Model Sewer Use Bylaw Development Report

–Final Report –

Prepared for:

Canadian Council of Ministers of the Environment

Prepared by:

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1. INTRODUCTION

1.1 PURPOSE

The purpose of this document is to summarize the approach undertaken to develop the National Model Sewer Use Bylaw. This document provides background and details of information sources and methods used to research and develop the substance list and concentration limits. The National Model Sewer Use Bylaw is provided under separate cover. Note that this document is not intended to be a guidance resource to municipalities in adapting and implementing sewer use bylaws based on the national Model Sewer Use Bylaw.

1.2 BACKGROUND

In November 2003, the Canadian Council of Ministers of the Environment (CCME) agreed to engage in the development of a Canada-wide Strategy for municipal wastewater effluent (MWWE). The 14 federal, provincial and territorial member jurisdictions are developing the Canada-wide Strategy, which is aimed at providing an effective, efficient and harmonized management approach for MWWE. The development of a National Model Sewer Use Bylaw has been undertaken in support of the source control aspects of the Canada-wide strategy.

Representatives of three Sub-Committees to the Development Committee worked together to develop the Model Bylaw. The Sub-Committees represented were the Harmonization, Science and Research and the Environmental Risk Management Model Sub-Committees. As part of the Strategy development, an economic evaluation of the impacts of the proposed approach is being undertaken. Economic analysis pertaining to establishment of sewer discharge limits and implementation of sewer use bylaws was not within the scope of this specific assignment.

1.3 OBJECTIVES

As outlined in the CCME Request for Proposal (RFP) for this project, the key objectives of this Task were to:

1. Complete a review of existing provincial model sewer use by-laws and sewer use by-laws currently in force
2. Complete an analysis of potential contaminants and parameters to be covered in the National Model Sewer Use By-law
3. Develop a National Model Sewer Use By-law
4. Provide recommendations for federal, provincial, and territorial governments to develop and implement effective sewer use by-laws, including such factors as sector approaches (e.g. Codes of Practice) and Pollution Prevention Plans.

As mentioned, the product of Objective 3, the National Model Sewer Use By-law, has been prepared under separate cover.

1.4 REPORT ORGANIZATION

This report is organized around each of the objectives, as follows:

- Section 2 provides the approach and results of the review of existing provincial model sewer use by-laws and sewer use by-laws.
- Section 3 provides the approach and results of the analysis of potential contaminants and parameters.
- Section 4 provides the approach and summary of the development of the National Model Sewer Use By-law.
- Section 5 provides a summary of information gaps and recommendations.
- Section 6 provides references and a series of appendices provide details of various analyses and steps undertaken as part of the project.

2. REVIEW OF EXISTING PROVINCIAL MODEL SEWER USE BYLAWS AND MUNICIPAL BYLAWS

2.1 MUNICIPAL BYLAWS REVIEWED

In consultation with the CCME Project Committee, a total of 24 existing municipal bylaws were selected for review as well as three provincial model bylaws (Proposed 1998 Ontario Model Sewer Bylaw, Manitoba Model Sewer Bylaw, and Nova Scotia Model Sewer Bylaw). The municipal bylaws were selected from a range of jurisdictions across the country. Key criteria for selection of municipalities included an existing sewer-use by law and representative community sizes (based on population) and geographic locations across Canada. With one modification (Montreal instead of Quebec City), all provincial and territorial capital cities were included in the list as these might be expected to provide a good example of jurisdictional practices. Other suggestions for municipalities for inclusion were provided by CCME representatives and were identified through consultant team research. Exhibit 2.1 identifies the municipalities selected and associated characteristics.

Exhibit 2.1
Municipal Bylaws Reviewed

Facility Size[1]	Population[2]	Number in Study	Municipality
Very Small	<=1000	2	Delisle SK Mahone Bay NS
Small	>1,000 - 5,000	1	Val-David QC
Medium	>5,000 - 35,000	7	Stratford PEI Charlottetown PEI Whitehorse YK Yellowknife NWT Iqualuit Nunavut Banff AB Portage La Prairie MB
Large	>35,000 - 100,000	6	Fredericton NB Kelowna BC Nanaimo BC Oxford County ON Saint John NB St. John's NL
Very Large	>100,000	8	Capital Region District BC Vancouver BC Edmonton AB Regina SK Winnipeg MB Toronto ON Montreal QC Halifax, NS
Total		**24**	

Notes:
1 - Facility size and population definitions were per CCME definitions.
2 – Population source: Statistics Canada. 2001.

Two additional municipalities, Ottawa and Peel, also provided important information for the Model Bylaw development through the CCME Steering Committee contacts.

Subsequent to the bylaw reviews, a sample of 11 municipalities were contacted to request the rationale for inclusion of parameters and to obtain specific information on the bylaws. The municipalities contacted for further consultation are listed in Exhibit 2.2 following.

Exhibit 2.2
Municipal Contact List

Facility Size	Number	Municipality
Very Small	2	Delisle, SK Mahone Bay, NS
Small	0	
Medium	3	Charlottetown, PEI Whitehorse, YK Portage La Prairie, MB
Large	2	Nanaimo, BC Oxford County, ON
Very Large	4	Edmonton, AB Winnipeg, MB Toronto, ON Halifax, NS
Total	**11**	

A sample questionnaire for these municipalities is provided in Appendix A. A summary of the results of the substances included in these sewer use bylaws is provided in Appendix B.

2.2 ADDITIONAL INFORMATION COLLECTED ON RESOURCE REQUIREMENTS

2.2.1 Staffing for Municipal Sewer Use Bylaws

At the request of the CCME committee, municipalities contacted were briefly surveyed on their current sewer-use bylaw staffing levels to obtain an indication of on-going resources required to implement a sewer use bylaw. Based on a small sample of responses (9 municipalities), the staffing levels for sewer-use issues range from no dedicated staff to 29 employees. Existing staffing levels (including management, technical, enforcement, sampling) in municipal sewer bylaw regulatory groups were noted as follows:

- Charlottetown, PEI: 0 employees[1]
- Nanaimo, B.C.: 0.3 employees

[1] No dedicated regulatory or enforcement sewer-use bylaw staff. Some assistance is provided from the Charlottetown Water and Sewer Utility, if violations become known to the Utility. Based on personnel communication with Craig Walker, Utility Manager, Charlottetown Water and Sewer Utility, March 2006.

- Delisle, SK: 0.7 employees[2]
- Mahone Bay, NS: 2 employees
- County of Oxford: 2 employees
- Whitehorse, YK: 3 employees[3]
- GVRD[4], BC: 8 employees
- Edmonton, AB: 12 employees
- Toronto, ON: 29 employees

In an earlier project on behalf of the CCME, Marbek surveyed municipalities with respect to sewer bylaw staffing and other practices. The results of the relevant survey questions for the *Review of Existing Municipal Wastewater effluent (MWWE) Regulatory Structures in Canada*, Final Report March 2005, are provided in Appendix C.

In summary, the staffing levels of municipalities for sewer use bylaw management, promotion and enforcement vary widely with community size, bylaw provisions and resource availability. Further work would be required to estimate average staffing levels and costs associated with sewer use bylaw promotion and enforcement.

