

Source Protection 101

Overview of the Source Protection Program Ministry of the Environment and Climate Change (MOECC) 2017



Source Protection Presentation Outline

I. Program Context

- Justice O'Connor Inquiry
- Multi-barrier Approach
- Clean Water Act and Regulations

II. Source Protection Program Overview

- Structure and Process
- Assessment Reports
- Source Protection Plans and Policies

III. Source Protection Annual Progress Reporting



I. Source Protection Program Context

- After the Walkerton tragedy in May 2000, Justice Dennis O'Connor was commissioned to lead an inquiry into the contamination of the Walkerton water supply and more broadly, the safety of Ontario's drinking water.
 - Walkerton Inquiry Report made 121 recommendations.
- Clean Water Act, 2006 (CWA) came into force July 3rd, 2007.
 - Fulfills 12 of the Justice O'Connor's recommendations.
- First Principle concept of prevention in the safeguarding of our drinking water for our communities and our health.







Scope of the Clean Water Act, 2006

- The purpose of the CWA is to protect existing and future sources of drinking water from contamination or depletion.
 - Manages activities that could be a risk to sources of drinking water in Ontario.
 - Relies on existing legislation, regulations, and processes to manage or eliminate risks.
 - Does not extend the powers of existing legislation and regulations.
 - Where there is a conflict between pieces legislation the one that is more protective of drinking water applies.
 - Part IV of the CWA provides municipalities with a new authority to regulate threat activities that may pose a significant risk to drinking water. It is intended to *address the gaps* where Significant Drinking Water Threats (Significant Drinking Water Threats) cannot be addressed by other existing planning tools or regulatory instruments.



II. Source Protection Program

- The CWA established 38 source protection areas within the Province generally based on Conservation Authority boundaries under the *Conservation Authorities Act*, 1990.
- Source protection plans are now in place for municipal residential drinking water systems within the 38 source protection areas, representing approximately <u>90% of the population</u> within those source protection areas.
- Other systems (i.e. cluster of private wells/intakes, non-residential systems) may be added by municipal council resolution, or through Minister's Order.
- First Nations drinking water systems may be included through amendment to Regulation 287/07 and a band council resolution.
- Moving forward, any new municipal residential drinking water systems will need to be added to existing source protection plans.



Source Protection Funding

To date, the Province has invested over \$280M in the source protection planning and implementation process.

Funding has been provided under 4 main funding programs:

Capacity Funding – Investment in building capacity at source protection authorities and First Nations in order to undertake source protection planning work for their local watersheds.

Technical Studies Funding – funding to municipalities and conservation authorities to gather the science to inform the development of the assessment reports.

Source Protection Municipal Implementation Fund – financial assistance for small rural municipalities fulfilling policy obligations for significant drinking water threats.

Ontario Drinking Water Stewardship Program – main focus was providing financial assistance to landowners implementing early on the ground actions which helped address risks to municipal drinking water sources ahead of the development of local source protection plan.







Key Players

Source Protection Committee (SPC)

- Multi-stakeholder committee, 1/3 municipal representation.
- Were responsible for (1) terms of reference, (2) assessment report, and (3) source protection plan.
- Ongoing role in any revisions of these documents and in review of annual progress on implementation.



Source Protection Authority (Conservation Authority)

- Appoints the SPC and provides administrative and technical support to the Committee.
- Supports implementation and tracks and reports on progress.
- Responsible for plan revisions (s.34, 35, 36) and engaging the SPC, municipalities and others in these revisions.



Other Key Players

Municipalities

- Participated in the initial development of the terms of reference (ToR), assessment report (AR) and source protection plan (SPP).
- Implementers and enforcers of local measures and actions to address drinking water threats.
- Lead implementer for Part IV policies (including enforcement).
- Ongoing role in plan updates and ensuring new drinking water systems are included in plans.

