requirements of the Drinking Water Quality Management Standard (**DWQMS**) and how to report the results of this review, including identified deficiencies, and decision and action items

The DWQMS is the standard upon which drinking water system operational plans are developed and operating authorities are accredited. The requirements of the DWQMS, when implemented, will assist owners and operators of municipal drinking water systems to develop sound operational procedures and controls. Additional information on the **bolded** elements of the DWQMS listed above can be found further in this section of the guide.

Drinking Water Quality Management Standard (DWQMS)



The DWQMS is based on a PLAN, DO, CHECK and IMPROVE methodology which is similar to that found in some international standards. PLAN requirements of the standard typically specify policies and procedures that must be documented in the operational plans for the drinking water system, while DO requirements specify that the policies and procedures must be implemented. CHECK and IMPROVE requirements of the standard are reflected in the requirements to conduct internal audits and management reviews.

Example of a QMS Policy

The following is an example of a QMS policy for the Westhill Water Supply and Distribution System:

The Municipality of the Town of Westhill owns, maintains and operates the Westhill Water Supply and Distribution System.

The Town of Westhill is committed to:

1. ensuring a consistent supply of safe, high quality drinking water
2. maintaining and continuously improving its quality management system, and
3. meeting or surpassing applicable regulations and legislation

(Source: Ontario Ministry of the Environment, 2007, Implementing Quality Management: A Guide for Ontario’s Drinking Water Systems)

DEFINITIONS

CONTINUAL IMPROVEMENT is understanding what you already do well, and then finding ways to do it better.

CORRECTIVE ACTION is a method of improvement, and the solutions that are generated by those actions are also inputs to continual improvement.

(Source: Ontario Ministry of the Environment, 2007, Implementing Quality Management: A Guide for Ontario’s Drinking Water Systems)

ACTIONS YOU CAN TAKE

- Ask your operating authority to speak to your municipal council about your operational plan.
- Consider and act on any advice (including deficiencies and action items) identified during the annual management review process.
- Review the QMS policy in your operational plan and its commitments.
- Ask your operating authority to show how it is meeting these commitments.

Drinking Water System Reports and Inspections: *What they tell you about your drinking water system*

Municipal Reports

An owner of a drinking water system is required to ensure that an annual summary report is presented to the members of council or local services board. Summary reports must be produced by March 31 of each year to cover the preceding calendar year.

The summary report must include:

- information about any requirements of the SDWA, the regulations, the system's approval, drinking water works permit, municipal drinking water licence and any order that the system failed to meet during the time period, plus the duration of the failure
- a description of the measures taken to correct each failure
- a comparison of the system's capability with the quantities and flow rates of the water supplied the preceding year to help assess existing and planned uses

Municipalities are also required to provide details about each residential drinking water system in an annual report to consumers. This annual report must be completed by February 28 each year and include:

- a brief description of the drinking water system including chemicals used
- a summary of the results of required testing, plus the approval, licence or provincial officer order issued to the system
- a summary of any adverse test results required to be reported to the Ministry of the Environment and Climate Change
- a description of any corrective actions taken
- a description of any major expenses incurred to install, repair or replace required equipment

ACTIONS YOU CAN TAKE

- Obtain and thoroughly review copies of the most recent annual and summary reports.
- Ask for explanations of any information you don't understand.
- Consider, act on and correct any deficiencies noted in the reports.

Ministry of the Environment and Climate Change Inspections

Every municipal residential drinking water system is inspected at least once a year by the Ministry of the Environment and Climate Change. An inspection includes the review of a system's source, treatment and distribution components, as well as water quality monitoring results and procedures to evaluate system management and operations.

MOECC prepares an inspection report that highlights any areas of non-compliance and what actions are required to correct them. The report also includes an inspection rating out of 100 per cent to help you compare your system's current and past performance, and identify areas for improvement. An inspection rating that is less than 100 per cent does not necessarily mean your municipality's drinking water is unsafe. It does mean that there may be opportunity for improvement in operational or administrative areas.



Q & A

What happens if the Ministry of the Environment and Climate Change identifies non-compliance issues as part of its annual inspection?

Inspection ratings for municipalities in Ontario have been excellent and have remained consistent for many years. The ministry continues to work with owners and operators of systems with inspection ratings below 100 per cent to help them gain a better understanding of their obligations and responsibilities so they can improve the performance of their systems.

In a small number of cases each year, inspectors may issue a Provincial Officer's Order that requires the system owner or operator to take corrective action by a specific deadline or refer an incident to the ministry's Investigation and Enforcement Branch.

ACTIONS YOU CAN TAKE

- Review your annual inspection results and ask questions if there is any indication of declining quality.
- Clarify any technical terms.
- Ask how deficiencies are being addressed.
- Review your system's standing in the ratings reported in the Chief Drinking Water Inspector's Annual Report. If your rating is less than 100 per cent, ask why.
- Consider, act on and correct any deficiencies highlighted in the inspection.

DEFINITIONS

A **RISK ASSESSMENT** is an orderly methodology of identifying hazards or hazardous events that may affect the safety of drinking water and evaluating their significance.

RISK is the probability of identified hazards causing harm, including the magnitude of that harm or the consequences.

A **HAZARD** is a source of danger or a property that may cause drinking water to be unsafe for human consumption.

(Source: Ontario Ministry of the Environment, 2007, Implementing Quality Management: A Guide for Ontario's Drinking Water Systems)

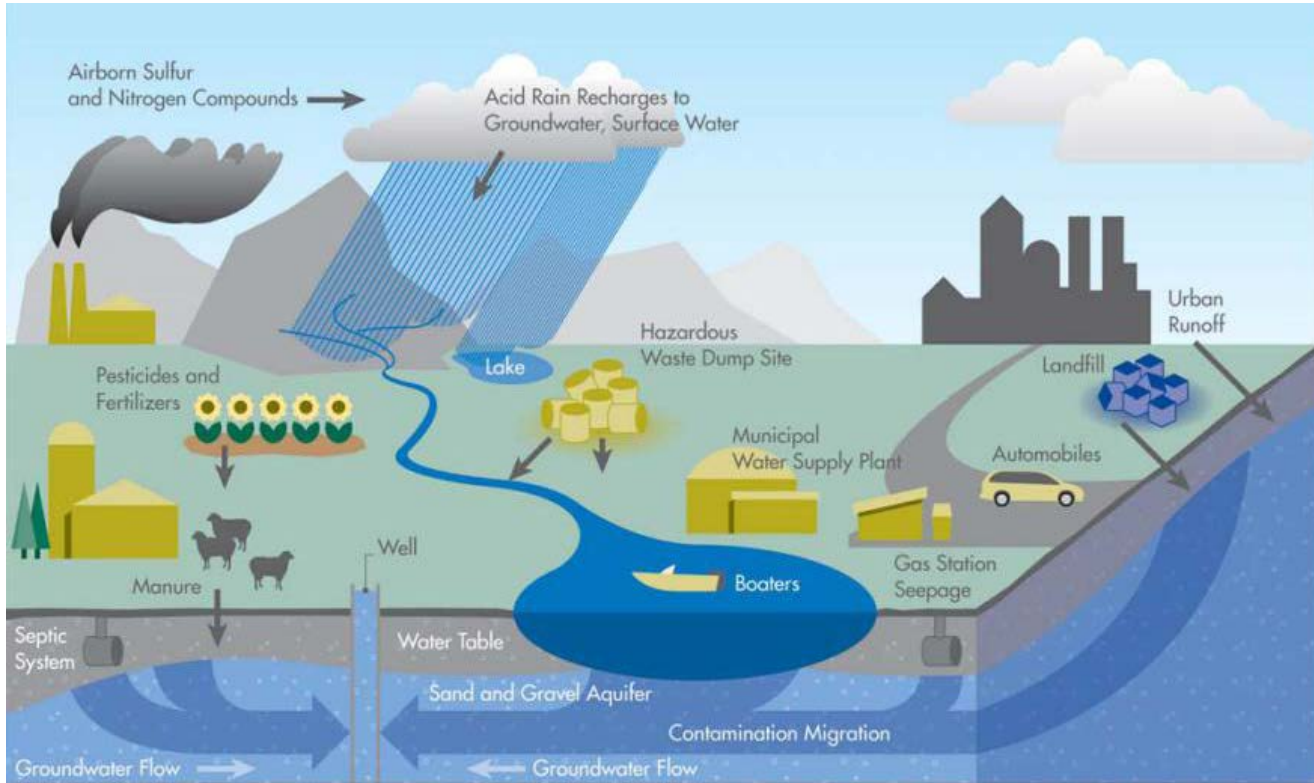
Managing the Risks to Drinking Water

Conducting a risk assessment is a key component of your drinking water system's operational plan. By performing a risk assessment, your operating authority will assess:

