



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 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:

- American Water Works Association, 2009, Water Basics for Decision Makers
- Emergency Management Ontario, 2010, Emergency Management Doctrine for Ontario
- Environment Canada, 2010, 2010 Municipal Water Use Report: 2006 Statistics
- Ontario Ministry of the Attorney General, 2002, Part Two Report of the Walkerton Inquiry
- Ontario Ministry of the Environment, 2006, The Clean Water Act: Promoting Municipal Awareness and Understanding
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- Ontario Ministry of the Environment, 2007, Towards Financially Sustainable Drinking-Water and Wastewater Systems
- Ontario Ministry of the Environment, 2009, Annual Report 2007-2008 Chief Drinking Water Inspector
- Ontario Ministry of the Environment and the Ontario Ministry of Natural Resources, 2009, Safeguarding and Sustaining Ontario's Water Resources for Future Generations
- Pollution Probe, 2006, The Source Water Protection Primer

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A Message from the Chief Drinking Water Inspector of Ontario



Ensuring the safety of Ontario's drinking water is a shared responsibility. It requires dedication and a commitment to constant vigilance from many partners, ranging from governments to treatment plant operators. More than 80 per cent of Ontario's population receive their drinking water from a

municipal drinking water system, and much of the important work of maintaining safe drinking water for the people of Ontario is done at the municipal level. Drinking water quality and inspection results consistently show that Ontario's municipalities are doing an exceptional job in this regard. If millions of Ontarians take clean, safe drinking water for granted, it is because so many dedicated public officials do not.

This guide is intended to support you in your role as a municipal councillor who may have oversight responsibilities for one of these drinking water systems. The 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 safeguarded. It will help answer questions about your statutory standard of care responsibilities, and it provides some basic reference material on drinking water. It also has some practical advice on additional actions you can take to be better informed and questions to test your knowledge.

As Chief Drinking Water Inspector, I look forward to continuing to work with Ontario's municipalities to safeguard Ontario's drinking water.

John Stager
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. We all know that if a drinking water system fails, serious life-threatening consequences can result.

Ontario's public health units 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, I encourage you to understand how your role can directly affect the health of your community and to keep it as a paramount consideration in your decision-making.

Dr. Arlene King
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 are entitled to expect safe, high quality drinking water. It is a matter vital to public health. As a member of 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 oversight responsibilities for municipal drinking water systems that can extend to municipal councillors as of January 1, 2013. There are legal consequences for negligence, including possible fines or imprisonment. (Read more on page 7 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 11.)

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 9.)