2.2.2 P2 Plan Costs and Considerations: City of Toronto Experience

The City of Toronto estimates that their new Sewer Use By-law requires the following resources:

- Initial start-up costs of approximately $55,000 for guidance manuals, staff training, and industry workshops on P2 Plans required by the bylaw;
- Laboratory upgrades of approximately $180,000;
- $17,000 in annual support costs; and
- Two Pollution Prevention Officers from the existing enforcement staff.[5]

Based on Toronto's research into P2 Plans in the State of New Jersey (where industries are also required to prepare P2 Plans), surveys of 20 facilities revealed that costs to prepare P2 plans typically ranged from $1,000 to $50,000. It was noted that over 90% of companies in New Jersey implemented all or part of the P2 plans, and that P2 activities provided economic business benefits. Toronto also referenced a study by Inform Inc., which found that, of 38 pollution prevention projects examined, 24 had fully paid back the initial investment in six months or less".[6,7]

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[2] Two field staff noted for water/sewer/transportation department. Based on personnel communication with Mark Dubrowski, Delisle. February 2006. Assumed 0.7 equivalent staff for sewer department.

[3] Three regular by-law officers on staff - address sewer by-law issues only as requested by wastewater control staff; three technical staff involved in sewer maintenance (based on personnel communication with Larry Shipman, Whitehorse, March 2006). Assumed 1 equivalent staff for sewer by-law. Sewer maintenance staff not included.

[4] Greater Vancouver Regional District (GVRD)

[5] Toronto Staff Report. City of Toronto New Sewer Use By-law. Barry H. Gutteridge, Commissioner, Works and Emergency Services. April 10, 2000. [costs indicated are presumed to be in year 2000 dollars]

[6] Inform Inc. website: http://www.informinc.org/about.php

[7] Toronto Staff Report. City of Toronto New Sewer Use By-law. Barry H. Gutteridge, Commissioner, Works and Emergency Services. April 10, 2000. [original Inform Inc. study reference not provided]

3. ANALYSIS OF POTENTIAL CONTAMINANTS FOR THE NATIONAL MODEL SEWER USE BY-LAW

3.1 DEVELOPMENT OF MASTER LIST OF SUBSTANCES - OVERVIEW

For the National Model Sewer-Use Bylaw, a list of substances and parameters needed to be developed. The purpose of the list of substances was for inclusion as 'prohibited' substances' or 'restricted' substances in Schedules A and B of the Model Sewer Use Bylaw. A long list of substances was compiled from a number of sources and through a sequence of steps identified in Appendix D.

Once the long list of substances was compiled, research was conducted to characterize the substances, as described in Sub-section 3.2 following. With this characterization information, a set of criteria to screen out substances was proposed and discussed with the Steering Committee. The screening criteria approved were applied to the long list to develop the Master List of Substances. However, as discussed in Sub-section 3.3, policy decisions by the Development Committee are required to finalize additional screening criteria in order to make final recommendations regarding what substances should be included in the Model Bylaw.

For the Model Bylaw, the Master List of Substances was divided into two groups: the Core List of Substances and a Supplemental List of Substances, as described in Sub-section 3.4. The Supplemental List of Substances contains all other substances on the Master List and may reduced, pending Development Committee discussion on screening criteria (as mentioned above). Proposed discharge limits have been developed for a Core List of Substances, as described in Sub-section 3.5. Other substances are discussed in Sub-section 3.6. Depending on the decisions of the Development Committee, some substances on the Supplemental List may also require limits to be established, while others may not be included in the Model Bylaw.

3.2 CATEGORIZATION OF SUBSTANCES

The characterization of the substances on the long list of substances was developed based on the following characteristics:

- Human health effects
- Known or possible carcinogen
- Toxic in accordance with the definition of the *Canadian Environmental Protection Act 1999* (CEPA)
- Persistent in the environment
- Bioaccumulative
- Poses risk to sewer collection systems
- Poses risk to wastewater treatment systems
- Poses risk to sewer worker and public safety
- Known to accumulate in biosolids
- Poses risk to receiving water or effluent quality.

Appendix E provides a brief overview of these characteristics and the sources used to assess the substances. In order to track the characterization information on the long list of substances, an Excel spreadsheet database was developed.

3.3 DEVELOPMENT AND APPLICATION OF SCREENING CRITERIA

The objective of developing screening criteria was to identify substances most appropriate for sewer source controls across Canada and, if possible and appropriate, to shorten list of substances for inclusion in the Model Bylaw. Appendix F contains the implemented and proposed screening criteria as discussed with the Sub-Committee. The first three screening criteria were approved and were applied to the long list of substances. Substances screened out of the long list are identified in Exhibit 3.1 below.

Exhibit 3.1
Screened–out Substances from the Long List

Screening Criteria	Substance Removed from Long List
Criterion 1: Substances that are not contained in the Task 1 Science Report and do not have identified characteristics of concern	Bismuth
	Magnesium
	Beryllium
Criterion 2: Substances that have only 'other' human health effects noted, but are not carcinogenic and are not included for protection of the collection system, wastewater process, biosolids quality, or effluent quality	Antimony
	Barium
	Manganese
	Vanadium
Criterion 3: Parameters that are used in the disinfection process for drinking water treatment and that are regulated by drinking water standards	Chlorine (free and total)
	Chloramines

The long list of substances contained over 140 listings, although some of these were repeated groups (such as various descriptions for oil and grease contained in existing municipal bylaws). With the screening criteria, the Master List was developed and, where appropriate, substance overlaps were removed as well as substances on the prohibited list (e.g. dyes).

The resulting list of substances is the Master List of Substances. The Excel spreadsheet for the Master List of Substances, with characterization summaries, is provided in Appendix G (note this and several other Appendices requires large-size paper to print).

3.4 DEVELOPMENT OF A CORE LIST OF SUBSTANCES

The Master List of Substances contains 120 substances and physical parameters (such as pH, for example). From this list, a core group of substances was identified. The Core List comprises substances that are recommended for inclusion in all bylaws, based on their characteristics or effects. The characteristics of the Core List are substances that:

- Are conventional parameters for domestic wastewater
- Have an inhibitory effect on an activated sludge process
- Pose a hazard to sewer worker health

- Are known to accumulate in biosolids (based on preliminary information reviewed on biosolids)[8]
- Note that substances that pose a severe hazard to the sewer collection system and public health, such as explosive materials, are typically prohibited and therefore do not require concentration limits.

Conventional parameters for domestic wastewater are included since these will be present in all wastewater streams in municipalities. Substances that inhibit activated sludge are included since the proposed CCME Strategy establishes equivalent to secondary treatment as the national benchmark for treatment. Activated sludge processes are the most common type of secondary treatment process applied in Canada. Protection of worker safety is also a top priority since sewer workers are exposed to untreated waste streams. While the focus of the current CCME Strategy is on wastewater effluent, certain substances are well-known to accumulate in biosolids and, as such, are commonly included in restricted substances for municipal sewer use bylaws.

The Core List of Substances identifies 41 substances (or characteristics, such as temperature and pH). (As described in the next sub-section, Appendix I provides the Core List of Substances, characteristics of concern and proposed limits.)