- existing or potential hazardous events facing your drinking water system, e.g. rail car derailment, algal blooms, water main breaks, etc.
- the impacts on drinking water if a hazardous event occurs, e.g. biological/chemical contamination of source water, possible biological/chemical contamination due to loss of supply/low pressure, etc.
- the necessary measures or response measures for each hazardous event (these measures may already be in place through such barriers as source protection or treatment processes)
- ranking of each event according to its likelihood of occurring and the consequences or severity of the results

In addition to the risks assessed by your operating authority, your local source protection authorities have performed detailed, science-based risk assessments of municipal drinking water sources within source protection areas. Learn more about the source protection program on **page 31**.

Human Activities Affecting Source Water



(Source: Pollution Probe, 2006, The Source Water Protection Primer)

In some cases, the operating authority may identify measures to address hazardous events which will call for improvements that require long-term planning. These types of decisions will often involve council approval. As a councillor, you should take time to understand the underlying risks associated with these decisions, their potential likelihood and impacts to public health.

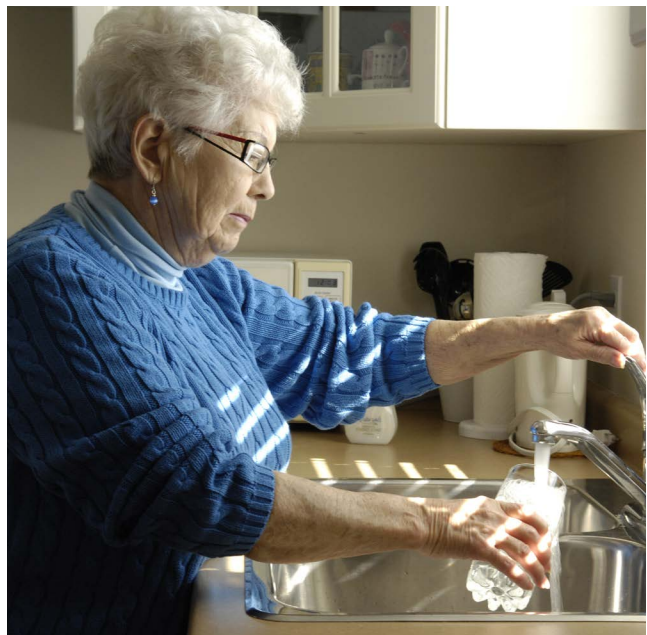
In other cases, the operating authority may identify risks that are outside of their control. For these, it may be appropriate to develop contingency or emergency response procedures (see Emergency Planning for Drinking Water for more details on **page 25**).

Peer to Peer

“Adequate municipal funding is a key component of risk management.”
 – Former Councillor Ken Graham, Town of Smiths Falls

Peer to Peer

“Never take the quality of our drinking water for granted. There are too many factors that can turn good water into bad.”
 – Councillor Jack Miller, City of Belleville



More on Hazardous Events and Hazards to Drinking Water

Hazardous events can be natural or technological in origin, or result from human activities. Natural events include floods, ice storms, drought and spring run-off. Technological events could include equipment failure or a power outage. Human activities that could lead to a drinking water risk include vandalism, terrorism, chemical spills and construction accidents.

The four different types of hazards that may affect drinking water are biological, chemical, physical and radiological:

Biological Hazards:

- include bacterial, viral and parasitic organisms, such as E.coli, Giardia and Cryptosporidium
- are considered the most significant drinking water health risk because effects are acute; can cause illness within hours
- are commonly associated with fecal wastes from humans or animals, or occur naturally in the environment

Chemical Hazards:

- include toxic spills, heavy metals, dissolved gases like radon, pesticides, nitrates, sodium, and lead
- can come from source water or occur in the treatment and distribution system

Physical Hazards:

- include suspended particles and sediments that can carry microbiological hazards and interfere with disinfection process
- can result from contamination and/or poor procedures at different points in the delivery of water to the consumer

Radiological Hazards:

- can be naturally occurring chemicals such as radon or uranium; most frequently occur in groundwater in low quantities
- may arise from man-made or natural sources

Infrastructure Planning

Having a sustainable drinking water infrastructure is necessary to meet the demand for safe drinking water. Machinery, equipment and structures used to produce and provide safe drinking water must be in place, maintained and improved when necessary.

Your operating authority is required to:

- document a procedure for conducting an annual review of your drinking water system's infrastructure
- provide a summary of the programs in place to maintain, rehabilitate and review that infrastructure
- report their findings after the review to the owner
- monitor the effectiveness of its maintenance program

Depending on the structure of — and relationship between — the owner and operating authority, the results of the annual review can be communicated through such means as council, budget, planning or other management meetings.



Maintenance activities can be either planned or unplanned:

- Planned maintenance includes scheduled or proactive activities needed to maintain or improve infrastructure elements, e.g. equipment maintenance, main replacements, etc. They are done to reduce the risk of an unplanned failure.
- Unplanned maintenance includes reactive activities, e.g. to deal with main breaks, pump failures, etc. They can draw heavily on resources and adversely affect drinking water quality.

By establishing planned programs for maintenance, rehabilitation and renewal, the operating authority can save time and costs and increase public confidence in drinking water.

Some drinking water systems have five or 10-year rolling plans to address such considerations as main rehabilitation, upgrades and replacement, water treatment and storage due to increased projected demands. These

DEFINITIONS

INFRASTRUCTURE – the set of interconnected structural elements that provide the framework for supporting the operation of the drinking water system, including buildings, workspaces, process equipment, hardware and software, and supporting services such as transport or communications.

REHABILITATION – the process of repairing or refurbishing an infrastructure element.

RENEWAL – the process of replacing the infrastructure element with new elements.

(Source: Ontario Ministry of the Environment, 2007, Implementing Quality Management: A Guide for Ontario’s Drinking Water Systems)



Peer to Peer

“Aging infrastructure is the major challenge facing municipalities today, and a solid long-term plan to address this is a must.”

– Councillor Paul Hubert, City of London

ACTIONS YOU CAN TAKE

- Find out what maintenance, rehabilitation and renewal plans are in place for your drinking water system.
- Ask your operating authority to present the findings of its annual infrastructure review.

types of system maintenance requirements are usually tied to the capital budgets of the operating authority and/or the owner of the drinking water system.

Sustainable Financial Planning for Drinking Water Systems

Achieving financial sustainability in Ontario’s municipal water and wastewater is a long-term goal. Financial sustainability is needed to ensure that Ontarians continue to enjoy clean and safe drinking water, water and wastewater services are reliable and environmental protection is maintained.