“

“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

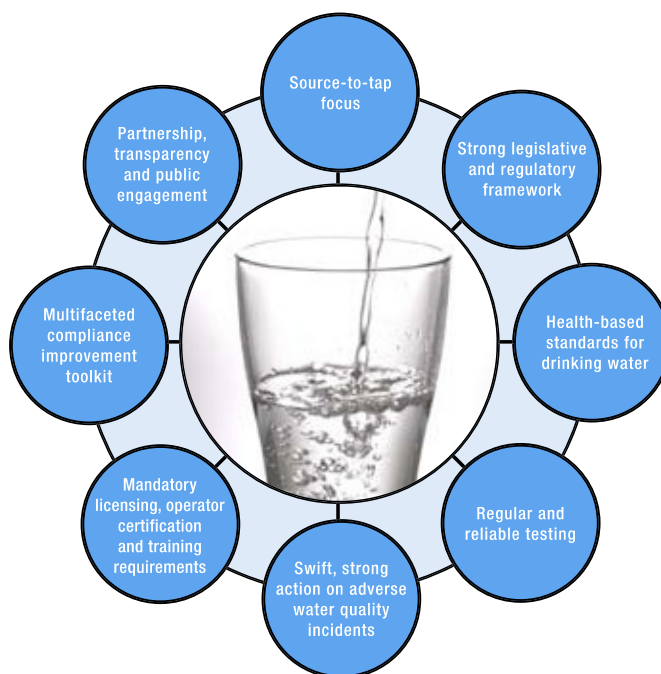
UNDERSTANDING YOUR RESPONSIBILITIES FOR OVERSEEING DRINKING WATER

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



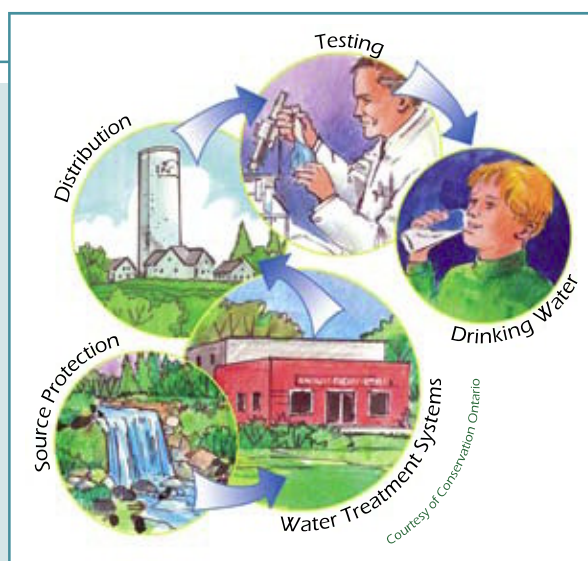
What is our Multi-Faceted Approach?

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)



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

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 testing. In a municipal context, a drinking water system includes all treatment and distribution pipes up to customer property lines.

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, read Conservation Ontario’s brochure entitled “How Ontario’s Drinking Water is Protected” at www.conservation-ontario.on.ca/resources/Brochures/CWALegsandRegsBrochure.pdf.

The Big Picture

There are approximately 700 municipal residential drinking water systems registered with the Ministry of the Environment (MOE) that supply drinking water to more than 80 per cent of the homes in Ontario. In recent testing, more than 650,000 drinking water test results were submitted to MOE by laboratories licensed to perform these tests. Over 99 per cent of these drinking water tests met the province’s rigorous, health-based drinking water quality standards.



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 and users of the system in accordance with the Act
- 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 MOE
- Obtaining a drinking water licence for a municipal residential drinking water system from the MOE, 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 drinking water and the system providing it, and an annual summary report for the owners of the drinking water system.

Q&A

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.

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. 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 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 and,
- 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: A proclamation has been issued naming January 1, 2013 as the day on which s.19 of this Act comes into force. 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 standard of care imposed under

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.” – Councillor Ken Graham, Town of Smiths Falls

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.” – 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?

As an owner of a drinking water system, you remain responsible for meeting the statutory standard of care even though you have contracted out operations to an operating authority. (For more details see page 7 on Section 14 (3) of the SDWA.)

If something goes wrong, will I be held responsible?

The statutory 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. 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 statutory standard of care and if you should be held responsible.

What can happen to someone who breaches the statutory 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 statutory standard of care, the MOE 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 MOE statutes.

ACTIONS

You Can Take To Be Better Informed

The following are some suggested actions you can take to be better informed about your drinking water oversight responsibilities. Look for more of these suggested action boxes in Section 3 of this guide. A summary list of all actions found in the guide has been compiled for your convenience on **page 33**.

- 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.
- 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.



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 requirement 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?
- What were the results of our last inspection? Are there areas for improvement?
- 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 the municipal role in source protection planning?
- 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? When? 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 our municipal drinking water licence and the key elements of the licence (e.g. drinking water works permit, operational plan, financial plan, etc.)?

If you can't answer any of these questions, review them with municipal staff.

Training on a variety of drinking water topics is also available through the Walkerton Clean Water Centre. Visit the Centre's website at www.wcwc.ca to view its course catalogue.



