



UPPER THAMES RIVER ASSESSMENT REPORT

Section Summary - 5.0 Issues Evaluation

Section Summaries

The Assessment Reports for the Thames-Sydenham and Region are large summary documents compiling information from many technical reports. These technical reports include Water Budgets, Watershed Characterization Reports and many Source Protection Technical Studies related to municipal drinking water systems. That information has been summarized and compiled into Assessment Reports of the Region. Each section of the Assessment Reports has been summarized in a series of Section Summaries.

5.0 Issues Evaluation

Under the Clean Water Act (2006), drinking water quality issues must be identified. A drinking water issue is a parameter (substance) or pathogen (disease-causing microorganism) that is present at a level that may cause the deterioration of the quality of water used as a source of drinking water. An issue may also be identified when levels of that substance or organism show an increasing trend that may result in deteriorated quality of water used as a source of drinking water.

What is an Issue?

The Technical Rules: Assessment Report indicates the following parameters can be considered in the identification of drinking water quality issues in raw (untreated) source water: Schedule 1, 2 and 3 parameters of the Ontario Drinking Water Quality Standards (O. Reg. 169/03 of the Safe Drinking Water Act, 2002), and Table 4 parameters of the Technical Support Document for the Ontario Drinking Water Standards, Objectives and Guidelines (MOE publication, June 2006). The parameters are physical (e.g., taste, turbidity), chemical (e.g., lead, nitrate), radioactive (e.g., uranium-235) or indicator microbial (total coliform, *E. coli*).

Safe levels of the parameters in treated drinking water are identified in the above referenced tables. Parameters are listed and further described in the Issues Evaluation Section of the Assessment Report.

Pathogens, which are disease-causing organisms such as cryptosporidium or certain strains of bacteria, can also be considered.

Impact of Identifying an Issue

According to the Clean Water Act Technical Rules, activities or conditions (past activities) that contribute to drinking water quality issues (known to be partially or wholly due to anthropogenic sources), are deemed significant drinking water threats regardless of assigned vulnerability scores. This

applies to intake protection zones and wellhead protection areas only, for drinking water systems identified in the Source Protection Area Terms of Reference. The risks that these significant threats pose must be reduced through the source protection plan.

If an issue is identified, the activities that contribute to the issue and the areas where they occur (within vulnerable areas) must also be identified. A third intake protection zone (IPZ-3) for surface water intakes, or a WHPA-F for groundwater wells may be delineated to include the activity and area known to contribute to the drinking water quality issue (if the issue is known to be partially or wholly due to anthropogenic causes). A WHPA-F is delineated if the well is subject to issues that originate from outside the other parts of the WHPA, and only if a WHPA-E has already been delineated.

Issue Evaluation Methodology

Issues were identified in the Upper Thames River Source Protection Area (SPA) by following the Thames-Sydenham and Region Issues Evaluation Methodology (May 14, 2009), depicted in Figure 1. The evaluation is a two-step process.

Firstly, in the screening step, raw (untreated) water quality data are compared to a benchmark and parameters or pathogens may be flagged if they meet the screening criteria. For chemical, physical and radioactive parameters, the benchmarks are generally half the applicable human health based Ontario drinking water standards (Maximum Acceptable Concentrations, or MAC), and the full levels of the aesthetic objectives (AO) and operational guidelines (OG), and any plant operating authority concerns.

For parameters flagged through the screening, the second identification step involves a review of trends and spikes, frequency and duration of occurrence, presence at or trending towards the applicable MAC, AO or OG benchmark, consideration of existing water treatment plant capabilities and discussions with the water treatment plant operating authority.



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Pathogens are evaluated differently. A known pathogen of concern that is flagged through the screening process must be subject to a microbial risk assessment to identify it as an issue. This assessment involves pathogen characterization, exposure assessment and risk characterization.

Thames River SPA are provided in Table 1 (there are no surface water intakes located in the SPA). Parameters may be due to anthropogenic (man-made) sources, i.e., activities on land, or may be naturally occurring, or both. No pathogens are identified as issues in the raw (untreated) source water in the Upper Thames River SPA. Information on flagged parameters is provided in Appendix 9 of the Assessment Report.