3.5 APPROACH TO ESTABLISHING LIMITS

An approach to determining concentration limits was needed for 'Restricted Substances' contained in the Model Sewer-Use Bylaw. 'Restricted Substances' are those substances with discharge concentration limits. (Substances classified as 'Prohibited Substances' in the Bylaw would not have concentration limits, as discharge of any amount would be prohibited.) The approach developed is adapted from that of the City of Ottawa.[9]

Overall, the approach starts with very conservative limits (the Canadian Water Quality Guidelines for the Protection of Aquatic Life) and modifications are made, up or down, based on health, safety and technology available to remove and measure the contaminants. Briefly, the steps of the approach for each substance are as follows:

- *Step 1* – Identify the Canadian Water Quality Guidelines for the Protection of Aquatic Life (October 2005, or more recent) for parameters with guidelines established. This establishes the starting point for the concentration limit.
- *Step 2* - Determine what concentrations are achievable through pre-treatment at source using established Best Demonstrated Available Technologies (BDAT), excluding substances slated for virtual elimination (with the exception of mercury and PCBs). Raise limit where required.
- *Step 3* – Compare limit established in previous steps to the threshold inhibitory concentration for the activated sludge process. Lower limit where required.

[8] The Ontario MOE *'Guidelines for Utilization of Biosolids and Other Wastes on Agricultural Land'* document was used as one reference. The 11 heavy metals with quality criteria were proposed for life-cycle management. No concentration limits for toxic organics in biosolids have been developed by the Ontario MOE or the federal government to date.

[9] For the Ottawa approach, refer to Sewer Use By-law Administration Policy By-law No. 2003 – 514, (April 2004 – draft) available at website link: http://ottawa.ca/calendar/ottawa/citycouncil/occ/2004/09-22/pec/ACS2004-TUP-UTL-0010.htm (accessed March 8, 2006).

- *Step 4* - Compare limit to the Guidelines for Canadian Drinking Water Quality. Raise limit where required.
- *Step 5* - Compare limit to contaminant concentrations found in typical domestic wastewater. Raise limit where required.
- *Step 6* - Consider maximum discharge concentration that will provide protection against inhalation health risk exposure to sewer and wastewater treatment plant workers. Lower limit where required.
- *Step 7* - Identify the laboratory method detection limit (MDL), multiply it by 10, and compare to limit established from the previous steps. Raise limits where required.

In all steps of the proposed approach, there will be parameters for which there is no limit or guideline established. As a result, there may be insufficient information to establish a concentration limit using this approach. Where this is the case, an additional step was taken:

- *Step 8* – Use other available sources: Examine limits in existing bylaws surveyed and select a concentration limit based on rationale from the municipality or professional judgment where rationale is not available. Where existing bylaws surveyed do not identify the parameter, note these for one of two paths 1) exclusion from the Model Sewer Use Bylaw or 2) inclusion on the prohibited substances list, based on the characteristics of the substance.

Applying this approach, preliminary limits were established for all substances on the Core List with one exception: insufficient information was identified for benzidine + benzidine dihydrochloride. This substance was included in the core list because it is inhibitory to the activated sludge process.

Appendix H provides additional detail on each step as well as references used to develop the limits. Appendix I provides the Excel database used to develop limits for the Core Substance List and the limits identified. Appendix J provides a simplified database of Core Substances, preliminary limits and the rationale for substance inclusion in the Core List.

Two important notes regarding this approach should be noted:

1. The approach to setting limits focuses on effluent and the water column. Consideration of biosolids quality criteria is not included in this approach, except where data was readily available on substances accumulating in biosolids (as part of the substance characterization work). The CCME is currently undertaking additional work to address the issue of biosolids. As a result of this work, some of the limits identified through the proposed method of approach may need to be modified. Factors to consider in developing limits to protect biosolids include, but are not limited to:

    - Wastewater influent quality for substances accumulating in biosolids
    - Applicable biosolids quality criteria for the jurisdiction
    - Threshold loading for these substances at the wastewater treatment facility to meet biosolids criteria, which will vary with type of treatment system in place
    - Sources of sector loadings and allocation between industry/commercial/institutional and domestic discharges

2. The step to apply Best Demonstrated Available Technologies (BDAT) considers treatment technology to remove the substance from a wastewater stream. BDATs are based on biological treatment systems or wet air oxidation, followed by a combination of biological and activated carbon treatment systems.[10] For these treatment methods, the parameters treated can be transferred from the liquid phase to the air and/or sludge phase. Lower concentrations of the substances may be achievable through pollution prevention (e.g. elimination of the substance from an industrial process). Pollution prevention also has the advantage of not creating the same air and waste residual problems as treatment. In the case of some substances, the limit derived using the approach herein is higher than some limits in current sewer use bylaws (mercury, for example), forcing the use of P2 measures for those substances. Unfortunately, no database exists that details achievable reductions of substances as a result of P2 measures.

3.6 OTHER SUBSTANCES

In the Model Bylaw, the Master List of Substances is split into two lists: the Core List and the Supplemental List. The Supplemental List contains substances that were also found in municipal sewer use bylaws, as well as substances that are of potential concern for environmental release or human health. For purposes of discussion by the Development Committee, the Supplemental List is provided in this report in two groups:

- Appendix K contains the substances for discussion regarding inclusion or exclusion by the Development Committee (i.e. banned substances; substances subject to 'virtual elimination' as defined under COA and the Binational Toxics Strategy; and, CEPA Schedule 1 substances not in the Core List);
- Appendix L contains other substances that may be suitable for inclusion in municipal bylaws, depending on potential sources within the community.

The industrial sectors that are potential sources for these substances are identified in the Hydromantis *et.al*. report prepared for the CCME, *Review of the State of Knowledge of Municipal Effluent Science and Research. Final Report – Task 1: Review of Effluent Substances*. As discussed in Section 4, municipalities may supplement the Core List of Substances with substances from the Supplemental List of Substances, depending on the industrial/ commercial client base of their community.

3.7 STORMWATER

The focus of the CCME for the Model Sewer Use Bylaw is on wastewater in sanitary and combined sewer systems. Stormwater quality is typically addressed in municipal sewer use bylaws and, in some cases, restricted substances are identified with associated limits. The approach for the Model Sewer Use Bylaw for stormwater was to identify prohibited substances and to require best practices to protect stormwater quality. In particular, best practices are required for construction erosion and sediment control and for outdoor storage of materials. A concentration limit is identified for total suspended solids, based on the limit commonly identified in existing municipal bylaws. No other specific concentration limits for substances were developed for stormwater.

[10] United States Environmental Protection Agency, Centre for Environmental Research Information. (January 1995). Manual: Groundwater and Leachate Treatment Systems. Cincinnati, Ohio 45268. EPA/625/R-94/005.

4. NATIONAL MODEL SEWER USE BYLAW DEVELOPMENT

4.1 TEXT OF THE BYLAW

The text for the Model Sewer Use Bylaw was developed in parallel with the development of the Master List of Substances. The bylaw text was reviewed in first and final draft by our team's legal expert of Nelligan O'Brien Payne LLP. The Model Bylaw is presented in two modules. The first module is suitable for smaller, primarily residential municipalities looking for a comprehensive but fairly straight-forward bylaw. The second module contains optional clauses that municipalities can add into the bylaw to address industrial and other non-residential discharges.