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:

- What are the risks to public health?
- Are there any areas of risk that council needs to address?
- What checks and balances are in place to ensure the continued safety of our drinking water?
- Are we meeting our legislative and regulatory requirements?
- What is the public health impact or long-term cost of deferring this decision?
- Will this decision affect our drinking water sources?
- How will this decision impact our community's demand for water?
- How are we managing our drinking water infrastructure? Is our infrastructure sustainable for future generations?
- Are there any emerging issues related to our drinking water that council should be aware of?
- What is the emergency management plan for a negative drinking water event? What is the role of council in a drinking water emergency?
- Have staff taken required training and upgrading?

Be informed. Ask questions. Get answers.

It's your duty.



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
- Municipally-owned corporate 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) 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

Municipal Licensing: *Tools that can help you*

In Ontario, all municipal drinking water systems that provide water to residences in a community must have a licence from MOE. 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.

For a drinking water system to receive 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, and
- 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
- the consumer to provide safe drinking water, and
- 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 (as the owner's representative) 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.

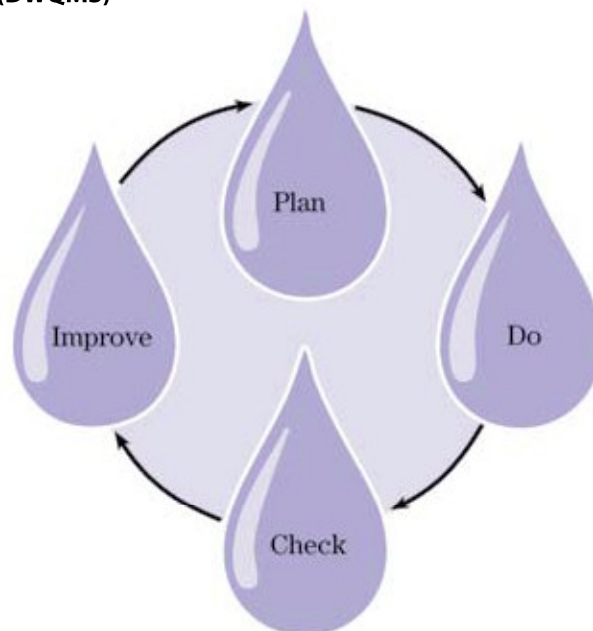
In addition to the QMS policy, the operational plan will also include:

- 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.

The Municipality of Westhill
June 1, 2006

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

ACTIONS You Can Take To Be Better Informed

- 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.

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)



Managing the Risks to Drinking Water

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. chemical contamination of source water, 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), and
- ranking of each event according to its likelihood of occurring and the consequences or severity of the results.

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

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)

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 22**).

Human Activities Affecting Source Water



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

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 sediments that can carry microbiological hazards and interfere with disinfection process, biofilms and pipe materials
- can result from contamination and/or poor procedures at different points in the delivery of water to the consumer.

Radiological Hazards:

- are naturally occurring chemicals such as radon or uranium; most frequently occur in groundwater
- may arise from man-made or natural sources.



Peer to Peer

“Adequate municipal funding is a key component of risk management.”

– Councillor Ken Graham, Town of Smiths Falls

Infrastructure Planning

Having a sound 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, and
- 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 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.



ACTIONS

You Can Take To Be Better Informed

- 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.

Scope of Assets

It's estimated that Ontario will require \$30 to \$40 billion of investment in water infrastructure repairs and upgrades over the next 15 years. Water efficiency measures can be used to extend the capacity of existing infrastructure and defer upgrading costs.

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

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



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.