Province

- Develop, update and provide guidance on CWA, Regulations and technical rules.
- Provide funding.
- Approvals (ToR, AR, SPP and revisions to plans).
- Enforcement in unorganized territories.
- Implement policies including legally binding decisions on prescribed instruments (e.g. permits, approvals, licences etc.) and other non-legally binding policies (e.g. funding, research, education and outreach etc.).
- Reporting on implementation progress.





monitoring, reporting



Source Protection Plan Implementation

- Source protection plans are being implemented across the Province. Together they the help protect sources of drinking water for about 450 municipal drinking water systems.
- There are annual reporting requirements under the Clean Water Act to track progress made on implementing source protection plan policies.
- There are also a number of mechanisms within the Clean Water Act to ensure these plans are kept up to date.



Source Protection Plan Amendments

Revisions	<u>Examples</u>
s.34 Amendment (CWA) (SPA Proposes)	 New/expanded systems Completion of technical work e.g., water budgets, new systems
s. 35 Order (CWA) (<i>Minister's Order</i>)	Minister's discretion
s. 36 Update (CWA) (Mandatory Review)	 Most plan revisions (continuous improvement) e.g., new policies, new technical work
s. 51 (O.Reg.287/07) (SPA's Discretion)	 Minor administrative errors e.g., correction of typos, spelling, etc.



Assessment Report

- Assessment Reports determine the vulnerability of groundwater and surface water within watersheds.
- They consist of 3 main parts:
 - Watershed characterization: an overview of the watershed, location of drinking water systems.
 - Vulnerability Assessment: assessing the vulnerability of sources of drinking water to contamination or depletion.
 - Threats assessment: identification and enumeration of risks to drinking water in vulnerable areas.



Vulnerability Analysis

- Water quality vulnerability analysis assesses how vulnerable groundwater and surface water sources are to contamination.
- Water quantity vulnerability analysis uses **water budgets** to assess the sustainability of the drinking water sources.
- Through these analyses four types of vulnerable areas are delineated:
 - Intake Protection Zone (IPZ) (Quality and Quantity)*
 - Well Head Protection Area (WHPA) (Quality and Quantity)*
 - Significant Groundwater Recharge Areas (SGRAs)(Quantity)
 - Highly Vulnerable Aquifers (HVAs) (Quality)

*areas where significant risk can occur



Vulnerable Areas – Surface Water (IPZ)



- The vulnerable areas around a surface water intake are known as Intake Protection Zones (IPZs) and there are 3 subareas within the IPZ for water quality:
 - **IPZ-1**: zone closest to intake, most vulnerable, direct and immediate impacts to drinking water source possible; no spill response time.
 - **IPZ-2**: zone further upstream from intake, direct impacts to drinking water source possible; limited spill response time.
 - **IPZ-3**: zone covers larger portion of watershed; time available to manage spills.
- Modelling and local site characteristics are used to delineate these protective zones.



Vulnerable Areas – Groundwater (WHPA)



- The WHPA is the area around the well that has the highest probability of impacting the water quality flowing into the well. Its size is dependent on several factors, including type of aquifer (bedrock, sand) and the direction and speed that groundwater travels.
- Four water quality zones are delineated based on how long it takes water to move underground to the well (the time of travel):
 - WHPA-A: 100m radius (quickest)
 - WHPA-B: 2 yr. Time of Travel (TOT)
 - WHPA-C: 5 yr. TOT
 - WHPA-D: 25 yr. TOT (slowest)



Vulnerable Areas – Groundwater (WHPA)



There are two additional quality zones that capture areas where surface water influences groundwater quality at a well:

WHPA-E: delineated as an IPZ-2 to capture surface water bodies that contribute water within a specific time of travel. WHPA-Es are the only WHPAs that can overlap with the other WHPA areas.

WHPA-F: An additional area of the watershed, beyond the boundary of a WHPA-E, where surface water can contaminate groundwater with contaminants that have already been identified as a drinking water issue at the well. There is no vulnerability score associated with WHPA-F.