Some guidance is provided to bylaw authors within the Model Sewer Use Bylaw text. However, for ease of use and technology transfer, a more complete guidance document would be useful (see Recommendations, following).

Note that the Model Bylaw text contains footnotes identifying the origin of certain clauses. These are provided for the information of the CCME and to assist discussion of the Bylaw in consultation with stakeholders. It is recommended these be removed prior to publication of the final Model Bylaw.

4.2 SUBSTANCES IN THE BYLAW

Substances in the Model Sewer Use Bylaw are not linked to the Modules. In other words, communities that select Module 1 may have the same substances in their bylaws as communities that have added clauses from Module 2. Two lists of substances are provided for bylaw development: the Core List of Substances and the Supplemental List of Substances.

The Core List of Substances are sorted by organic, inorganic and physical characteristics in 'Schedule B, Restricted Substances' of the Model Bylaw. As indicated in Sub-section 3.4 above, these substances are recommended for inclusion in all bylaws.

The Supplemental List of Substances is provided in the Model Bylaw as a 'pick-list' for municipalities to identify additional substances to add to the Core list for inclusion in the bylaw. (Please refer to Sub-section 3.6 above for a description of the two broad groups of substances on this list.) Work is currently underway by the CCME to develop a searchable database of substances associated with industrial sector wastewater discharges. In the interim, the Supplemental List of Substances in the Model Bylaw provides information by substance on industrial sectors that may potentially discharge the substance. This information is included as part of the Model Sewer Use Bylaw, provided under separate cover.

It should be noted that, pending discussion by the Development Committee of the substances for inclusion in the Model Bylaw, there is some minor overlap between Prohibited Substances and substances identified in the Core or Supplemental Lists. Specifically, PCBs and pesticides are banned (per Schedule A of the Model Bylaw), however specific individual PCBs and some individual pesticides are included on the Core and Supplemental Lists.

Treatment of the substances identified in Appendix K within the Model Bylaw is a management decision for the Development Committee. Options include:

- Do not include the substances in the Model Bylaw, except as prohibited groups where appropriate (e.g. pesticides, PCBs, PAHs)
- Prohibit the substances and identify them individually in Schedule A of the Model Bylaw
- List the individual substances, or groups of substances where appropriate (pesticides, PCBs, PAHs), as restricted substances with associated concentration limits (i.e. include in the Core Group and Supplemental List as appropriate for inclusion by municipalities on Schedule B).

4.3 SELECTION OF SUBSTANCES AND SECTORS FOR P2 PLANS AND CODES OF PRACTICE

The City of Toronto is the first municipality in Canada to have a requirement for mandatory Pollution Prevention Plans in their Sewer Use Bylaw. Based on feedback received from the City of Toronto, they would recommend a combination of Pollution Prevention Plans for unique sectors and Codes of Practice for more uniform or predictable sectors. Other municipalities, such as the Capital Regional District (Victoria), BC, rely solely on Codes of Practice. Both options are presented in the National Model Sewer Use Bylaw.

For the National Model Sewer Use Bylaw, a P2 plan is recommended for:

- 11 heavy metals with concentration limits in the '*Ontario Guidelines for Utilization of Biosolids and Other Wastes on Agricultural Land*' (MOE, 1996). These are: arsenic, cadmium, cobalt, chromium, copper, mercury, molybdenum, nickel, lead, selenium, and zinc.

The following groups of substances would also be appropriate for P2 Planning requirements (if it is the decision of the Development Committee that CEPA Schedule 1 substances subject for virtual elimination, and Tier I COA and Binational Toxics Strategy substances should be included in the Model Bylaw):

- The 26 Tier I/Tier II COA substances/groups of substances (17 PAHs are listed as a group);
- Level I/Level II Canada-United States Binational Toxics Strategy substances not already included in the COA (5 additional substances); and
- Schedule 1 CEPA substances (all, or those slated for virtual elimination depending on the life cycle of the substance).

The following general industrial sectors are suggested as candidates for Pollution Prevention Plans. Due to the variation in processes between facilities, these industry types are not well-suited to more prescriptive Codes of Practice:[11]

- Metal finishing/metal plating industries
- Chemical manufacturing industries

[11] Based on lessons learned from City of Toronto experiences on P2 Plan requirements in their sewer-use bylaw; personnel communication with Vijay Ratnaparkhe, Sewer Bylaw Enforcement Supervisor, City of Toronto, March 2006.

- Other manufacturing industries as appropriate for the community.

Municipalities may choose to add any industrial, commercial or institutional sector of specific interest for their communities to the list of sectors required to provide P2 Plans. Note that the intent of the Model Sewer Use Bylaw is that P2 Plan implementation is mandatory. (In the case of Toronto's Sewer-Use Bylaw, P2 Plans are required, but implementation of the P2 Plan is voluntary.)[12]

The following industrial, commercial, and institutional facility types are suggested for Codes of Practice (and are based on Capital Regional District's bylaw requirements). Some of these operations would exist in both small and large municipalities, and others primarily in large municipalities. These operations are considered to be more homogenous in nature, and thus, well-suited to a standard Code of Practice:

- Food Services Operations
- Dry Cleaning Operations
- Photographic Imaging Operations
- Dental Operations
- Automotive Repair Operations
- Vehicle Wash Operations
- Carpet Cleaning Operations
- Fermentation Operations
- Printing Operations
- Recreation Facility Operations
- Laboratory Operations.

Again, municipalities may choose to add sectors of specific interest for their communities to the list of sectors subject to Codes of Practice.

[12] Based on personnel communication with Vijay Ratnaparkhe, Sewer Bylaw Enforcement Supervisor, City of Toronto, March 2006.

5. INFORMATION GAPS AND RECOMMENDATIONS

5.1 INFORMATION GAPS

A number of key information gaps were encountered during this project. These include:

- Laboratory maximum acceptable detection limits for some parameters identified in the Master List of Substances were not contained in the two sources referenced: 1999 Ontario MISA document *"Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater"* or the City of Toronto's Laboratories method detection limits.

- Best Demonstrated Appropriate Technology (BDAT) achievable concentration limits for some substances were not identified in the U.S. EPA reference document. In addition, the U.S. EPA BDAT document was developed in 1995, and technology capabilities have advanced since this time.

- No information on untreated domestic wastewater in Canada was available. In the absence of Canadian data on untreated domestic wastewater, the Metcalf & Eddy (2003) *"Wastewater Engineering"* reference source was used. Typical concentration levels for substances and parameters in untreated domestic wastewater was only available for a limited number of substances in the proposed Final List of Substances.

5.2 RECOMMENDATIONS

The following are recommendations for further development of the National Model Sewer Use Bylaw. In addition, recommendations are provided for implementation of effective sewer use by-laws, as requested in the RFP.