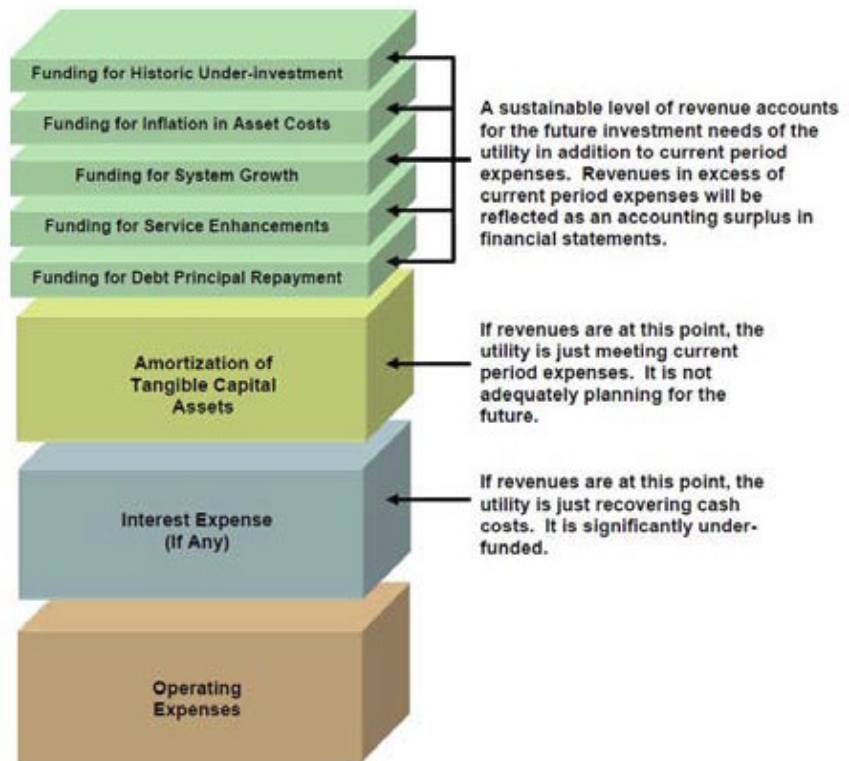
To receive a municipal drinking water licence for your drinking water system, your municipality needs to prepare a financial plan.

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.
- An asset management plan is a key input to the development of a financial plan.

A Building-block Approach to Determining Utility Needs



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

“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

- Financial plans benefit from the close collaboration of various groups including engineers, accountants, auditors, utility staff and municipal council.



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, and
- 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 combined 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, 12 per cent of water produced at municipal water treatment facilities in Ontario is lost, mainly due to leaks in the distribution system infrastructure. Others sources estimate this figure is as high as 30 to 40 per cent.

(Sources: Environment Canada, 2010, 2010 Municipal Water Use Report: 2006 Statistics; The Undergrunder magazine, April 2010)

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 opera-

ACTIONS

You Can Take To Be Better Informed

- 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.

tional 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.

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.

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,

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)

spills, pandemics and deliberate acts of vandalism or terrorism. Potential emergencies can be identified through risk assessments, MOE inspections, corporate audits, insurance company reviews, and records of past emergencies.

ACTIONS

You Can Take To Be Better Informed

- 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.

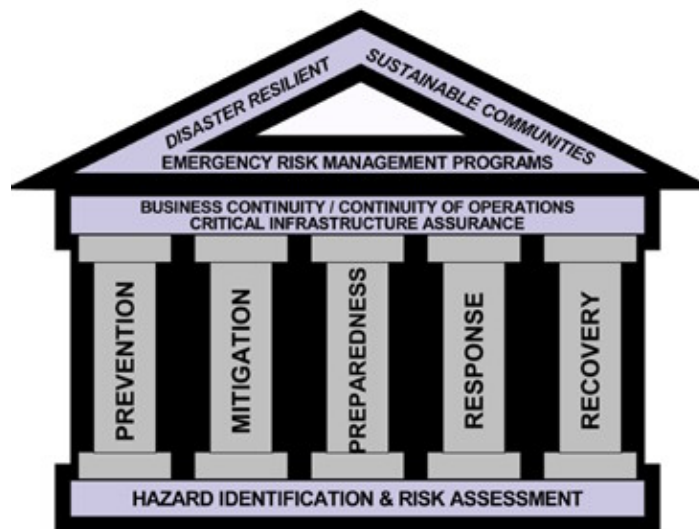
An element of the QMS emergency procedures is to clearly document the roles and responsibilities of the owner and operating authority during each emergency. For example, in an emergency, your Clerk-Treasurer may be assigned the responsibility of seeking resource authorization from council and act as 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 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: Emergency Management Ontario, 2010, Emergency Management Doctrine for Ontario)

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

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
- a description of any corrective actions taken, and
- a description of any major expenses incurred to install, repair or replace required equipment.