Vulnerable Areas – Significant Groundwater Recharge Areas (SGRAs)



- A recharge area is the area of land where the rain or snow seeps into the ground and flows into an aquifer.
- A recharge area is considered 'significant' when it supplies more water to an aquifer used for drinking water than the land around it.
- These SGRAs often have more permeable soil, such as sand or gravel, and allow the water to seep more easily into the ground.
- A SGRA is delineated as part of the water budget analysis.
- *note Significant Drinking Water Threats are not identified in an SGRA



Vulnerable Areas – Highly Vulnerable Aquifers (HVA)



- The vulnerability of an aquifer is based on several factors, including its depth underground, the type of soil covering it, and the characteristics of the overlying materials.
- The faster water flows through the ground to an aquifer, the more vulnerable the area is to contamination.
- Technical analysis results in defining high, medium, or low groundwater vulnerability areas across the landscape.
- High vulnerability areas are delineated and mapped as <u>HVAs</u>.
- High, Medium and low groundwater vulnerability areas factor into the scoring of WHPAs.



Tiered Water Budget Framework Tier 3: Type I, II or III 3D GW Flow or Continuous SW Flow Model System (Water Quantity Risk Assessment) Tier 2: 3D GW Flow or Continuous SW Flow Model Subwatershed Increasing Certainty Increasing Model Complexity Tier 1: **Refined Spatial GIS Water Budget or Equivalent** Scale (Supply, Demand, Stress Assessment) Subwatershed **Conceptual Water Budget** (Characterization & Visualization) Watershed



Vulnerable Areas - Water Quantity



- Water Budgets focus on water quantity the amount of water available.
- A water budget is determined by analyzing how much water enters a watershed, how much is stored and how much leaves/is used.
 - If a tier 3 water budget process shows a system is vulnerable to depletion the following areas are defined:
 - WHPA Q1- areas around a well where consumptive water takings can pose a risk.
 - WHPA Q2- areas around a well where reductions in recharge can pose a risk.
 - IPZ-Q- areas around an intake where consumptive water takings or recharge can pose a risk.



Identifying Drinking Water Threats

- The CWA prescribes 21 activities that pose a potential risk to drinking water and need to be addressed through source protection policies.
 - 19 prescribed activities are risks to water quality.
 - 2 prescribed activities are risks to water quantity.

Water Quality:

- The 19 prescribed threats are further categorized into threat subcategories in the tables of Drinking Water Threats:
 - These tables set out the circumstances including vulnerability scores, where activities pose a risk to drinking water.
 - Table of Drinking Water Threats
- There are 2 types of water quality drinking water threats not prescribed by regulation:
 - Conditions and local threats.
 - Risk is calculated using assigned hazard ratings and vulnerability scores.

Water Quantity

 The prescribed drinking water threats (water takings and reductions in recharge) become significant risks in the WHPA-Qs and IPZ-Qs depending on their tier 3 water budget stress levels.



21 Prescribed Drinking Water Threat Activities

1 - waste disposal

2 - sewage

Agriculture

- 3 application of Agricultural Source Materials
- 4 storage of Agricultural Source Materials
- 5 management of Agricultural Source Materials
- 6 application of Non Agricultural Source Materials

7 – handling and storage of Non Agricultural Source Materials

- 8 application of commercial fertilizer
- 9 handling and storage of commercial fertilizer
- 10 application of pesticide
- 11 handling and storage of pesticide

21 - livestock grazing and pasturing

Clean Water Act (General Reg. 287/07)

- 12 application of road salt
- 13 handling and storage of road salt

14 – storage of **snow**

Industrial

- 15 handling and storage of fuel
- 16 handling and storage of dense nonaqueous phase liquid (**DNAPL**)
- 17 handling and storage of an **organic** solvent
- 18 chemicals used in the de-icing of aircraft

Water Quantity

19 - consumptive water taking

20 – activity that reduces the recharge of an aquifer



Conditions and Local Threats

- The CWA defines other types of threats that can be identified: Conditions and Local Threats.
- **Condition** = Contamination related to historical activities
 - May be impacted soil, groundwater, or sediment (e.g. contaminated site).
- Local threat = Request by SPC/SPA to address unique local situation (eg. pipelines)
 - Request must be approved by Source Protection Program Branch Director and, if approved, the Director establishes the associated hazard rating.