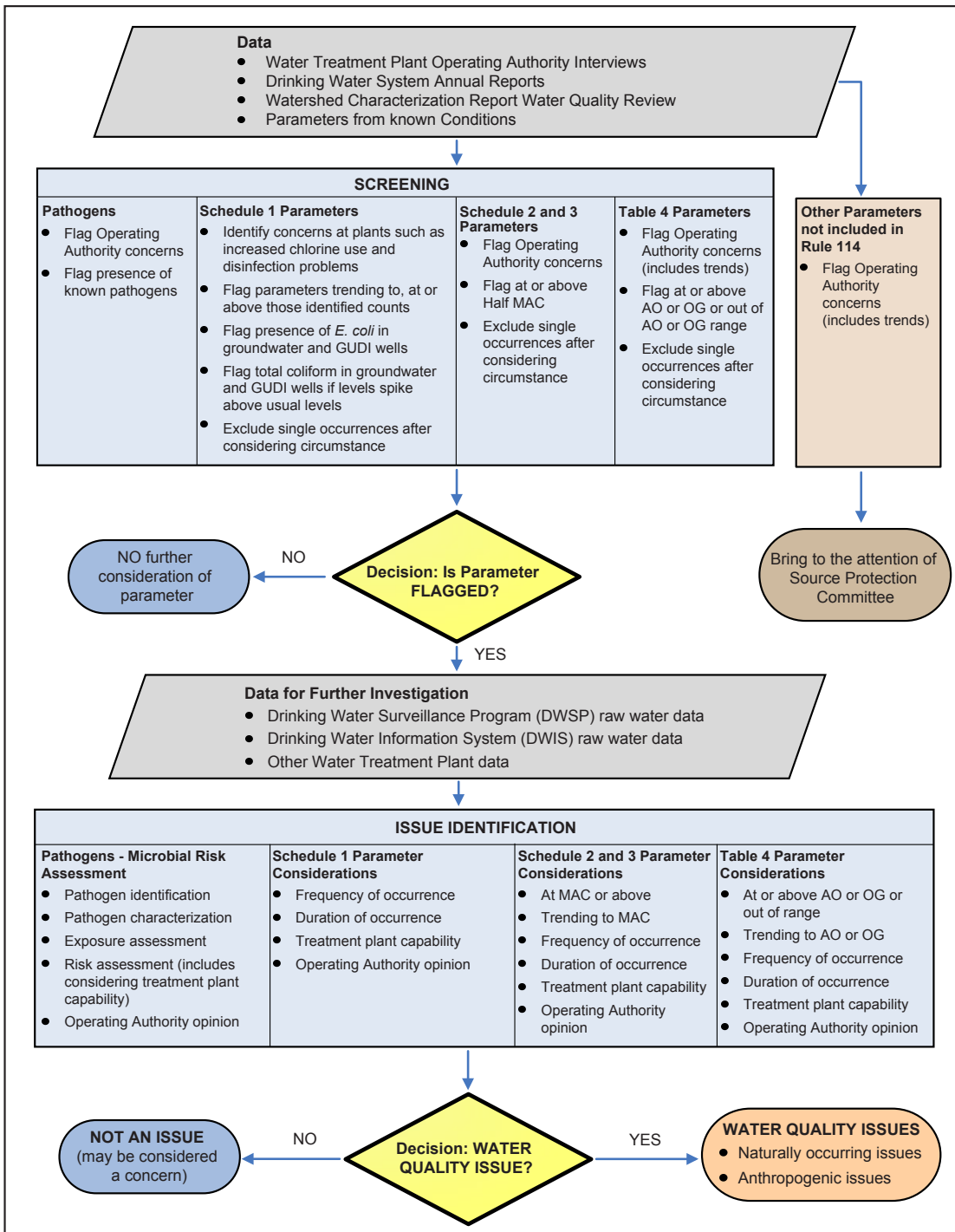
Identified Issues

The drinking water quality issues identified in the raw (untreated) water to the groundwater wells of the Upper

It is important to note that the drinking water quality issues identified in Table 1 are based on raw (untreated) water quality and do not represent the quality of water after

treatment. The operation of a water treatment plant including treatment and distribution, are governed separately by the Safe Drinking Water Act (2002).