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

ACTIONS

You Can Take To Be Better Informed

- 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.

MOE 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 to help you compare your system's current and past performance, and identify areas for improvement.



ACTIONS

You Can Take To Be Better Informed

- 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.

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, 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
- Ordering and maintaining a stock of parts, chemicals and supplies
- Maintaining operating records and submitting operating reports to the system's operating authority/owner and the province
- 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 laboratory.)
- Explaining and recommending to the operating authority/owner any major repairs, replacements or improvements that should be made to the plant.



ACTIONS

You Can Take To Be Better Informed

- Ensure there are sufficient resources for appropriate 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.

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 to match the classification of the facility.

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 - all persons who adjust processes, equipment or the flow, pressure or quality of water in the system. Operators must hold a valid operator's certificate or work under the direct on-site supervision of a certified operator.

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

The operational complexity of your drinking water system will determine what certification requirements your operators must have to operate the system. Certification requires applicants to meet requirements in education, training, experience and knowledge and pass required exams. A certificate is valid for three years. To renew a 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 careers.

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."

– Councillor Ken Graham, Town of Smiths Falls



Water Conservation

Creating and implementing water conservation measures help to reduce water and energy consumption, lower long-term infrastructure costs 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

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

- Ontarians currently use about 267 litres of water per capita per day, which is nearly twice as much as other 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 municipalities that use volume-based water charges (i.e. meters), the average daily consumption is 263 litres per person, while in municipalities that charge a flat or assessed rate, the corresponding figure is 76 per cent higher, or 464 litres per person.

(Source: Environment Canada, 2010, 2010 Municipal Water Use Report: 2006 Statistics)