Methods of assessing Drinking Water Threats

- There are 3 approaches for assessing the risk posed by prescribed threats, local threats and conditions.
- The use of these approaches is dependent on the type of drinking water system.

	Possible Approaches		
Type of Drinking Water System in your Source Protection Area	(1) Threats Approach	(2) Issues Approach	(3) Event Based Approach
Groundwater	\checkmark	\checkmark	-
Large surface water bodies such as Great Lakes, Connecting Channels, Lake St. Clair, Lake Simcoe, Lake Nipissing and Ottawa River.	\checkmark	\checkmark	\checkmark
Other surface water bodies	\checkmark	\checkmark	-



Threats Approach

The threats approach uses the following formula to assess risk:

RISK SCORE= VULNERABILITY SCORE X HAZARD SCORE

- The risk scores are the basis behind the table of drinking water threats, which summarizes where activities pose a risk to drinking water.
- The vulnerability score indicates how vulnerable the source of drinking water is to contamination and is based on a number of factors (e.g. land cover, rainfall, type of intake, well depth etc.).
- The hazard score is assigned to each type of threat and is based on a number of factors (e.g. toxicity, release to the environment etc.).



Issues Approach

- Assessing issues is another method by which significant threats can be identified within Assessment Reports:
 - Issue = deterioration in source water quality (anthropogenic).
 - Issue Contributing Area = the geographic area within existing vulnerable areas where activities and conditions may contribute to the parameter/pathogen of concern identified in the source water.
 - E.g. Ramsey Lake ICA is delineated for both sodium, and phosphorous (that enhances the development of Algal blooms that may release Microcystin).
 - All activities and conditions that are or could contribute to these issues within the Ramsey Lake ICA are considered to be Significant Drinking Water Threats.
 - For Sodium: storage of salt, road salt application, storage of snow.
 - For Phosphorous : application and storage of (non) agriculture source materials, sewage (septic, storm-water management ponds, etc.).







Event Based Areas (EBA) Approach

- EBAs were introduced to the technical rules to assess situations where the vulnerability scoring approach did not adequately address the risk of spills in certain protection zones.
- Applicable only to surface water intakes located in large water bodies such as Great Lakes, Connecting Channels, Lake St. Clair, Lake Simcoe and Ottawa River.
- EBAs can be used to identify areas where the release and transport of contaminants to an intake under extreme weather events pose a risk to a drinking water system. The SPC/SPA must identify and locate the activities to be evaluated through EBA.
- Where EBAs are located outside an IPZ-1 or 2, an IPZ-3 is added to include the EBAs.



Source Protection Plans – Address Risks

- SPPs contain policies to protect existing and future sources of drinking water.
- The source protection plan is the document that sets out how local communities will address each of the threats identified in Assessment Reports and protect their sources of drinking water.
- Plans must include policies to address both existing and future threat activities.
- Mandatory to include policies to either manage or prohibit significant drinking water threats.
- Optional to write policies to manage moderate/low drinking water threats
- SPCs are also required to write monitoring policies to ensure we track the implementation of each significant drinking water threat policy



Source Protection Plan Tools

Committees first decided desired outcome: manage or prohibit, then chose the specific tool(s) to achieve this



Objective of significant threat policies: Ceases to be / does not become significant (i.e., sufficiently managed)



Part IV Tools

- Risk Management Plans (RMPs) (Section 58)
 - RMPs are negotiated, site (or property) specific documents that will outline required actions to address Significant Drinking Water Threats.
 - Risk Management Officials (RMO) are appointed by the municipality and negotiate with the person engaged in Significant Drinking Water Threats activity to develop the RMP.
- Prohibition (Section 57)
 - Prohibition can be applied to future activities, but can also serve to phase out existing activities.
 - If a prohibition policy is included in the source protection plan (SPP), the policy will designate the activities that will be prohibited and the areas where the policy applies.
 - Those designated activities can not be engaged in at the locations specified in the source protection plan policy.
- **Restricted Land Uses** (Section 59)
 - Section 59 enables a process for "catching" or "flagging" activities before they are established so they don't become a drinking water threat.
 - Process is triggered by development applications and building permits.