Figure 1. Issues Evaluation Methodology



Data Gaps

Schedule 2 (chemical), Schedule 3 (radiological) and Table 4 (aesthetic and operational) data for the well raw water were limited due to infrequent sampling or short periods of data. Additional data collection would facilitate future issues evaluation.

There is usually no long-term (more than 10 years) groundwater quality data available for parameters that can be considered issues under the Clean Water Act. Continued data collection in the future would aid in determining trends and better facilitate future issues evaluation.

Most of the identified issues are naturally occurring. The sources of the rest of the issues are yet to be determined. If more information becomes available to the SPC, and the issues contributing area and activities must be determined, they will be included in a subsequent Assessment Report.

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Table 1. Drinking Water Quality Issues Identified in the Upper Thames River Source Protection Area

Municipality/ System - Wellfield	Issue	Brief Description of Evaluation	Natural or Anthropogenic Source
MIDDLESEX COUNTY			
Birr (1 well)	Hardness	Hardness levels for the well range between 128 to 200 mg/L (data from 2005 to 2008), and are above the treated water OG of 80 to 100 mg/L. Hardness is naturally high in the aquifer and is therefore considered a natural-based issue.	Naturally occurring
Melrose (2 wells)	Hardness	Hardness levels for both wells range between 130 to 240 mg/L (data from 2005 to 2008), and are above the treated water OG of 80 to 100 mg/L. Hardness is naturally high in the aquifer and is therefore considered a natural-based issue.	Naturally occurring
	Turbidity	Turbidity ranges between 5.73 to 10.04 NTU (data from 2004 and 2006 to 2008). These levels are above the treated water AO of 5 NTU. This parameter should continue to be monitored, as there is no filtration incorporated in this water system, and increasing turbidity can ultimately hinder the disinfection process.	Naturally occurring
Thorndale (2 wells)	Fluoride (both wells)	Fluoride in the raw water has consistently been above the treated drinking water MAC of 1.5 mg/L between 2003 and 2006, and in 2008. In 2007, it was above the half MAC. Fluoride concentrations are considered to be naturally high in the aquifer. A Fluoride Fact Sheet, provided by the Middlesex London Health Unit (MLHU), is distributed annually to all Thorndale water system customers.	Naturally occurring
Dorchester (9 wells)	None	None identified.	
CITY OF LONDON (Back up systems)			
City of London – Fanshawe wellfield (6 wells)	Hardness (all wells)	Hardness levels for all the wells range between 150 to 449 mg/L (data from 1994 to 2008 for all wells except Well 2, for which data were from 2000 to 2008). These levels are above the treated water OG of 80 to 100 mg/L. Well 5 appears to have the highest reported hardness. Hardness is naturally high in the aquifer.	Naturally occurring
	Manganese (Wells 2 to 6)	Concentrations in Wells 2, 3, 4, 5 and 6 are above the treated water AO of 0.05 mg/L at least once between 2000 and 2008, with a high level of 0.27 mg/L in Well 3 in 2005. Concentrations in Well 4 appear to be increasing. Elevated levels are typically due to interaction between the groundwater and manganese mineral deposits.	Naturally occurring
	Turbidity (Well 3)	In Well 3, concentration (7.06 NTU) in 2007 is above the treated water AO of 5 NTU. The source would be iron or dissolved solids naturally occurring in the aquifer. This parameter should continue to be monitored, as there is no filtration incorporated in this water system, and increasing turbidity can ultimately hinder the disinfection process.	Naturally occurring
	Organic Nitrogen (all wells)	Concentrations of organic nitrogen are regularly above the 0.15 mg/L treated water OG in all wells between 1994 and 2005. There is no specific trend to the data. Elevated concentrations appear to occur randomly but regularly in all wells, with a high of 1.2 mg/L in Well 3 in 2002.	Possibly both natural and anthropogenic causes, further investigation required
City of London – Hyde Park wellfield (1 well)	Hardness	The available data (2003 to 2008) indicate that the raw water hardness averaged 360 mg/L and was consistent throughout the data period. The average hardness level at the well exceeds the treated water OG of 80 to 100 mg/L. Hardness is considered naturally high in the groundwater, and is therefore considered a natural-based issue.	Naturally occurring
	Total Dissolved Solids	Data from 2003 to 2008 show levels of total dissolved solids in the range of 486 to 591 mg/L with the average being 545 mg/L. Although the reported levels of TDS are above the treated water AO of 500 mg/L, they are not substantially over the limit. It is likely that the high levels are a result of natural geology and are identified as a natural-based issue.	Naturally occurring