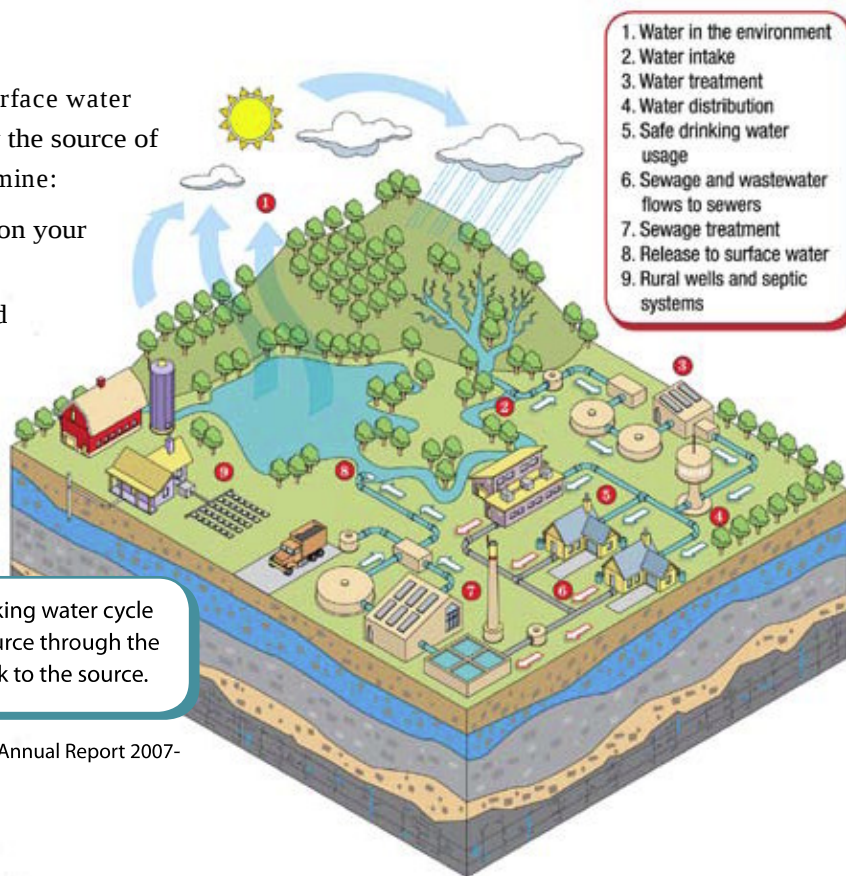
LEARN MORE ABOUT DRINKING WATER

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.

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.



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

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 districts 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.

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 70 per cent of Ontarians get their drinking water from the Great Lakes.

Groundwater

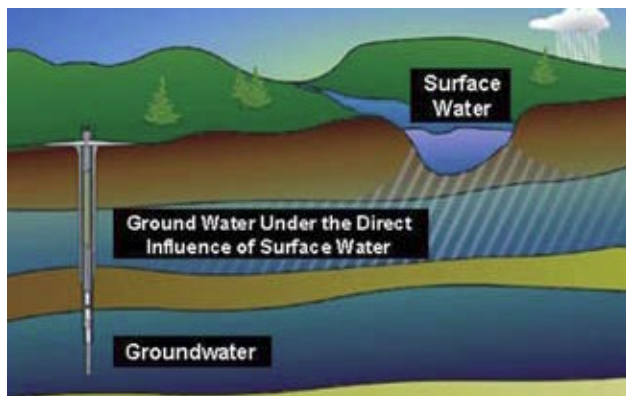
Groundwater (defined as ‘water that occurs beneath the surface of the Earth’) can be found in most parts of Ontario. It gathers in aquifers, the layers of sand, gravel and rock through which water seeps from the surface.

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 behind the Clean Water Act, 2006 (CWA) and the first component of Ontario's multi-faceted approach to providing safe, clean drinking water.

The source protection process in Ontario is helping municipalities and others identify potential threats to sources of drinking water so that better decisions can be made about managing such threats and plans can be developed to protect these vulnerable sources into the long-term future.

Source protection activities may have an impact on a municipality's land use planning rules. For example, source protection plans developed under the CWA may require new land use planning policies to be included in the municipality's Official Plan, as well as by-laws to prevent future significant threats to drinking water sources.

To learn more about source protection planning for municipalities, please visit www.ontario.ca/cleanwater.

(Source: Ontario Ministry of the Environment, 2006, The Clean Water Act: Promoting Municipal Awareness and Understanding)

Getting Groundwater to the Surface

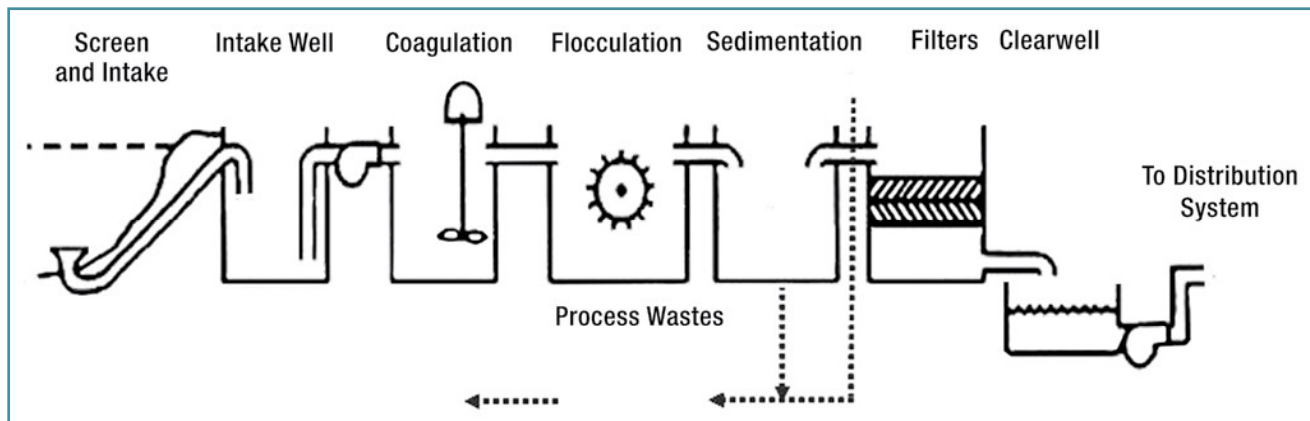
Groundwater is sourced through traditional (gravity) wells and artesian wells.