List of Substances

1. As described in this report, the Development Committee should discuss the criteria for inclusion of substances in the Model Sewer Use Bylaw and provide policy direction to finalize Schedules A, B, E and the Supplemental List of Substances. (See Appendix K.)

Filling Information Gaps

2. Undertake a review of the 1995 U.S. EPA BDAT document to update the achievable concentration limits for all substances in the Model Sewer Use Bylaw.

3. In collaboration with the Canadian Association for Environmental Analytical Laboratories (CAEAL), and other relevant agencies, develop recommended maximum detection limits (RMDL) for substances and parameters in the final list of substances for the national Model Sewer-Use Bylaw.

4. Conduct further analysis on concentration limits for protection of biosolids.

5. Assess the need to develop a list of restricted substances and associated limits for stormwater in the Model Bylaw.

Implementation Recommendations

6. Develop a comprehensive guidance document to accompany the Model Sewer Use Bylaw to provide assistance to municipalities in developing and implementing bylaws. The Guidance should include advantages and disadvantages of P2 Plans, Codes of Practice and methods for selection of contaminants/ sectors. The Guidance should also assist municipalities in estimating staffing levels and other resources necessary for Module 1 and Module 2 components (such as initial start-up costs, support services costs, and laboratory upgrading costs.) In addition, the guidance should identify the benefits of effective sewer use bylaws to assist municipality staff in presenting and 'selling' sewer use control programs to municipal councils, industrial clients and the general public.

7. In conjunction with CAEAL, develop a national document similar to the Ontario MISA *"Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater"* (1999) [13], to clearly set out testing methodologies and recommended maximum detection limits (RMDL) for substances and parameters in the Model Sewer-Use Bylaw.

8. Assess laboratory capabilities across the country to undertake analysis of substances in the Model Sewer Use Bylaw, noting that some cities and/or provinces may not have the laboratory equipment necessary to analyze for all substances in the Master List of Substances. To implement their bylaws, municipalities would need to verify existing laboratory capabilities available to them before adopting their substance lists and limits[14].

9. Develop model Codes of Practice for identified sectors, in support of the implementation of Codes of Practice in communities.

10. Once developed, ensure easy accessibility to the searchable database for substances-industrial sectors discharging to wastewater systems. Promote the use of the database in communications on the Model Sewer Use Bylaw.

11. Over the long term, work with municipalities to develop a database of the effectiveness of pollution prevention measures by industrial sectors (i.e. reductions achieved in substance concentrations) and use this information to develop or modify bylaw limits in the Model Sewer Use Bylaw as required.

[13] Ontario Ministry of the Environment. (1999). Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater. Municipal/Industrial Strategy for Abatement (MISA). Toronto, Queens Printer.

[14] CAEAL's website has a searchable database of laboratories and parameters tested at each facility; detection limits are not provided in all cases.

6. REFERENCES

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APPENDIX A
Questionnaire for Municipalities

Two surveys were administered: a general survey for all municipalities except Toronto (Exhibit A.1 following) and a specific set of questions for Toronto (Exhibit A.2 following).

Exhibit A.1
SURVEY – for - Model Sewer Use Bylaw and Instruments for Source Reduction

- INTERVIEW QUESTIONS –

Date: _____
Jurisdiction: _____
Contact Person:
Name: _____
Position: _____
Telephone: _____
Fax: _____
Email: _____

Introduction

The Canadian Council of Ministers of the Environment (CCME) is developing a Model Sewer Use By-law. The By-law will address regulatory policy issues and the limits for waste discharged to sanitary sewer. The background research for this review includes a survey of practices in other jurisdictions. We appreciate your time in participating in this brief survey.

Please fill in the blank areas or place an X in the appropriate box. Thank you.

Sewer Use Bylaw

1. Which sectors are regulated under the Bylaw?

   Residential: ☐ Industrial: ☐ Commercial: ☐ Institutional: ☐

2. How many staff are in your regulatory group?

   Total: ☐ Management: ☐ Technical: ☐ Enforcement: ☐ Sampling: ☐

3. Discharge Limits – Bylaw [spreadsheet sent to municipalities]

   Reviewed with municipality via telephone ☐

   Received email response ☐

4. Is there anything in the bylaw that would be included or excluded, if given the opportunity to revise the bylaw?

5. Miscellaneous Comments (e.g. additional suggestions for the Model Sewer Use Bylaw).

Exhibit A.2
SURVEY – for - Model Sewer Use Bylaw and Instruments for Source Reduction:
City of Toronto

- INTERVIEW QUESTIONS –

Date:	February 22, 2006
Jurisdiction:	Toronto
Contact Person:	
Name:	Vijay Ratnaparkhe
Position:	Supervisor – Bylaw Enforcement
Telephone:	416-392-9938
Fax:	
Email:	vrathna@toronto.ca

Introduction

The Canadian Council of Ministers of the Environment (CCME) is developing a Model Sewer Use By-law. The By-law will address regulatory policy issues and the limits for waste discharged to sanitary sewer. The background research for this review includes a survey of practices in other jurisdictions. We appreciate your time in participating in this brief survey.

Please fill in the blank areas or place an X in the appropriate box. Thank you.

Sewer Use Bylaw

1. Which sectors are regulated under the Bylaw?

   Residential: [x] Industrial: [x] Commercial: [x] Institutional: [x]

2. How many staff are in your regulatory group?

   Total: [ ] Management: [1] Technical: [2] Enforcement: [12] (Industry) Sampling: [ ]

In addition: 6 commercial inspectors, 7 storm water inspectors, 1 supervisor for storm water. 10 more staff may be hired. Tech staff are engineers, and enforcement staff monitor industrial discharges.

3. Discharge Limits – Bylaw [spreadsheet sent to municipalities]

   Reviewed with municipality via telephone [ ]

   Received email response [x]

4. Is there anything in the bylaw that would be included or excluded, if given the opportunity to revise the bylaw?

NPs and NPEs in Bylaw Limits are too low. Most industries are having a hard time meeting the limits. He noted that there is some confusion regarding testing.

5. How does the city ensure that companies follow their P2 plans?

Updates to the P2 plans are required every 2 years, and most facilities don't remember to send in updates. As a result, the City needs to send industries a reminder. Industry sends summary of P2 plan initially to T.O. Subsequent updates sent to T.O. (one document format).

Vijay noted that Toronto cannot enforce the implementation of the P2 plans.

6. Have the development of P2 plans resulted in any notable improvements in the quality of effluent to the treatment plants? (e.g. it's been noted that mercury has been reduced by approx. 40% after installation of mercury amalgam separators in dental offices. Other examples?)

1) some metals concentrations are down, some are up.
2) Textiles: Reduced NPEs concentrations
3) Industries Laundries – reduced NPEs (Supplier reformulated product)
   - Reduced VOCs

Toronto has reduced Hg by 40% in sludge and influent wastewater.

7. Are there any copyright issues we should be aware of in using T.O.'s Bylaw as one of the templates?

-Vijay noted that are no issues that he's aware of.
-Bylaw is on the website

8. Miscellaneous Comments (e.g. additional suggestions for the Model Sewer Use Bylaw).

Residential sectors are regulated under the bylaw but it is not routinely monitored. The City only deals with complaints received on residential discharges.

