

7 PRESCRIBED THREATS

A drinking water threat is defined in the *Clean Water Act, 2006* (Section 2(1)) as:

an activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water.

O. Reg. 287/07 under the *Clean Water Act, 2006* has prescribed 21 threats for which the Source Protection Committee must write policies in areas where these threats could be significant.

1. The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the *Environmental Protection Act*.
2. The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.
3. The application of agricultural source material to land.
4. The storage of agricultural source material.
5. The management of agricultural source material.
6. The application of non-agricultural source material to land.
7. The handling and storage of non-agricultural source material.
8. The application of commercial fertilizer to land.
9. The handling and storage of commercial fertilizer.
10. The application of pesticide to land.
11. The handling and storage of pesticide.
12. The application of road salt.
13. The handling and storage of road salt.
14. The storage of snow.
15. The handling and storage of fuel.
16. The handling and storage of a dense non-aqueous phase liquid.

Just because an activity is a significant threat does not mean that it is currently harming water sources. It has the potential to cause harm if something should go wrong, such as an accidental spill or leak.

17. The handling and storage of an organic solvent.
18. The management of runoff that contains chemicals used in the de-icing of aircraft.
19. An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body.
20. An activity that reduces the recharge of an aquifer.
21. The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard.

In addition to the prescribed threats listed above, a SPC may determine that there are other activities in their area that they think pose a risk to drinking water. Where this is the case, the SPC may ask the Director at the Ministry of the Environment and Climate Change if the activity can be considered as a local threat to drinking water. In 2009, the Lake Ontario Collaborative (LOC) project initiated event based modelling for the purpose of identifying if certain prescribed or local activities posed a significant risk to the LOC municipal partners' Lake Ontario intakes. A list of proposed spill scenario simulations for existing facilities was developed in consultation with municipal partners, SPC Chairs and Project Managers, and MOE. The selected LOC spill scenarios are based on 'real' events that have occurred in the past and are therefore not representative of extreme events. The following spills scenarios resulted in the identification of five different significant drinking water threat activities to Lake Ontario water treatments plants (WTP). Three of these activities fall under the MOE prescribed drinking water quality threats (*Tables of Drinking Water Threats, Clean Water Act, 2006*):

- Threat # 2. The establishment, operation, or maintenance of a system that collects, stores, transmits, treats, or disposes of sewage (relates to two activities).
- Threat # 15. The handling and storage of fuel.

Two of the activities required MOE approval of additional 'Local' drinking water threats:

- Pipeline transporting petroleum products (containing benzene) crossing tributaries of Lake Ontario; and
- Spill of tritium from nuclear generating station.

Both of these 'local threats' only apply to specific Lake Ontario intakes (**Table 6-2**) identified in the respective Assessment Reports.

7.1 IDENTIFYING AND ENUMERATING POTENTIAL SIGNIFICANT THREATS

Land use activities have been inventoried in vulnerable areas and potential significant threats have been identified using desktop information but have not been confirmed through site visits. All of this information can be found in the Assessment Reports. Just because one of the 21 activities is identified as a significant threat does not mean that it is currently harming the water or that it will in the future. Determining whether or not a threat actually exists is a complex process. The MOE has ranked drinking water threats as being significant, moderate or low. The SPP must, at a minimum, include policies for all areas where significant threats could occur. There are three possible approaches to identifying drinking water threats.

7.1.1 Vulnerability Scoring/Threats-Based Approach

The vulnerability scoring approach relies upon the *Tables of Drinking Water Threats* created by MOE to identify and rank drinking water threats. A variety of specific circumstances are outlined in the *Tables of Drinking Water Threats* for each of the 21 prescribed drinking water threats. These tables were created to provide a consistent approach across all Source Protection Regions in Ontario. The *Tables of Drinking Water Threats* provide the list of circumstances where provincially prescribed activities are low, moderate or significant threats to drinking water. The tables can be accessed through the Ministry of the Environment and Climate Change's website.

To understand how each circumstance applies within the vulnerable areas, it is necessary to understand how the *Tables of Drinking Water Threats* were set up. The tables link the hazard rating of an activity under a specific circumstance and for a specific source of water, with the vulnerability scores needed to make the activity/circumstance a significant, moderate or low drinking water threat. The risk score is determined through the use of the following equation:

$$R = V \times HR$$

Where:

R is Risk Score

V is Vulnerability of the source water area (scale of 1 – 10)

HR is the Hazard Rating of the threat (scale of 1 – 10)

Risk Score Range	Drinking Water Threat Classification
80 – 100	Significant
60 - < 80	Moderate
> 40 - < 60	Low

The hazard ratings are not provided in the *Tables of Drinking Water Threats*, but the threat level is identified based on the vulnerable area and vulnerability score where the activity is or would be located. The chemical hazard ratings were determined by considering factors such as toxicity, environmental fate, quantity and method of release. The vulnerability scores for different parts of the vulnerable areas described in Chapter 6 are calculated based on provincially mandated factors applied to site specific information about the area, for example how permeable the soil is above the aquifer. The Assessment Reports describe the information and approach used to calculate the vulnerability scores for around each well or intake. The maps (**Appendix F**) included in this SPP show the vulnerability scores for areas around wells or intakes where significant drinking water threats may occur.