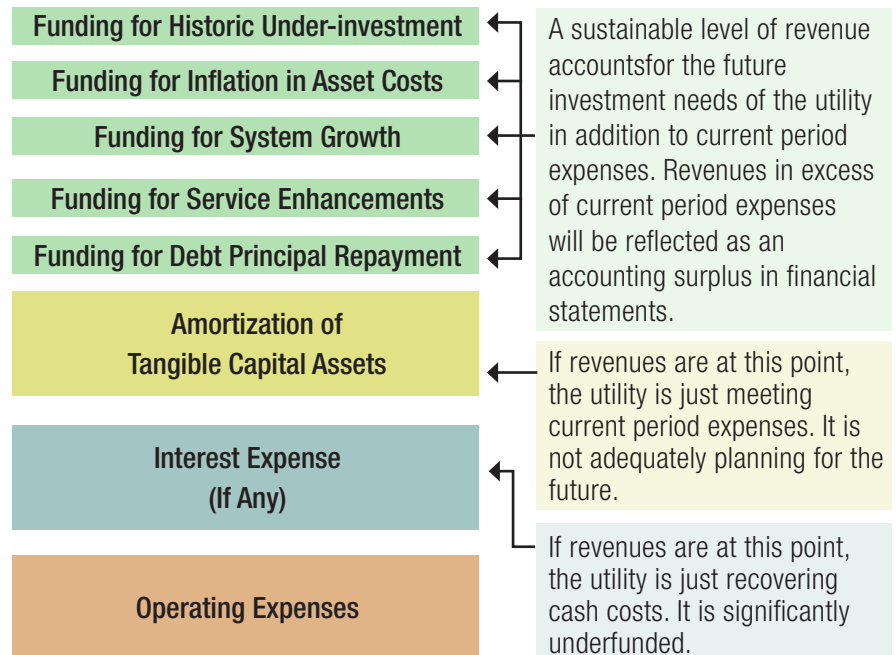
To receive or renew a municipal drinking water licence for your drinking water system, your municipality needs to prepare a financial plan.

You have an important role to play in ensuring that appropriate resources are made available to ensure that a financial plan can be prepared. Municipal councils have ultimate responsibility for approving financial plans that are prepared for a water utility.

The following are some key principles for developing a financial plan:

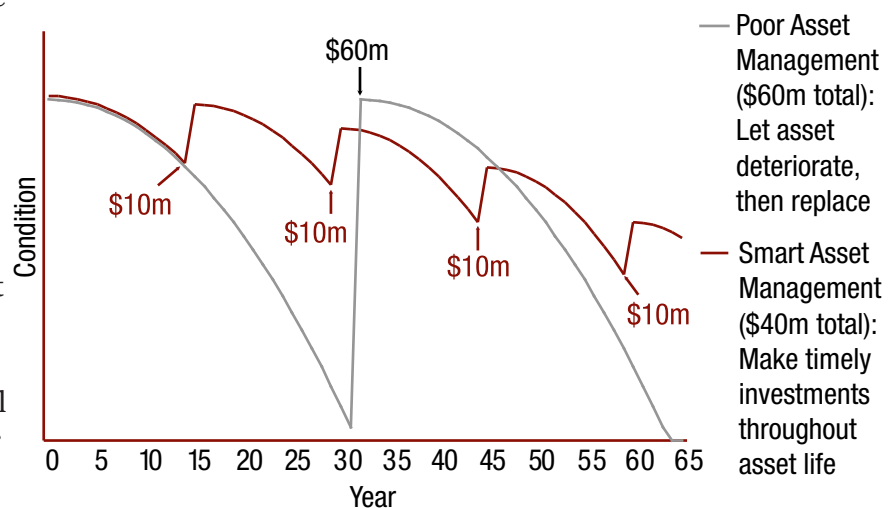
- Ongoing public engagement and transparency can build support for – and confidence in – the financial plan and the drinking water system.
- An integrated approach to planning among water, wastewater and storm water systems is desirable given the inherent relationship among these services.
- Revenues collected to provide water and wastewater services should ultimately be used to meet the needs of those services.
- Life-cycle planning with mid-course corrections is preferable to planning over the short-term or not planning at all.

A Building-block Approach to Determining Utility Needs



(Source: Ontario Ministry of the Environment, 2007, Toward Financially Sustainable Drinking Water and Wastewater Systems)

Timely Renewal Investments Save Money



(Source: Adapted from Ontario Ministry of Infrastructure, 2012, Building Together: Guide for Municipal Asset Management Planning)

- An asset management plan is a key input to the development of a financial plan.
- Financial plans benefit from the close collaboration of various groups including engineers, accountants, auditors, utility staff and municipal council.

“Municipalities need to ensure that their water systems are adequately financed. Over the long term, safety depends on stable and adequate financing to maintain the water system’s infrastructure and its operational capacity to supply high-quality water consistently.” — Justice Dennis O’Connor, 2002, Report of the Walkerton Inquiry



Water Audits and Accounting for Water Losses

An important tool in understanding the condition of your drinking water system assets is a water audit. This is the process of estimating where all of the water entering the distribution system ends up. One of the things a water audit will reveal is how much water is being lost to leaks from water mains and service connections. Leaks are a concern as they can:

- signal deteriorating water main conditions and be a precursor to more breakages
- be a source of bacterial contamination
- result in additional costs for pumping and treating water that is not ultimately delivered to consumers
- damage other infrastructure such as roads and sewers

(Source: Ontario Ministry of the Environment, 2007, Towards Financially Sustainable Drinking-Water and Wastewater Systems)

Financial plans for drinking water systems are required to forecast costs over a minimum period of six years, although municipalities are encouraged to adopt a life-cycle approach to managing their drinking water assets as a long-term goal. Financial plans are living documents and should be updated and reviewed as new information becomes available. As a best practice, they should be updated annually to foster continuous improvement and rolled into the annual municipal budget process.

There are many different costs, both capital and operating, associated with planning, building

and operating water systems. Some costs reflect outputs not attributable to the provision of water such as fire protection services, or the operation of storm and sanitary sewer systems.

A sustainable system is one that can adequately cover current operating costs, maintain and repair its existing asset base, replace assets when appropriate, fund future growth and enhancements to services, and account for inflation and changes in technology.

The Big Picture

According to Environment Canada, 10.6 per cent of water produced at municipal water treatment facilities in Ontario is lost, mainly due to leaks in the distribution system infrastructure. Other sources estimate this figure is as high as 30 to 40 per cent.

(Sources: Environment Canada, 2011, 2011 Municipal Water Use Report: 2009 Statistics)

Communicating With Your Operating Authority

Within the operational plan, your operating authority is required to have a procedure for communicating with the owner of the drinking water system, its personnel, suppliers and the public. You should be familiar with how communication about drinking water takes place. The procedure for communicating with the owner may be as simple as indicating the status of the implementation of the QMS and its effectiveness during scheduled meetings, such as council meetings. Communication with the public may include posting information on a publicly accessible website or through billing inserts.

As noted previously, your council may be asked to provide a written endorsement of the system's operational plan. Depending on the nature of your system's management structure, the operating authority may also involve the owner in other areas of the QMS such as risk assessment, management review or infrastructure.

ACTIONS YOU CAN TAKE

- Determine when and how your operating authority will communicate to you as an owner.
- Find out what information is made available to the public and how.

Emergency Planning for Drinking Water

Under the Emergency Management and Civil Protection Act, your municipality will already have an Emergency Response Plan for a wide range of potential scenarios. Some of these scenarios may involve drinking water and may link to planning done as part of the QMS to document procedures to maintain a state of emergency preparedness.

Emergency preparedness means identifying what could happen in your system to cause an emergency and having processes and procedures in place to prepare for and respond to those emergencies. Some elements of an emergency response plan include communications, training, testing, responsibilities and contact information.

DEFINITIONS

A **DRINKING WATER EMERGENCY** is a potential situation or service interruption that may result in the loss of the ability to maintain a safe supply of drinking water to consumers.

(Source: Ontario Ministry of the Environment, 2007, Implementing Quality Management: A Guide for Ontario's Drinking Water Systems)



Utilities Helping Utilities

A number of Ontario municipalities and utility sector associations joined together to establish the Ontario Water/Wastewater Agency Response Network, or OnWARN.

A province-wide network of "utilities helping utilities," OnWARN supports and promotes province-wide emergency preparedness, disaster response, and mutual aid and assistance for public and private water and wastewater utilities.

Learn how your municipality can become part of this growing network at www.onwarn.org

In a drinking water context, emergencies can happen as the result of a variety of natural and human-caused events such as severe weather, major power outages, spills, pandemics and deliberate acts of vandalism or terrorism. Potential emergencies can be identified through risk assessments, MOECC inspections, corporate audits, insurance company reviews, and records of past emergencies.