Risk Management Officials and Inspectors Roles/Responsibilities

- Negotiating risk management plans (RMP).
- Issuing section 59 (restricted land use) notices.
- Issuing orders under section 61 requiring persons responsible for a significant drinking water threat activity to which section 58 (RMP) applies to provide a report describing manner in which the activity is being engaged in.
- Collecting documents or data on the property that relates to an activity that is subject to a prohibition (s. 57), and RMP (s. 58).
- Issuing enforcement orders.
- Ensuring compliance with sections 57 and 58 through inspections.
- Preparing an annual report to the source protection authority summarizing Part IV enforcement.



Prescribed Instruments

Ministry of the Environment and Climate Change

•Environmental Compliance Approval

- Sewage works (Ontario Water Resources Act (OWRA))
- Waste disposal site (Environmental Protection Act (EPA))
- Waste management system (EPA)

•<u>Municipal Drinking Water Licence and</u> <u>Drinking Water Works Permit</u> (Safe Drinking Water Act (SDWA))

•Permits to Take Water (OWRA)

•Pesticide Permits (Pesticide Act)

•Renewable Energy Approval (EPA)

Ministry of Natural Resources and Forestry

- Aggregate Instruments
 - Licence (Aggregate Resources Act (ARA))
 - Permit (ARA)
 - Site Plan (ARA)

Ministry of Transportation

- Aggregate Instruments
 - Wayside Permit (ARA)**

Ministry of Agriculture, Food and Rural Affairs

- Nutrient Management Instruments
 - Nutrient Management Strategy (Nutrient Management Act (NMA))
 - Nutrient Management Plan (NMA)
 - Non-Agricultural Source Material Plan (NMA)

**MTO issues wayside permits - regulates temporary aggregate operations on private lands for purposes of public authority road construction/maintenance projects.



Prescribed Instrument Policies

Policies affecting prescribed instruments fall into two main categories:

- Prohibition of the activity through instrument decisions
 - Generally limited to issuance of future instruments
- **Management** of the activity through instrument requirements
 - Reviewing/amending existing instruments to determine if they contain the required terms/conditions and operational measures to ensure the activity ceases to be a Significant Drinking Water Threat
 - Issuing new instruments that contain terms and conditions and design/operational measures to ensure the activity does not become a Significant Drinking Water Threat



Land Use Planning Policies

- Municipalities must amend their official plan and zoning by-laws to <u>conform to</u> land use planning policies for Significant Drinking Water Threats (includes decisions on applications for consents, plan of subdivision approvals, site plan approvals)
- Generally, land use planning used to **prohibit** future threat activities
 - Affect broad categories of land use related to a threat activity, e.g. waste disposal, industrial, etc.
 - Only apply to future land uses
- Land use planning policies may also be used to manage future threat activities by requiring:
 - Technical studies, disclosure reports, or other supporting documentation to complete applications
 - Low impact development measures in certain areas (e.g. reduce impervious surface areas)



Policies that Specify Actions

- There are also several types of policies that specify actions within SPPs.
 Some examples include:
 - incorporating source protection information into spills response plans
 - updating/implementing salt management plans
 - conducting mandatory on-site sewage system inspections
- May be directed at ministries, municipalities, federal government departments, conservation authorities