The City can charge residences under bylaw. T.O. has approximately 2500 dentists.

T.O. Metal Industries – Vijay indicated the city does a complete scan of the discharge and then decide which substances to monitor frequently - grab sample once per month.

Some industrial laundries monitor once per month.

2005 revisions to the bylaw - auto sector has to follow BMPs

T.O. bylaw was developed in 1998 and is continually reviewed.

In 2005 ~12 charges for exceedances

- Inspectors can order sampling – at industry's cost – came in 2005 amendment

Vijay noted that he would limit P2 Plans to Manufacturing industries and metal finishing – industries with a lot of variation. For the rest of Industries/commercial/institutional, he recommends guidelines in form of BMPs and require facilities to comply. He also noted that if industry follows the P2 plan and they exceed limits, the facility is not subject to the concentration limits in the bylaw.

APPENDIX B
Summary of Sewer Use Bylaws Reviewed

Identifier	Substance	Units	Manitoba Model Sewer Use By-law	Proposed (1998) Ontario MOE Model Sewer Use By-law (mg/L)	Nova Scotia Model Sewer Use By-law (mg/L)	Victoria Sewer Use Bylaw	Vancouver (GVRD) Sewer Use Bylaw	Edmonton Sewer Use Bylaw	Regina Sewer Use Bylaw	Winnipeg Sewer Use Bylaw	Toronto Sewer Use By-law	Montreal Sewer Use Bylaw	Halifax Sewer Use By-law	Fredericton Sewer Use By-law	Charlottetown Sewer Use By-law	St. John's Sewer Use By-law	Whitehorse Sewer Use By-law	Yellowknife, NWT	Iqaluit, Nunavut	Nanaimo, B.C.	Kelowna, B.C.	Banff, Alberta	Delisle, Sask.	Portage La Prairie, MB	Oxford County, ON	Val David, Quebec	Mahone Bay, NS	Saint John, NB	Stratford, PEI
CCME - TOR	2,4-D	mg/L	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aldrin/dieldrin	mg/L	-	0	-	-	-	0	0	-	0.0002	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Aluminum	mg/L	50	-	50	-	50	-	-	50	50	-	50	50	-	-	50	-	-	-	50	-	-	-	50	-	-	-	-
CCME - TOR	Ammonia	mg/L	Inoffensive odour	-	Inoffensive odour	-	-	0	-	-	Inoffensive odour	-	Inoffensive odour	Inoffensive odour	Inoffensive odour	-	-	-	-	-	-	-	-	-	Inoffensive odour	-	-	-	-
CCME - TOR	Anthracene	mg/L	-	-	-	Included in total PAHs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Arsenic	mg/L	1	1	1	0.4	1.0	1.0	-	1	1	1	1	1	-	-	1.00	-	-	0.5	1.0	-	-	-	1	1	-	-	-
	Benzene	mg/L	-	0.01	0	0.1	0.1	0.0	1.0	0.5	0.01	-	0	0.0	0	-	1 (BTEX)	-	-	-	-	-	-	-	-	-	-	0	0
CCME - TOR	Benzo(a)anthracene	mg/L	-	-	-	Included in total PAHs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Benzo(a)pyrene	mg/L	-	-	-	Included in total PAHs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Biochemical Oxygen Demand	mg/L	300	300	300	500	500	300	-	300	300	-	300.00	600	300	300	300	-	-	500	500	-	500	300	300	-	-	400	300
CCME - TOR	Bis(2-ethylhexyl)phthalate	mg/L	-	-	-	-	-	-	-	-	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Boron	mg/L	-	-	-	-	50	0	-	-	-	-	-	-	-	-	30.00	-	-	-	50	-	-	-	-	-	-	-	-
CCME - TOR	Cadmium	mg/L	1	0.7	0.1	0.3	0.2	0.1	4	0.5	0.7	2	1	2	-	0.05	0.1	-	-	0.05	0.2	-	-	1	1	2	-	0	-
	Carbon tetrachloride (tetrachloromethane)	mg/L	-	-	-	-	-	0	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-
	Chemical Oxygen Demand	mg/L	-	-	1000	1000	-	600	-	-	-	-	1,000	-	-	-	600	-	-	-	750	-	-	-	-	-	-	-	-
CCME - TOR	Chlordane	mg/L	-	-	-	-	-	0	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chloride	mg/L	-	-	1500	1500	1500.0	-	-	-	-	-	1,500	1,500	-	-	-	-	-	-	-	-	-	1500	1500	-	-	1500	-
CCME - TOR	Chloroform	mg/L	-	0.04	-	-	-	0	-	-	0.04	-	0	-	-	-	0.20	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Chlorophenol (Phenols, chlorinated)	mg/L	-	-	-	Restricted	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Chromium (hexavalent)	mg/L	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	2	In total Cr	In total Cr	2	In total Cr	In total Cr	In total Cr	3	0.05	In total Cr	-	-	In total Cr	In total Cr	-	-	-	In total Cr	-	-	-	3
CCME - TOR	Chromium (total)	mg/L	5	5	4	4	4	4	5	5	4	5	2	5	-	-	4	-	-	1	4	-	-	1	5	5	-	0	-
CCME - TOR	Chromium (trivalent)	mg/L	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	In total Cr	-	1	In total Cr	-	-	In total Cr	In total Cr	-	-	-	In total Cr	-	-	-	-
	Cobalt	mg/L	-	5	5	5	5	5	-	-	5	-	5.0	-	-	-	5	-	-	-	5	-	-	-	5	-	-	-	-
CCME - TOR	Copper	mg/L	1	3	1	1	2	1	4	5	2	5	1.0	5.0	1	0.3	1	-	-	1	2	-	-	1	2	5	-	0	1
CCME - TOR	Cyanide	mg/L	2	2	2	1	1	2	3	2	2	10	2.00	2.00	2	2	2	-	-	1	1	-	-	1	2	2	-	0	2
CCME - TOR	DDT	mg/L	-	-	-	-	-	0	-	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Dichlorobenzene (1,2-)	mg/L	-	-	-	-	-	0	-	-	0.05	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichlorobenzene (1,4)	mg/L	-	0.47	-	-	-	0	-	-	0.08	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichlorobenzidine (3,3' -) (3,3-dichlorobenzene)	mg/L	-	-	-	-	-	-	-	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Dichloroethane (1,2-)	mg/L	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichloroethylene (Cis-1,2-)	mg/L	-	-	-	-	-	-	-	-	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Dichlorophenol (2,4-)	mg/L	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichloropropylene (Trans-1,3-)	mg/L	-	-	-	-	-	-	-	-	0.14	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Di-n-butyl phthalate	mg/L	-	-	-	-	-	-	-	-	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Ethylbenzene	mg/L	-	0.16	-	0.2	1.0 (total BTEX)	0	1	-	0.16	-	0	-	-	-	1 (total BTEX)	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Fluoranthene	mg/L	-	-	-	Included in total PAHs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Fluorene	mg/L	-	-	-	Included in total PAHs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Fluoride	mg/L	-	10	10	-	10	0	-	-	10	-	10	10	-	-	10	-	-	-	-	-	-	-	10	-	-	-	-
	Hexachlorobenzene	mg/L	-	-	-	-	-	0	-	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Iron	mg/L	-	-	50	50	10	0	-	-	-	-	50	50	-	15	5	-	-	3	10	-	-	-	50	-	-	-	-
CCME - TOR	Lead	mg/L	1	2	2	1	1	1.0	5	2	1	2	1	5	-	0.2	1	-	-	0.5	1	-	-	1	5	2	-	-	-
CCME - TOR	Lindane (Hexachlorocyclohexane)	mg/L	-	-	-	-	-	0	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Mercury	mg/L	0.1	0.05	0.1	0.02	0.1	0.1	-	0.1	0.01	0.05	0	0	-	0.005	0.10	-	-	0.006	0.05	-	-	-	0.1	0.05	-	-	-
	Methylene chloride (dichloromethane)	mg/L	-	0.21	-	-	-	-	-	-	2	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mirex	mg/L	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Molybdenum	mg/L	-	5	5	5	1	5	-	-	5	-	5	-	-	-	5	-	-	-	1	-	-	-	5	-	-	-	-