A traditional well is created by sinking a hole or a shaft into the ground to reach the water in an aquifer. This water is not under pressure and must be pumped to the surface for use.

An artesian well taps an aquifer where the water is under pressure and rising from being confined between two containing layers.

A spring forms when groundwater flows naturally from rock or soil onto the land surface.

Drinking Water Treatment Processes



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

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 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 direct influence of surface water must also provide a filtration process ahead of the disinfection.

Some municipalities also 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.

Here is a list of the treatment process steps taken in a conventional water treatment plant used to treat surface water:

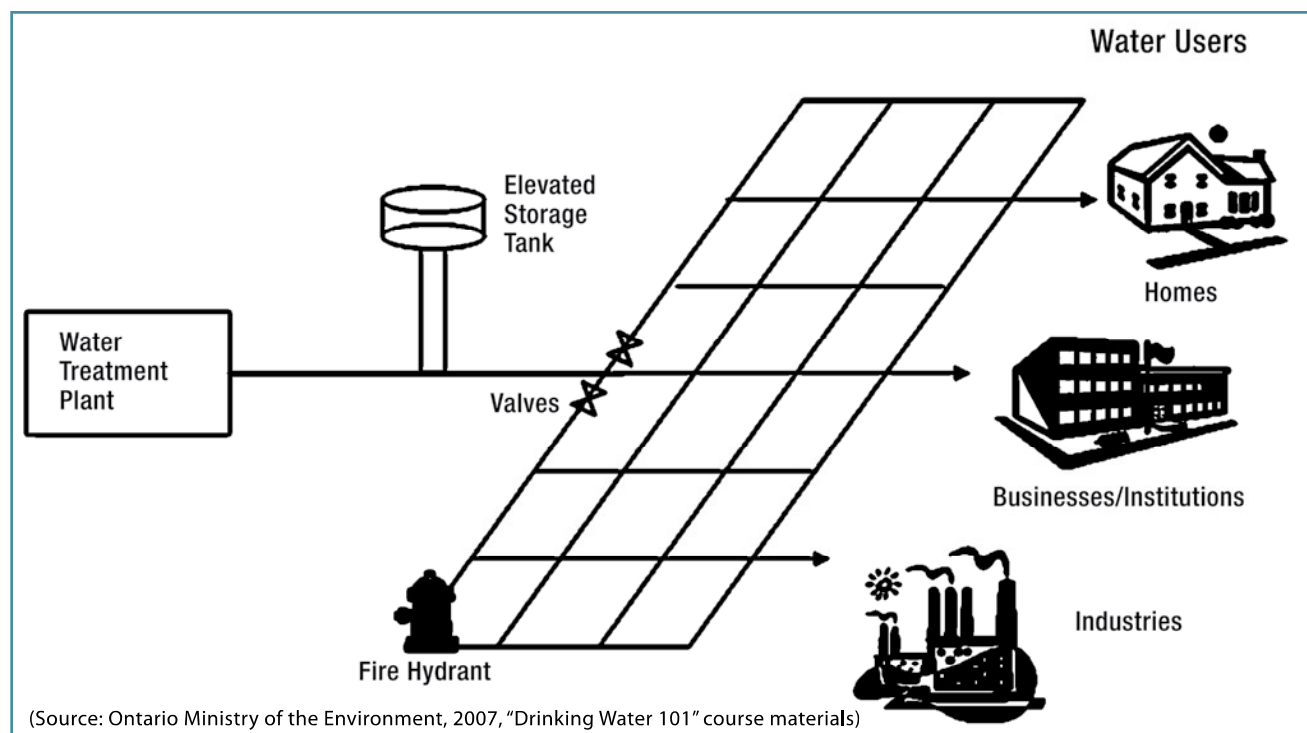
Intake and screen	Intake structures are used to draw water from lakes, reservoirs or rivers. Screens are used to remove large debris from raw water, such as logs or fish, or other unwanted matter (e.g. algae). Screens can also be designed for coarse or fine matter.
Coagulation	Coagulation is a chemical 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	The purpose of clarification is to remove 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	The purpose of filtration is to remove particles from the water not removed during clarification by passing the water through a granular or membrane filter that retains all or most of the solids on or within itself.
Disinfection	Usually the addition of chlorine to raw or filtered water to remove or inactivate human pathogens such as bacteria and protozoa in water and viruses, or for the purpose of maintaining a consistent level of chlorine in a drinking-water distribution system.