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OXFORD COUNTY			
Ingersoll (7 wells)	Hydrogen Sulfide (all wells)	All wells in Ingersoll are above the treated water AO of 0.05 mg/L for hydrogen sulphide between 2001 and 2009. Levels are reported as ranging from 0.26 to 6.02 mg/L. It is believed that the levels in Ingersoll source water are higher than some of these results indicate, as the parameter easily volatilizes in air. When not removed from the water prior to disinfection, the hydrogen sulphide can cause significant water quality and treatment issues.	Naturally occurring
Thamesford (3 wells)	Manganese (Wells 1 and 2)	The raw water in Wells 1 and 2 has levels of manganese above the treated water AO of 0.05 mg/L, with concentrations of 0.14 to 0.35 mg/L (data 2001 to 2009). No increasing trend is evident. The treatment facility removes manganese through an oxidation and filtration process. Failure of this process could potentially result in decreased clarity of the water, which would impact the effectiveness of the UV disinfection.	Naturally occurring
Woodstock (11 wells, including 1 planned well)	Nitrates (Wells 1, 2, 3, 4, 5, 8 and 11)	Nitrate occurs in the Thornton wellfield (Wells 1, 3, 5, 8 and 11) and Tabor wellfield (Wells 2 and 4) of the Woodstock well supply. Nitrate levels in Wells 1, 2, 3, 5, 8 and 11 are routinely above half of the treated water MAC (nitrate MAC is 10 mg/L). In Well 4, the concentration is typically below the half MAC threshold but has occasionally been marginally above the half MAC. In 2008 the concentration ranged from 3.7 to 11.5 mg/L in the raw water. Well 3 typically has the highest nitrate concentrations. Data for all wells are 2001 to 2009. Nitrate is not typically a naturally occurring parameter in groundwater at levels around the MAC and may be from anthropogenic sources.	Possibly both natural and anthropogenic causes, further investigation required
Beachville, Embro, Hickson, Innerkip, Lakeside, Mount Elgin, Tavistock	None	None identified.	
PERTH COUNTY			
Mitchell (4 wells)	Fluoride	Fluoride levels are above the treated water AO of fluoride, 1.5 mg/L. Levels ranged from 1.6 to 1.9 mg/L between 2003 and 2008.	Naturally occurring
Shakespeare (1 well)	None	None identified.	
Sebringville (1 well)	Fluoride	Fluoride levels are above the treated water AO of fluoride, 1.5 mg/L. Levels ranged from 2.06 to 2.74 mg/L between 2003 and 2008.	Naturally occurring
	Iron	From the limited iron data, iron levels are slightly above the OG of 0.3 mg/L, at 0.35 mg/L (in 2005) and 0.4 mg/L (in 2008). An operations manager at the Ontario Clean Water Agency (OCWA), who maintains the wells, has indicated that there are no problems in treatment due to the iron levels, and will continue to monitor iron levels.	Naturally occurring
St. Pauls (1 well)	Fluoride	Fluoride levels are above the treated water AO of fluoride, 1.5 mg/L. Levels ranged from 1.59 to 1.69 mg/L between 2003 and 2006.	Naturally occurring
CITY OF STRATFORD			
Stratford (11 wells)	Fluoride	Fluoride levels are at or above the treated water AO of fluoride, 1.5 mg/L. Levels ranged from 1.5 to 2.6 mg/L between 2004 and 2008.	Naturally occurring
TOWN OF ST. MARYS			
St. Marys (3 wells)	None	None identified.	

For more information contact your local Conservation Authority or visit our website



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