Identifier	Substance	Units	Manitoba Model Sewer Use By-law	Proposed (1998) Ontario MOE Model Sewer Use By-law (mg/L)	Nova Scotia Model Sewer Use By-law (mg/L)	Victoria Sewer Use Bylaw	Vancouver (GVRD) Sewer Use Bylaw	Edmonton Sewer Use Bylaw	Regina Sewer Use Bylaw	Winnipeg Sewer Use Bylaw	Toronto Sewer Use By-law	Montreal Sewer Use Bylaw	Halifax Sewer Use By-law	Fredericton Sewer Use By-law	Charlottetown Sewer Use By-law	St. John's Sewer Use By-law	Whitehorse Sewer Use By-law	Yellowknife, NWT	Iqaluit, Nunavut	Nanaimo, B.C.	Kelowna, B.C.	Banff, Alberta	Delisle, Sask.	Portage La Prairie, MB	Oxford County, ON	Val David, Quebec	Mahone Bay, NS	Saint John, NB	Stratford, PEI
CCME - TOR	Nickel	mg/L	-	3	2	3	2	4	5	5	2	5	2	5	-	0.5	4	-	-	1	2	-	-	1	2	5	-	-	-
CCME - TOR	Nitrate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	-	-	-	-	-
	Nitrogen, Total Kjeldahl	mg/L	-	100	-	-	-	50	-	-	100	-	100	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Nonylphenol	mg/L	-	-	-	-	-	-	-	-	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Nonylphenol ethoxylate	mg/L	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil and grease - animal and vegetable	mg/L	-	-	-	-	-	-	-	-	150	-	150	-	-	10	-	-	-	-	-	-	-	100	100	100	-	150	-
	Oil and grease - mineral and synthetic	mg/L	-	-	-	-	-	-	-	100	15	-	15	-	-	-	-	-	-	-	-	-	-	15	100	30	-	15	-
	Oil and grease (total)	mg/L	-	-	-	100	150	100	-	-	-	150	-	-	-	-	100	-	-	-	150	-	-	-	-	-	-	-	-
	PAHs	mg/L	-	-	-	0.05	0.05	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PCBs (chlorobiphenyls)	mg/L	0	0	0	0	-	0	-	-	0.001	-	0	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
	Pentachlorophenol	mg/L	-	-	-	-	-	0	-	-	0.005	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	pH (unitless)	mg/L	-	6 - 10.5 (unitless)	5.5 - 9.5 (unitless)	5.5 - 11 (unitless)	5.5 - 12.0	6.0 - 11.5	5.5 - 9.0	5.5 - 9.0	6.0 - 11.5	6.0 - 10.5	5.5 - 9.5	6.0 - 10.5	5.5 - 9.5	5.5 - 9.0	5.5 - 10.5	-	-	5 - 9.5	5 - 11.0	-	-	5.5 - 9.5	5.5 - 10.5	5.5 - 9.5	-	6.0 - 9.5	5.5 - 9.5
CCME - TOR	Phenanthrene	mg/L	-	-	-	Included in total PAHs	-	-	-	-	0.005 (total PAHs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Phenolics (4AAP - specific compound)	mg/L	-	1	-	-	-	-	-	-	1	1	1	-	-	0.5	-	-	-	-	-	-	-	0.1	1	-	-	-	-
CCME - TOR	Phenols, Total (or Phenolic compounds)	mg/L	1	-	1	1	1	1	0.1	-	-	1	-	1	0.05	-	1	-	-	1	1	-	-	-	1	1	-	50	0.05
CCME - TOR	Phosphorus (total)	mg/L	-	10	30	-	-	10	-	-	10	-	10	100	-	10	10	-	-	-	12.5	-	-	60	10	100	-	-	-
CCME - TOR	Pyrene	mg/L	-	-	-	Included in total PAHs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Quinoline	mg/L	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Selenium	mg/L	-	5	5	0.3	1	0	-	-	1	-	1.00	-	-	-	5	-	-	-	-	-	-	-	5	-	-	-	-
CCME - TOR	Silver	mg/L	-	5	2	0.5	1	5	-	5	5	-	2	-	-	-	5	-	-	-	1	-	-	-	5	-	-	-	-
	Sulphates as SO4	mg/L	1500	-	1500	1500	1500	-	-	-	-	-	1,500.00	1,500	-	-	1500	-	-	-	1500	-	-	1500	1500	-	-	1500	-
CCME - TOR	Sulphide (as H2S)	mg/L	Inoffensive odour	-	2	1 (as S 2-)	1.0 (as S 2-)	3.0 (as S 2-)	3.0 (as ?)	10 (as S 2-)	-	5 (as S 2-)	-	-	Inoffensive odour	-	1.00 (as S 2-)	-	-	-	1	-	-	2	0	5 (as S 2-)	-	0	Restricted
	Suspended Solids, Total	mg/L	300	350	350	350	600	300	-	350	350	-	300	500	-	350	300	-	-	500	600	-	-	300	350	-	-	400	-
	Temperature (degrees C)	mg/L	-	60	60	65	65	75	65	61	60	65	65	75	66	-	75	-	-	65	65	-	-	65	65	-	-	65	66
	Tetrachloroethane (1,1,2,2 -)	mg/L	-	0.04	-	-	-	0	-	-	1.4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Tetrachloroethylene	mg/L	-	0.05	-	0	-	0	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Thallium	mg/L	-	-	-	-	-	1	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-
	Tin	mg/L	5	-	5	-	5	-	-	-	5	5	5	5	-	-	5	-	-	-	5	-	-	-	5	-	-	-	-
	Titanium (total)	mg/L	5	-	-	-	-	-	-	-	5	-	5	-	-	-	5	-	-	-	-	-	-	-	5	-	-	-	-
CCME - TOR	Toluene	mg/L	-	0.27	-	0.2	1.0 (BTEX)	0	1	-	0.016	-	0	-	-	-	1 (BTEX)	-	-	-	-	-	-	-	-	-	-	-	-
	Trichloroethylene	mg/L	-	0.07	-	-	-	0.0	-	-	0.4	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	Inoffensive odour	-	-	-
CCME - TOR	Trichlorophenoxyacetic acid (2,4,5-)	mg/L	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Xylene (o-)	mg/L	-	0.52	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Xylenes (total)	mg/L	-	-	-	0.2	1.0 (BTEX)	0	1	-	1.4	-	2	-	-	-	1 (total BTEX)	-	-	-	-	-	-	-	-	-	-	-	-
CCME - TOR	Zinc	mg/L	1	3	3	3	3	2	5	5	2	10	2.0	5.0	-	0.5	2	-	-	4	3	-	-	1	2	10	-	-	-