An element of the QMS emergency procedures is to clearly document the roles and responsibilities of the owner and operating authority during each emergency. For example, in an emergency, your Clerk-Treasurer may be assigned the responsibility of seeking resource authorization from council and act as chief liaison with council and the mayor.

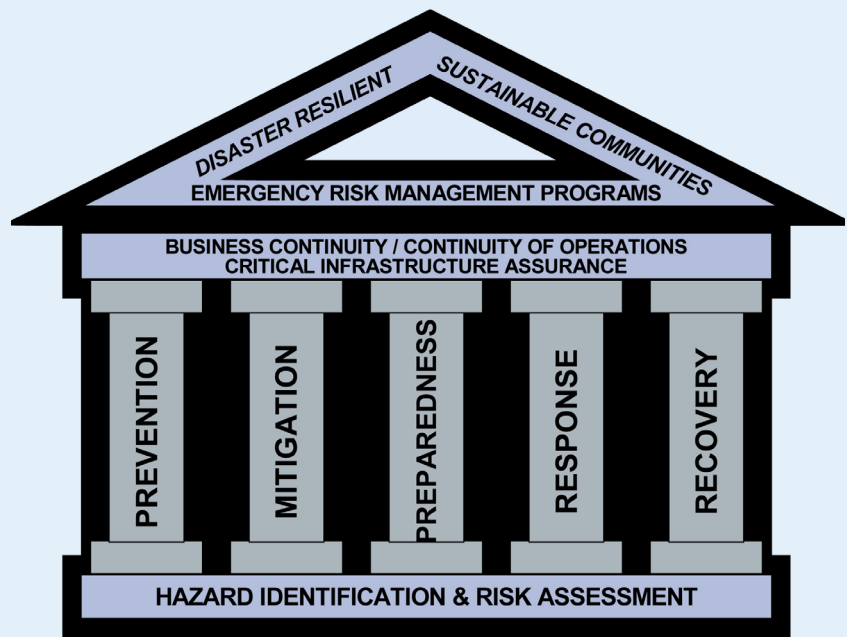
The QMS also requires that clear direction for communicating to the owner and others during an emergency be established. Planning beforehand how those in charge will talk to each other and the media can avoid complications during an emergency.

Preparing also means training and testing. The best emergency response procedures are ineffective if personnel are not properly trained on what to do and the procedures not tested. All personnel working within the drinking water system need to know what to do in an emergency, especially those with special response roles. Common forms of testing and training include orientation and education sessions, table-top exercises, walk-through drills, functional drills or full-scale exercises.

Five pillars of emergency management

Emergency management includes organized and comprehensive programs and activities taken to deal with actual or potential emergencies or disasters. It is based on a risk management approach and includes activities in five components: prevention, mitigation, preparedness, response, and recovery. These components are illustrated in the following figure:

(Source: Office of the Fire Marshall and Emergency Management, 2010, Emergency Management Doctrine for Ontario)



ACTIONS YOU CAN TAKE

- Ask your operating authority to review the drinking water emergency plan with council and to explain what responsibilities have been assigned to the owner.
- Know who will be the spokesperson during a drinking water emergency.
- Ensure critical staff have taken necessary training on emergency procedures and have participated in testing.

Adverse Drinking Water Incident, Boil Water Advisory and Drinking Water Advisory - *How are they different?*

An adverse water quality incident (AWQI) indicates that a drinking water standard has been exceeded or a problem has arisen within a drinking water system. AWQIs are an important component of the drinking water safety net. The report of an AWQI does not in itself indicate that drinking water is unsafe or that the statutory standard of care has not been met, but rather that an incident has occurred and corrective actions must be taken to protect the public. In some cases, these corrective actions may include a boil water advisory (BWA) or a drinking water advisory (DWA).

The local Medical Officer of Health in each of Ontario's 36 public health units is responsible for issuing BWAs and DWAs when necessary.

A BWA is issued when a condition exists with a drinking water supply that may result in a health risk and the condition can be corrected

by boiling the water or by disinfection. An example is the presence of bacteria in the water supply such as E. coli.

A DWA is issued when a condition exists with a drinking water supply that cannot be corrected by boiling the water or by disinfection. An example is the presence of chemical contaminants.

In both cases, the local Medical Officer of Health will direct the system owner to inform users of the advisory, through means such as door-to-door notification, public posting of notices and local media outlets, to boil water and/or use an alternate water supply until further notice. An advisory will be lifted only after the local Medical Officer of Health is satisfied that corrective actions were taken and the situation is remedied.

Drinking Water System Operators: *What do they do? What certification requirements must they meet? Why do you need to plan?*

Ontario has established requirements for the training and certification of drinking water (and wastewater) system operators. Municipal residential drinking water systems are required to use certified operators to perform all operational work.

Drinking water system operators play a vital operational role in providing safe drinking water to your community. The responsibilities of an operator may include:

- Checking, adjusting and operating equipment such as pumps, meters, filters, analyzers, and electrical systems, and having replacement parts on-site for critical repairs
- Determining chemical dosages and keeping chemical feed equipment appropriately filled with chemicals, adjusted and operating properly
- Maintaining operating records and submitting operating reports to the system's operating authority/owner and the province
- Ordering and maintaining a stock of parts, chemicals and supplies
- Collecting and submitting water samples as required by regulation (This usually involves taking samples from a number of key locations and transporting them to a licensed and accredited laboratory.)
- Explaining and recommending to the operating authority/owner any major repairs, replacements or improvements that should be made to the plant and/or distribution system

Types of Drinking Water System Operators

Overall Responsible Operator (ORO) - designated by the owner or operating authority, the ORO has overall operational responsibility for the system and must have an operator's certificate that is the same classification as (or higher than) the system.

Operator-in-Charge (OIC) - designated by the owner or operating authority, the OIC can direct other operators, set operational parameters in the system and has the authority to make operational decisions.

Operators - a person who conducts operational checks; who adjusts, tests, evaluates a process or directs the flow, pressure or quality of the water within the system. Operators must hold a valid operator's certificate. Non-certified persons may work under the direct onsite supervision of a certified operator, who physically oversees all operational work.

Operator-in-Training (OIT) - new operators who can operate a drinking water system. They cannot be designated as an ORO or OIC.

Water Quality Analyst - a person who is trained and certified to take operational tests, such as chlorine residual or turbidity tests, within a drinking water system.

Drinking water operators in Ontario must be certified and trained according to the type and complexity (class) of the drinking water system they operate. Operators are required to go through rigorous training, write examinations, and meet mandatory continuing education requirements to renew and maintain their certification. A certificate is valid for three years. To renew their certificate, operators must complete 20 to 50 hours of mandatory training per year on subjects related to the duties of a water system operator. Continuing education helps operators steadily improve their knowledge and skills throughout their

Peer to Peer

“Competent, certified operators are a key element to due diligence. Municipalities have an obligation to facilitate ongoing training for water treatment operators.”

– Former Councillor Ken Graham, Town of Smiths Falls

careers. Owners and operating authorities are responsible for ensuring drinking water systems are appropriately staffed and supervised by qualified persons.

ACTIONS YOU CAN TAKE

- Ensure there are sufficient resources for required levels of training for municipal staff involved in operating a drinking water system.
- Confirm that an overall responsible operator (ORO) has been designated and that procedures are in place to ensure all required staff and contractors are certified.
- Check to see if drinking water operator succession planning is being done and that measures are taken to address any current or anticipated challenges to recruiting skilled employees.
- Ensure your municipality or operating authority has contingency plans in place for situations where your certified operators may not be available (e.g. labour disputes, illnesses, vacancies, etc.) and, if activated, confirm that these contingency plans have been, where required, approved by the Ministry of the Environment and Climate Change and are working.

Water Conservation

Creating and implementing water conservation measures help to reduce water and energy consumption, lower long-term infrastructure costs, increase water sustainability and protect the environment.

It is estimated that every additional litre of water capacity costs roughly four dollars for expanded water and wastewater infrastructure. Many municipalities in Ontario are realizing significant savings from water conservation measures.