Incentive Program Policies

- Some source protection plans contain policies asking for implementing bodies to consider making incentives available to assist with the implementation of source protection plan policies. Some examples include:
 - Providing funding and support under the Ontario Drinking Water Stewardship Program
 - Providing funding to municipalities and SPAs for local research into drinking water issues (e.g. nitrogen, phosphorus, pathogens etc.)
 - Waiving application fees for prescribed instruments



Education and Outreach Policies

- There are a number of Education and Outreach policies in plans across the province aimed at increasing awareness of source protection in order to change behaviour. Some examples include:
 - Designing, manufacturing, installing and maintaining signs on provincial highways within vulnerable areas
 - Encouraging actions to reduce the application of commercial fertilizer and to encourage the proper handling and disposal of DNAPLs, fuels etc.
 - Encouraging increased water conservation
 - Helping landowners understand the objectives and benefits of septic inspection and maintenance programs



Source Protection Plan Policies and Implementing Bodies: An Overview



- SPP policies are implemented by various bodies including the province, municipalities, conservation authorities, and others such as the federal government departments
- In terms of the distribution of implementation responsibilities, the vast majority of the policies are implemented by the province, the RMOs and municipalities



Implementation Successes in Ontario's Public Sector

- Ministry of Municipal Affairs and Housing: ensuring municipal official plans incorporate provisions that protect municipal drinking water sources from significant land use risks.
- Ministry of Government and Consumer Services: implemented changes to the Fuel Oil Code and Liquid Fuel Handling Code to enhance environmental protection.
- MOECC: implementing changes to the environmental compliance approvals (ECAs), spills response program and compliance inspections.
- Ministry of Transportation: installing signs along major highways to raise awareness of drinking water protection zones.
- Ministry of Natural Resources and Forestry: made amendments to the Aggregates Resources Act and is undertaking regulatory changes to ensure drinking water is protected.



III. Source Protection Annual Progress Reporting

There are reporting obligations set out in the Act, Regulations and Source Protection Policies to monitor and report on implementation.

- The Clean Water Act requires that source protection plans include monitoring policies that set out how each implementing body will report on implementation. Implementing bodies report to the SPA on their monitoring policies by February 1st of each year.
- SPAs are required to report annually to the MOECC on progress towards plan implementation (beginning approximately 3 years after their source protection plan takes effect (Clean Water Act, ss. 46(1))
 - The Source Protection Committee is required to review and provide written comments on the SPA annual progress report (*Clean Water Act*, ss 46(3))
- The Minister is required to include a summary of the SPA progress reports in the annual report prepared under the Safe Drinking Water Act (SDWA) (Clean Water Act, ss. 46(7))



Source Protection Annual Reporting: Information Flow





Resources

Source Protection Information Atlas (SPIA)

- SPIA is a mapping tool which will provide external partners, the province, stakeholders and the general public with the ability to quickly determine a property's proximity to a source water vulnerable area. They will also be able to determine where source protection plan policies could apply.
- Supports implementation (e.g. Spills Action Centre, Municipalities, RMOs etc.);
- To access SPIA, visit: <u>https://www.ontario.ca/page/source-protection</u>
- Any questions about SPIA should be directed to <u>source.protection@ontario.ca</u>



Resources Continued

Ontario.ca source protection site:

<u>https://www.ontario.ca/page/source-protection</u>

Conservation Ontario site:

- Approved ARs and SPPs: <u>http://conservationontario.ca/conservation-</u> <u>authorities/source-water-protection/source-protection-plans-and-resources/</u>
- Education and Outreach Catalogue: <u>http://conservationontario.ca/resources/?tx_fefiles_files%5Bcategory%5D=25&tx_fefil</u> <u>es_files%5Baction%5D=list&tx_fefiles_files%5Bcontroller%5D=File&cHash=f0cef1f74</u> <u>32d1e95a919ccb47c8e8076</u>

Risk Management Measures Catalogue:

<u>http://www.trcagauging.ca/RmmCatalogue/</u>

Threats Look Up Tool:

http://swpip.ca/



QUESTIONS?