Find Out About Your Drinking Water System Treatments Processes

To quickly find out what treatment processes are used by the drinking water system(s) in your municipality, visit Drinking Water Ontario (www.ontario.ca/drinkingwater) and look for your municipality on the drinking water quality map.

Water Distribution

The Water Distribution System is the collection of pipes, valves, fire hydrants, storage tanks, reservoirs and pumping stations that carry water to customers.



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.

Types of Pipes

The most common types of material used for pipes include:

- 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 - not often used; lightweight, low cost
- Plastic - polyvinyl chloride (PVC) or polyethylene pipes are widely used today.

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 – Ontario Ministry of the Environment's Drinking Water Ontario website offering a single point of access to a wealth of information on drinking water and drinking water services in Ontario.

www.ene.gov.on.ca – The website of the Ontario Ministry of the Environment.

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).

ACTIONS**You Can Take To Be Better Informed****☑ SUMMARY OF ACTIONS YOU CAN TAKE**

- 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.
- 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.
- Ask your operating authority to speak to your municipal council about your operational plan.
- Consider and act on any advice (including identified 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Ensure there are sufficient resources for appropriate 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.

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

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 protective measures.

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

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: a notice issued by a local medical officer of health indicating water should be boiled before human consumption.

C

Certificate of Approval (C of A): a legal instrument which permits the construction or alteration of a drinking water system, or parts thereof. The Ontario Ministry of the Environment issues this document after an engineering review of the proposed facilities and when it is satisfied that the facilities will work as intended and will be able at all times to supply drinking water meeting Ontario Drinking Water Standards and requirements of O.Reg.170/03. For municipal drinking water systems that provide water to residences, the C of A program is being phased out and replaced with the Municipal Drinking Water Licensing Program.

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.

Coagulation: the addition of coagulant chemicals to water to allow for the agglomeration of the small suspended particles into larger particles that can be removed by sedimentation and filtration in the drinking water process.

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

Conservation Authority: 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: destruction or inactivation of pathogenic and other kinds of micro-organisms by physical or chemical means.

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 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 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.

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: the separation of suspended solid particles from a fluid stream by passing the fluid through a granular or membrane filter medium that retains most of the solids on or within itself.

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, that 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 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.

O (con't)

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 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 Provincial Officer to any person who contravenes any act governed by the Ministry of the Environment.

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: process which includes identifying potential risks to drinking water, assessing and addressing these risks, preventing new ones, and monitoring success.

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.

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
at **1-800-565-4923**
Email: ***drinking.water@ontario.ca***

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