The cost of energy to pump, distribute and treat water and wastewater is a significant expense for most Ontario municipalities. Saving water

saves money, energy and reduces greenhouse gas emissions. Better water management has the potential to be one of the most cost-effective energy reduction strategies for Ontario's municipalities.

(Source: Ontario Ministry of the Environment and the Ontario Ministry of Natural Resources, 2009, Safeguarding and Sustaining Ontario's Water Resources for Future Generations)



Peer to Peer

“Water is our most valuable natural resource. How we as councillors protect that resource will become more and more important as we continue to require safe drinking water in the future.”

– Councillor-at-Large Rebecca Johnson,
City of Thunder Bay



Water Conservation Facts

- In Ontario, the average residential water use is about 225 litres of water per person per day, which is significantly more than countries with similar standards of living such as Germany, the United Kingdom and the Netherlands.
- Pumping and distributing water to homes and businesses, and treating water and wastewater makes up one-third to one-half of a municipal government's total electrical use, which is double that of other municipal costs such as street lighting.
- Canadian surveys have consistently shown that as the percentage of metered homes in a community increases, water use per capita decreases. In Canadian municipalities that use volume-based water charges (i.e. meters), the average daily consumption is 229 litres per person, while in municipalities that charge a flat or assessed rate, the corresponding figure is 65 per cent higher, or 376 litres per person.

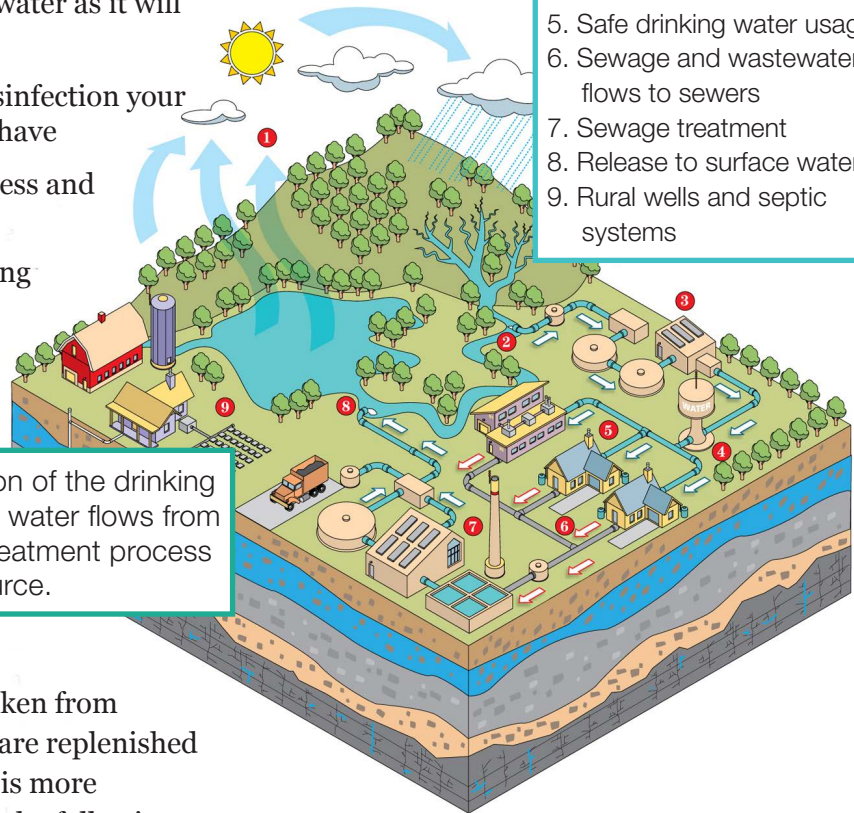
(Source: Environment Canada, 2011, 2011 Municipal Water Use Report: 2009 Statistics)

LEARN MORE ABOUT DRINKING WATER

Sources of Water

Ontario's drinking water comes from surface water or groundwater. It is important to know the source of your community's water as it will determine:

- the kind of treatment and disinfection your drinking water system must have
- the equipment needed to access and distribute your water
- the types of risks your drinking water may face, and
- planning for your water supplies for the future



1. Water in the environment
2. Water intake
3. Water treatment
4. Water distribution
5. Safe drinking water usage
6. Sewage and wastewater flows to sewers
7. Sewage treatment
8. Release to surface water
9. Rural wells and septic systems

Right: A graphical representation of the drinking water cycle demonstrating how water flows from the source through the water treatment process to your tap and back to the source.

Surface water

Surface water for public use is taken from rivers, lakes or reservoirs which are replenished by rain and snow. Surface water is more susceptible to contamination for the following reasons:

- **Rivers** – may flow through farmland, industrial areas, sewage discharge zones and other areas which may cause harmful contamination and/or affect taste, odour, clarity and colour. River water quality will vary throughout the year.
- **Lakes and reservoirs** – usually have better water quality than rivers. Suspended contaminants will 'settle out' in lakes. However, lakes and reservoirs are subject to plant and algae growth, which can give lake water unpleasant taste or odour. Human activities (power boats, feed-lots, etc.) are also a threat. In addition, lakes are often fed by rivers which carry contaminants.

(Source: Ontario Ministry of the Environment, 2009, Annual Report 2007-2008 Chief Drinking Water Inspector)

The Great Lakes and Drinking Water

Ontario borders on the Great Lakes, which store about 95 per cent of North America's supply of fresh water and about one-fifth of the world's supply of fresh surface water. Only one per cent of this water is renewed each year by rain and snowfall. More than 80 per cent of Ontarians get their drinking water from the Great Lakes.

Groundwater

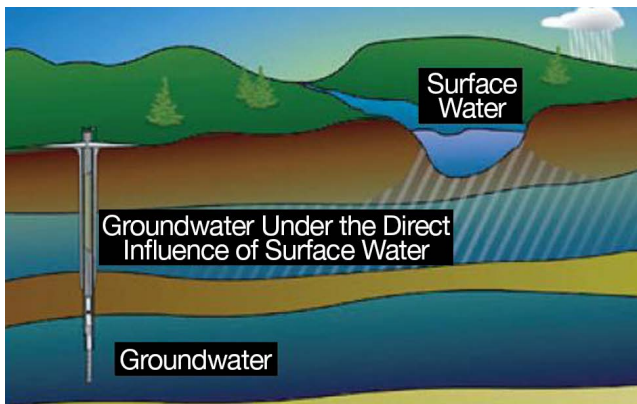
Groundwater (defined as ‘water that occurs beneath the surface of the Earth’) can be found in most parts of Ontario. It gathers in aquifers, the layers of sand, gravel and rock through which water seeps from the surface.

Sand and gravel aquifers are usually the most suitable for public water systems because water is more plentiful. Among rock aquifers, sandstone is often porous and can be a good source of groundwater. Limestone is not porous but may have cracks and cavities through which water can move and also provide a water supply.

Groundwater Under Direct Influence - GUDI

In addition to groundwater and surface water, there is a third source of water known as GUDI which stands for Groundwater Under Direct Influence of Surface Water.

An aquifer supplied by GUDI is viewed in the same category as surface water and has the same treatment and disinfection requirements.



(Source: Ontario Ministry of the Environment, 2007, “Drinking Water 101” course materials)

Source Protection in Ontario

Protecting our sources of drinking water is the purpose of the Clean Water Act, 2006 and the first component of Ontario’s multi-faceted approach to providing safe, clean drinking water.

The source protection process in Ontario helps municipalities and others identify risks to sources of municipal drinking water so that better decisions can be made about addressing such risks through source protection plans. This science-based process has identified vulnerable areas to protect drinking water sources.

Municipalities have a significant role in implementing source protection plans: they are responsible for over half of the policies in the plans. Many of these policies are legally binding on municipalities. For example, municipalities may be required to appoint risk management officials and inspectors. These officials will negotiate risk management plans with landowners or businesses to address the risks their activities could pose to sources of municipal drinking water.