The *Tables of Drinking Water Threats* separate circumstances into chemical and pathogen based contaminants. It should be noted that the presence of a DNAPL (dense non-aqueous phase liquid) is considered a significant threat if it occurs anywhere within the five year time of travel (WHPA-A to WHPA-C), regardless of the vulnerability score.

7.1.2 Issues Approach

A drinking water Issue is a documented, existing problem with the quality of the source water. An Issue exists if a contaminant is present at a concentration that may result in the deterioration of the quality of water used as a source of drinking water, or if there is a trend of increasing concentrations of the contaminant. Every elevated contaminant in the raw water is not necessarily considered an Issue.

Elevated parameters are not considered an Issue when they are known to be naturally occurring and do not present a problem for the water treatment plant operator. For Issues caused by human activities, the Assessment Report must delineate the area contributing to an Issue or include a plan to delineate

the Issue Contributing Area. Once a drinking water Issue is identified, then any activities or conditions that may be causing that Issue need to be identified. This is called the Issue approach to identifying drinking water threats.

The first step is to identify an Issue Contributing Area (ICA) in the vicinity of the location at which the Issue has been observed. The ICA may be different than the vulnerable area (WHPA or IPZ). In the second step, specific drinking water threats that could reasonably be expected to contribute to the Issue are identified. All such threats are automatically classified as significant.

7.1.3 Event-Based Approach

The event-based modelling approach was included in the *Technical Rules* to identify threats to drinking water in systems drawing water from larger surface water bodies where the vulnerability scores are generally low. In the CTC Source Protection Region, this approach was used to delineate an event based area (EBA) where a spill from a specific activity within this EBA would cause a significant risk to the drinking water source and hence the modelled activity would be identified as a significant threat; this modelling approach also informed the delineation of IPZ-3s where the EBA extends beyond IPZ-1 and IPZ-2 for the drinking water systems in Lake Ontario.

7.1.4 Enumerating Drinking Water Threats

The minimum requirement for the preparation of the Assessment Reports involved counting the potential significant drinking water threats within WHPAs or IPZs where the risk could be ‘significant’ based on the vulnerability score of the area. Policies must be developed to mitigate existing significant drinking water threats and ensure activities do not become a significant drinking water threat. The threats identified in the Assessment Reports are *potential* threats only. If an identified property does not have a specific threat activity being carried out on it then the ‘existing’ threat policies in the SPP for that threat would not apply. Conversely, even though a threat activity is not identified on a property, the relevant SPP policies apply if the threat activity is being carried out now or in the future.

A “condition” is defined as a past land use activity which may pose a problem to water quality.
An “issue” is defined as a documented water quality problem.

7.2 TRANSPORT PATHWAYS

The vulnerability of an aquifer may be increased by any land use activity or feature that disturbs the surface above the aquifer, or which artificially enhances flow to that aquifer. Man-made transport pathways include pits, quarries, mines, road cuts, ditches, storm water, pipelines, sewers, and poorly constructed wells. These pathways can bypass the natural system, resulting in faster pathways for contamination to reach the well or intake. For groundwater drinking water wells, if any of these constructed pathways exist in a water source, the vulnerability score increases by one or two steps (i.e., from low to medium, from medium to high, or from low to high). The decision by the SPC to increase the vulnerability score for an area should be supported by data, and use professional judgment. When determining whether the vulnerability of an area has increased, the following factors shall be considered, as per *Technical Rule 41*.

Hydrogeological conditions:

- The type and design of any transport pathways;
- The cumulative impact of any transport pathways; and
- The extent of any assumptions used in the assessment of the vulnerability of the groundwater.

Examples of features that may provide a transport pathway that could result in an increase in vulnerability of a water supply source include:

- Existing wells or boreholes
- Unused or abandoned wells
- Pits and quarries
- Mines

The *Technical Rules* indicate that a Source Protection Committee may conclude that the data available may be insufficient or of too poor quality to justify an increase in vulnerability.

Several datasets for pathway features were reviewed in an attempt to assess transport pathways within the CTC Source Protection Region. Only the data for pits and quarries were deemed sufficient to adjust the vulnerability score within WHPAs and HVAs.