The Clean Water Act, 2006 also requires municipal official plans to conform with source protection policies to protect vulnerable areas. Municipalities may need to include policies in the official plan, as well as zoning by-laws to prevent future risks to these sources. Plans may require municipalities to take other specific actions to protect sources of drinking water.

To learn more about source protection planning for municipalities, please visit www.conservation-ontario.on.ca/what-we-do/source-water-protection.

- Review the source protection plan for your area and find out what actions are being taken to protect vulnerable areas around your drinking water sources.
- Find out if your municipality has appointed risk management officials and inspectors to support source protection planning and whether you are sharing these duties with other municipalities or delegating to a local source protection authority.

ACTIONS YOU CAN TAKE

Drinking Water Treatment Processes

Treatment processes reduce or eliminate the potential for the presence of pathogens (organisms that can cause illness) in drinking water and are used to ensure your drinking water meets provincial standards. Different water sources necessitate different levels and methods of treatment to ensure safe, clean water is provided to consumers.

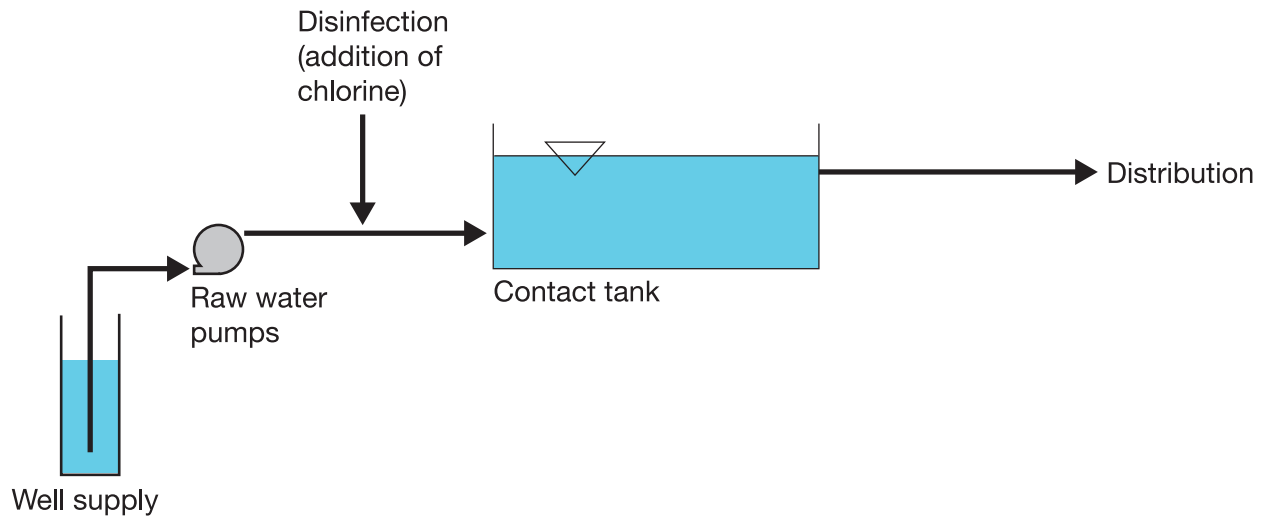
In Ontario, all municipal drinking water systems must have a disinfection process in place and all water must be disinfected before it is supplied to the public. The most widely used disinfectant is chlorine, which is a low-cost powerful disinfectant which continues

disinfecting as water passes through the distribution system.

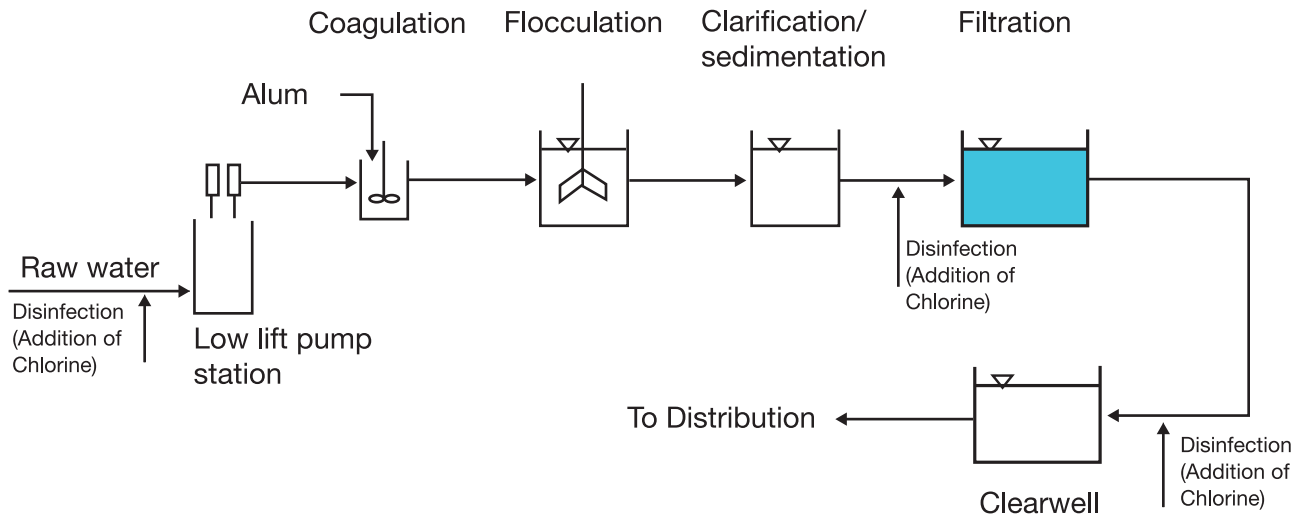
Drinking water systems using surface water or groundwater that is under the direct influence of surface water must also provide a filtration process ahead of the disinfection.

Some municipalities use certain treatment processes to address aesthetic problems with drinking water, such as taste and odour issues, that do not pose a risk to public health but which consumers find objectionable, or to address specific issues that are more local in nature, like zebra mussel control.

Typical groundwater treatment process



Typical surface water treatment process



Coagulation	Coagulation is a chemical process that causes smaller particles to bind together and form larger particles. The process is used to improve the removal of particles through sedimentation and filtration in the drinking-water treatment process.
Flocculation	Flocculation is the gathering together of fine particles in water by gentle mixing after the addition of coagulant chemicals to form larger particles that can then be removed by sedimentation and filtration.
Clarification/ sedimentation	Clarification removes suspended solids prior to filtration. In Ontario, the most common method of clarification used is sedimentation – or allowing suspended material to settle using gravity.
Filtration	Filtration removes particles from the water that were not removed during clarification by passing the water through a granular or media filter that retains all or most of the solids on or within itself, and removes pathogens trapped in the solids prior to disinfection.
Disinfection	Disinfection is usually the addition of chlorine to raw or filtered water to remove or inactivate human pathogens such as viruses, bacteria and protozoa in water, or for the purpose of maintaining a consistent level of chlorine in a drinking-water distribution system.

Beyond Conventional Treatment

Communities can face unique water-treatment challenges from causes that include low-quality water sources, treated water being degraded as it moves through the distribution system or the need to meet increasing consumer demand.

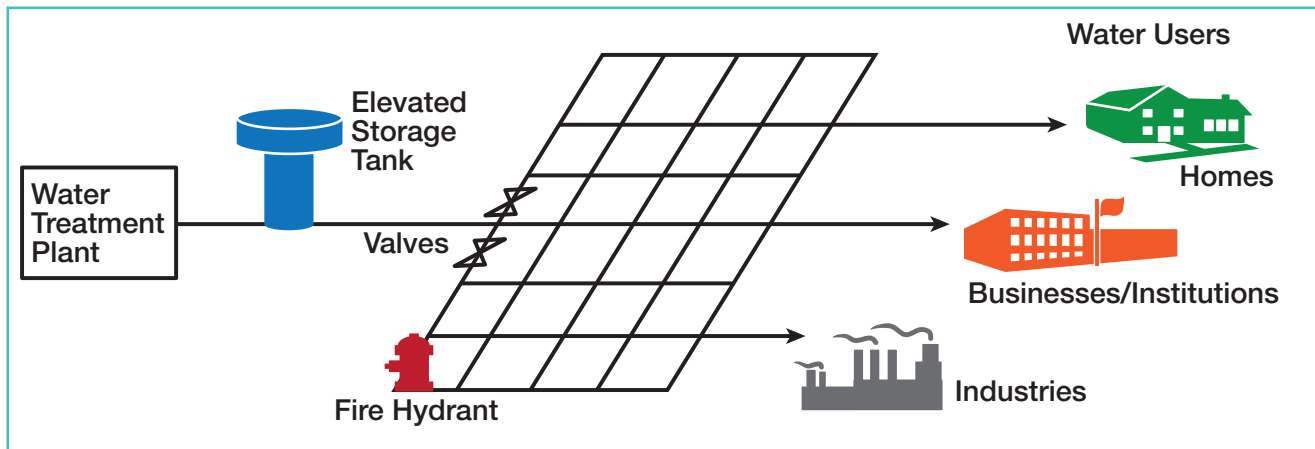
As a result, your community may use other water treatment processes, some of which are described in the chart below, to meet your community's unique challenges.

Type of water treatment process	What it does
Membrane filtration	Helps remove micro-pollutants
Biofiltration	Improves taste and odour and reduces disinfection by-products and subsequent need for coagulants
Advanced oxidation process	Helps reduce disinfection by-products and micro-pollutants and improves taste and odour and disinfection
Sludge recirculation clarifiers	Improves system capacity
Magnetic ion exchange resins	Reduces disinfection by-products and subsequent need for coagulants and disinfectant
Dissolved air floatation	Reduces algae
Activated carbon	Improves taste and odour
Ultraviolet (UV) light	Disinfects water without using chemicals

Water Distribution

The water distribution system is the network of pipes, valves, fire hydrants, storage tanks, reservoirs and pumping stations that carry water to customers. Municipalities that get their treated water from a treatment facility in another municipality and only have a distribution system are still required to exercise due diligence

and oversight. Clean, treated drinking water can become contaminated through a poorly maintained distribution system. System owners are required to maintain a consistent level of disinfectant throughout the distribution system to act as a barrier against contamination.



Types of Pipes

The most common types of material used for pipes include:

- Plastic - polyvinyl chloride (PVC) or polyethylene pipes; are widely used today
- Cast-iron - long-used; sturdy but capable of corroding in some cases
- Ductile-iron - widely-used, newer version of cast-iron; more flexible and less likely to corrode
- Asbestos-cement – no longer manufactured but still used in many distribution systems

Water Mains/Piping

Water mains are normally buried in the public street right-of-way. A trunk main is a larger size main used to move large quantities of water. The smaller diameter pipe which connects a water main to an individual building is called a water service. These smaller pipes contain a buried valve to allow service shut-off. Water service piping inside the property line is considered plumbing and is outside municipal jurisdiction.

The pipes of the distribution system must be large enough to meet domestic and industrial needs and provide adequate and ample flow for fire protection.

Valves

Valves are installed at intervals in the piping system so that segments of the system can be shut off for maintenance or repair.

Hydrants

Hydrants are distributed in residential, commercial and industrial areas, and are primarily used by fire departments in fighting fires. Fire hydrants and system valves should be operated and tested at regular intervals.

Water Storage Facilities

Water storage facilities exist in most municipalities to provide a reserve supply for times of emergency or heavy use (e.g. firefighting) and can include:

- elevated tanks (providing water pressure to a system)
- standpipes (also supply pressure from a high point of land)
- hydro-pneumatic systems (use air pressure to create water pressure in small systems)
- surface or in-ground reservoirs (where water can be stored and pumped out for use)

Pumping Stations

Pumping stations are facilities including pumps and equipment for pumping fluids from one place to another. Pumping facilities are required whenever gravity cannot be used to supply water to the distribution system under sufficient pressure to meet all service demands.

Water Meters

Water meters record the amount of water treated and delivered to the water system and measure the amount of water used by customers.

Water Distribution Atlas

Your municipality may maintain a water distribution system atlas which provides detailed mapping of the distribution system and information on infrastructure and maintenance records. Detailed mapping helps your municipality plan for future repairs and is essential for quick response to problems such as water main breaks.

For Further Information



To learn more about drinking water, visit these websites:

www.ontario.ca/drinkingwater – The Government of Ontario’s webpage offering a single point of access to information on drinking water and drinking water services in Ontario.

ontario.ca/bw44 - Ontario Ministry of Economic Development, Employment and Infrastructure’s guide for information relating to asset management planning.

www.wcwc.ca – The website of the Walkerton Clean Water Centre, an agency of the Ontario Government, which provides information on available training and education offered by the Centre, especially to those serving small and remote communities.

www.ocwa.ca – The website of the Ontario Clean Water Agency, an agency of the Ontario Government, which includes information on water and sewage works and related services provided by the Agency.

www.e-laws.gov.on.ca – The Ontario Government website providing access to provincial laws and regulations.

www.omwa.org – The website of the Ontario Municipal Water Association.

www.owwa.com – The website of the Ontario Water Works Association, a section of the American Water Works Association (www.awwa.org).

Glossary

The following is a list of drinking water related terms and phrases you may come across when carrying out your oversight responsibilities.

A

Accreditation body: a person designated or established as an accreditation body under Part IV of the Safe Drinking Water Act, 2002.

Accredited operating authority: an operating authority accredited under Part IV of the Safe Drinking Water Act, 2002.

Adverse Water Quality Incident (AWQI): an event in which an adverse test result triggers a process of notification and corrective measures.

Aquifer: a layer of soil, sand, gravel or rock that contains groundwater.

Asset management planning: is the process of making the best possible decisions regarding the building, operating, maintaining, renewing, replacing and disposing of infrastructure assets. The objective is to maximize benefits, manage risks, and provide satisfactory levels of service to the public in a sustainable manner.

Audit: a systematic and documented verification process that involves objectively obtaining and evaluating documents and processes to determine whether a quality management system conforms to the requirements of the Drinking Water Quality Management Standard (DWQMS).

B

Backflow preventer: a mechanical device for a water supply pipe to prevent the backflow of water into the water supply system from the service connections.

Boil water advisory: notice issued by local Medical Officer of Health to advise the community to boil or disinfect water before consumption. It is designed to make water safe to drink when there is a health risk through contamination that can be corrected by boiling or disinfecting the water.

C

Chemically assisted filtration: a water treatment process that uses chemicals, such as alum, as a coagulant to bind small particles

together into larger particles that are then easily filtered out when the water passes through sand beds or other filters.

Chlorine residual: the concentration of chlorine remaining in the chlorinated water at the end of a given contact time that is available to continue to disinfect. Measured as Free Chlorine, Combined Chlorine and Total Chlorine.

Clarification/Sedimentation: removal of suspended solids prior to filtration. In Ontario, the most common method of clarification used is sedimentation - or allowing suspended material to settle using gravity.

Coagulation: a chemical process that causes smaller particles to bind together and form larger particles. The process is used to improve the removal of particles through sedimentation and filtration in the drinking-water treatment process.

Colony counts: a scientific measure that identifies the number of bacteria, yeast or moulds that are capable of forming colonies.

Conservation Authorities: local watershed management agencies that deliver services and programs that protect and manage water and other natural resources in partnership with government, landowners and other organizations. (<http://conservation-ontario.on.ca/>).

Contaminant: any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that causes or may cause an adverse event.

Cross-connection: the physical connection of a safe or potable water supply with another water supply of unknown or contaminated quality such that the potable water could be contaminated or polluted.

Cryptosporidium: a single-celled protozoan parasite found in the intestinal tract of many animals. If the animal waste containing Cryptosporidium contaminates drinking water, it may cause gastrointestinal disease in humans.

D

Designated facility: under the Safe Drinking Water Act, 2002, designated facilities are defined as facilities that serve people who are potentially more susceptible to illness if they drink water that is of poor quality. These facilities include schools, universities and colleges, children and youth care facilities.

Disinfection: usually the addition of chlorine to raw or filtered water to remove or inactivate human pathogens such as viruses, bacteria or protozoa in water, or for the purpose of maintaining a consistent level of chlorine in a drinking-water distribution system.

Drinking water: (a) water intended for human consumption, or (b) water that is required by act, regulation, order, municipal by-law or other document issued under the authority of an act to be “potable” or to “meet or exceed the requirements of the prescribed drinking water quality standards.”

Drinking water advisory: notice issued by local Medical Officer of Health when a drinking water problem cannot be corrected simply by boiling the water or through disinfection. Under a Drinking Water Advisory, consumers are advised to use another source of drinking water until further notice.

Drinking water system: a system of works, excluding plumbing, that is established for the purpose of providing users of the system with drinking water and that includes:

- (a) anything used for the collection, production, treatment, storage, supply or distribution of water
- (b) anything related to the management of residue from the treatment process or the management of the discharge of a substance into the natural environment from the treatment system, and
- (c) a well or intake that serves as the source or entry point of raw water supply for the system.

Drinking Water Quality Management Standard (DWQMS): The Drinking Water Quality Management Standard is a made-in-Ontario standard that sets out a framework for the

operating authority and the owner of a drinking water system to develop a quality management system that is relevant and appropriate for their specific system. Operating authorities are accredited if they can demonstrate that they meet the requirements of the DWQMS through third-party verification.

Drinking Water Quality Standards: standards prescribed by Ontario Regulation 169/03 (Ontario Drinking Water Quality Standards) for microbiological, chemical and radiological parameters which when above certain concentrations have known or suspected adverse health effects and require corrective action.

Drinking water works permit: A drinking water works permit is an MOECC-issued approval that sets specific requirements for when a new municipal residential drinking water system is installed or when an existing system is being modified.

E

E. coli (*Escherichia coli*): a species of bacteria naturally present in the intestines of humans and animals. If animal or human waste containing E. coli contaminates drinking water, it may cause gastrointestinal disease in humans. Most types of E. coli are harmless, but some active strains, especially O157:H7, produce harmful toxins and can cause severe illness.

Exceedance: violation of a limit for a contaminant as prescribed in the Ontario Drinking Water Standards Regulation (O. Reg. 169/03).

F

Filtration: removes particles from the water that were not removed during clarification by passing the water through a granular or media filter that retains all or most of the solids on or within itself, and removes pathogens prior to disinfection.

Financial plan: Ontario Regulation 453/07 under the Safe Drinking Water Act, 2002 sets out the requirements for a financial plan. Financial plans help municipalities build capacity to plan for drinking water systems’ long-term financial sustainability. A financial plan must be in place before a licence can be issued or renewed, and must apply for a minimum of a six-year period that starts in the year the new (or renewed) licence will

be issued. Financial plans must contain details of a system's financial position, financial operations and cash flow and are required to be approved by a resolution of municipal council.

Flocculation: the gathering together of fine particles in water by gentle mixing after the addition of coagulant chemicals to form larger particles that can then be removed by sedimentation and filtration.

G

Giardia: protozoa, usually non-pathogenic, that may be parasitic in the intestines of vertebrates including humans and most domestic animals. If animal waste containing Giardia contaminates drinking water, it may cause gastrointestinal disease in humans.

H

Heterotrophic Plate Count (HPC): HPC is a microbiological test that gives an indication of general bacterial population. HPC results are not an indicator of water safety and should not be used as an indicator of potential adverse human health effects. This is a routine test to monitor water plant operations and assure treatment is working properly.

L

Laboratory: a place where drinking water tests are or will be conducted. In Ontario, laboratories must be accredited and licensed for each type of drinking water test they perform. Laboratories may conduct other types of tests as well.

M

Medical Officer of Health: with reference to a drinking water system, the medical officer of health for the health unit in which the system is located; if none exists, authority resides with the Chief Medical Officer of Health.

Microbiological organism: an organism so small that it cannot be seen without a microscope, including bacteria, protozoa, fungi, viruses and algae.

Municipal Drinking Water Licence (MDWL): A municipal drinking water licence is an approval

to operate a municipal residential drinking water system. The licence outlines specific operational parameters for the system including rated capacity, maximum flow rates and sampling, testing and monitoring requirements. The MDWL replaces the Certificate of Approval, which has been phased out for municipal drinking water systems.

Municipal drinking water system: a drinking water system (or part of a drinking water system):

- that is owned by a municipality or by a municipal service board established under s. 195 of the Municipal Act, 2001
- that is owned by a corporation established under s. 203 of the Municipal Act, 2001
- from which a municipality obtains or will obtain water under the terms of a contract between the municipality and the owner of the system, or
- that is in a prescribed class

O

Operating authority: with reference to a drinking water system, the person or entity that is given responsibility by the owner for the operation, management, maintenance or alteration of the system.

Operational plan: documents the Quality Management System (QMS) for a subject drinking water system.

Owner: with reference to a drinking water system, every person who is a legal or beneficial owner of all or part of the system (but does not include the Ontario Clean Water Agency [OCWA] or any of its predecessors where OCWA is registered on title as the owner of the system).

P

Pathogen: an organism that causes disease in another organism.

Permit to Take Water: permit from the Ministry of the Environment and Climate Change under the Ontario Water Resources Act, 1990, required of any person who takes over 50,000 litres of water per day from any source.

Potable water: water that, at a minimum, meets the requirements prescribed by O. Reg. 169/03 (Drinking Water Quality Standards). Other

definitions include: water of sufficiently high quality that it can be consumed or used without risk of immediate or long-term harm; water that satisfies the standards of the responsible health authorities as drinking water; water that is ‘fit to drink’.

Protozoa: a very diverse group comprising some 50,000 organisms that consist of one cell. Most are able to move on their own. Some are a health concern in drinking water. (See *Giardia* and *Cryptosporidium*)

Provincial Officer Order: an order issued by a Ministry of the Environment and Climate Change Provincial Officer to any person who contravenes any act governed by the Ministry of the Environment and Climate Change.

R

Raw water: surface or groundwater that is available as a source of drinking water but has not received any treatment.

S

Source water: untreated water in streams, rivers, lakes or underground aquifers which is used for the supply of raw water for drinking water systems.

Source water protection: action taken to prevent the pollution or depletion of drinking water sources, including groundwater, lakes, rivers and streams. Source water protection under Ontario’s Clean Water Act helps ensure public health through developing and implementing local plans to manage land uses and potential contaminants.

T

Total coliform bacteria: a group of waterborne bacteria consisting of three main sub-groups with common characteristics that is used as an indicator of water quality. The presence of total coliform bacteria in water leaving a treatment plant, or in any treated water immediately after treatment, could indicate inadequate treatment and possible water contamination.

Treatment system: any part of a drinking water system that is used in the treatment of water, including:

- anything that conveys or stores water and is part of a treatment process, including any treatment equipment installed in plumbing
- anything related to the management of residue from the treatment process or the management of the discharge of a substance into the natural environment from the system
- a well or intake that serves as the source or entry point of raw water supply for the system.

Turbidity: a visible haze or cloudiness in water caused by the presence of suspended matter, resulting in the scattering or absorption of light. The cloudier the water, the greater the turbidity.

W

Walkerton Inquiry: the public commission of inquiry led by Justice Dennis O’Connor into the events that occurred in May 2000 when the water supply in the Ontario town of Walkerton became contaminated with a strain of *E.coli* bacteria.

Waterborne illness: a disease transmitted through the ingestion of contaminated water. Water acts as a passive carrier of the infectious agent, chemical or waterborne pathogen.

Water quality: a term used to describe the chemical, physical and biological characteristics of water, usually in respect to its suitability for a particular purpose, such as drinking.

Watershed: a region or area bounded peripherally by a divide and draining into a particular watercourse or body of water.

**Be informed.
Ask questions.
Get answers.
It's your duty.**

www.ontario.ca/drinkingwater

For more information, call
the Ministry of the Environment and Climate Change
at 1-800-565-4923

Email: drinking.water@ontario.ca

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