Notes: BTEX - benzene, ethyl benzene, toluene, xylene

APPENDIX C
Summary of Municipal Responses on Bylaws, 2005

The following table summarizes the responses to Marbek's survey of municipalities conducted on behalf of the CCME, in support of the development of the background report for the national wastewater strategy, *Review of Existing Municipal Wastewater effluent (MWWE) Regulatory Structures in Canada*, Final Report March 2005. These responses were provided in the latter half of 2004 and so some changes may have occurred since that time.

BANFF	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Do you undertake monitoring of effluent by sewer users to assess compliance?	No
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: Grease trap inspections, daily WWTP testing	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	
List / Comment: Yellow fish PGM, Water conservation	

CALGARY	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: Corrective actions have been specified as part of a penalty or as an alternative to a penalty. Customer facility inspections are conducted for situations which may create risk to a customer's effluent quality. There are no custom surcharge agreements. The requirements in the bylaw are followed and some overstrength situations are allowed passively if no adverse effects are caused and the customer pays the appropriate surcharge. There has been only one sector discussion/negotiation. An education communications effort has been directed at one sector. A number of enforcement actions have been initiated as a result of a regular compliance monitoring program. Actions to date have been largely reactive to problem situations or sectors. The intent is to continue the programs and deal with other sectors once problem areas have been improved.	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	Yes
Comment: We are currently beginning a review of our bylaw but it is unclear whether significant revisions will be necessary. Many of the issues we face are jurisdictional and related to the discussion in item 4, below.	
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	No

CAMROSE	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Comment: The City of Camrose has two employees that will be involved with the compliance and enforcement duties of the Wastewater By-Law. They include a Plumbing Inspector and a By-Law Enforcement Officer. With upgrading the new By-Law the City is enhancing the education program to assist with the implementation of the revised By-Law to encourage compliance and cooperation before requiring enforcement measures.	

Do you undertake monitoring of effluent by sewer users to assess compliance?
Comment: Currently there is no specific monitoring in place to assess compliance. Monitoring is completed on an incident basis and will be reviewed with the implementation of the new Wastewater By-Law.
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?
Comment: As the City's Public Works Departments completes their daily duties, the City may find a questionable situation that prompts an investigation. At this time an inspection is completed and information is provided on how to rectify the situation. Following these activities depending on the result, the next steps the City could take may vary. Formal inspections are also completed when a potential problem is suspected and further information is required to determine what type of action would be justified for the situation. The most significant issue has been surface spills entering the storm system.

Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	Yes

Comment: The City of Camrose is currently completing upgrades to the Sewage By-Law, which will be termed the Wastewater By-Law when completed. Changes are being completed for the By-Law as a proactive approach to the management of sanitary and storm sewer effluent. Areas in which there have been changes from the original By-Law include the addition of a Hauled Waste and Wastewater, Releases, Sewer Connections, and Best Management Practices sections. Specific penalties for an offence, changes to some of the limit requirements for discharges to the sanitary and storm sewers plus numerous section components have been revised throughout the By-Law. Changes to the By-Law have been completed based on comparing other Municipality's By-Laws along with literature that was available for reference material. In completing the upgrade it is challenging to determine what information the By-Law should contain as there are differences between municipal By-Laws with limited standards provincially or federally on what should be included for this type of By-Law.
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?
List / Comment: There are no other By-Laws specific of the management of the wastewater effluent. With the upgraded Wastewater By-Law there is a Wastewater Policy that is being developed along side the By-Law, which includes information that is important for the management of the wastewater system, but not required in the actual By-Law.
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?
List / Comment: With the implementation of the upgraded By-Law the City of Camrose will be adding to their current education and awareness campaign. The City is hoping that with proactive education that this will encourage industries and businesses to follow the requirements within the By-Law and use enforcement as a last resort. The upgraded By-Law allows for the use of Best Management Practices, as well the City is looking at potential pollution prevention programs along with the education programs planned.

CORNWALL

Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes

What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?
Comment: inspections, industry discussions/ negotiations,

Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No

Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	No

CRD (VICTORIA)

Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes

Comment:
There are currently 7.5 FTE's working within the RSCP on the following program components: inspections, monitoring, enforcement, education and outreach, data management and planning and development.

Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes

Comment:
All dischargers operating under waste discharge permits are required to regularly monitor (self-monitor) their effluent and report results to RSCP permit managers for compliance assessment. RSCP monitoring staff collect regular audit samples of effluent from these facilities and submit the results to the permit managers to compare with, and validate, the self-monitoring results.

What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	

Comment:
Over the past four years, some of the main activities undertaken regarding bylaw compliance, inspections, sector outreach, enforcement, fees and fines are as follows:

The RSCP was enhanced in 2001 to accelerate the development of codes of practice, increase code of practice inspections and accelerate outreach and promotion of the program. By the end of 2003, 11 codes of practice had been adopted under the Sewer Use Bylaw and the outreach program had made significant progress within all code sectors. Stakeholder task forces played a major role in all code development and amendment over this period. In addition, a residential education component was initiated in 2002 to increase public awareness of the program and participation in source control activities.
All sectors operating under codes of practice have inspection and sampling targets set each year. The number of RSCP code inspectors was recently increased to help achieve or maintain these targets.
A review of operations under waste discharge permits was carried out from 2002 – 2004. Several new permits were added and others were transferred to authorizations. Each permittee is inspected and sampled for audit purposes at least twice per year.

A cost recovery fee structure for codes of practice was developed and adopted in 2000 in co-operation with stakeholders from a wide range of sectors. The fee structure for permits was adopted in 1997.

Amendments to the CRD's Municipal Ticket Authorization bylaw in 2001 allowed tickets to be issued for specific code of practice infractions.

In 2000, RSCP staff developed the framework for a database to track business registration, self-assessment, inspection, compliance and other information associated with the management of codes of practice. This database was further modified in 2003 and currently stores information on all operations identified within the 11 existing code sectors. Verification of business information through registration and inspection is ongoing. The database was expanded to include storage of waste discharge permit, authorization and enforcement data in 2003.

Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No

Comment:
A bylaw consolidation is expected to be undertaken in 2005. This will not change the current structure of the bylaw significantly, but will make minor additions to some sections, update and/or modify current requirements and make other minor adjustments.

Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?

List / Comment:
Source Control Local Service Establishment Bylaw (CRD Bylaws 2834, 2402) – This bylaw establishes the boundaries, participating areas, cost recovery and maximum requisition for the CRD's source control local service area.

Sewer Local Service Area Sewer Regulation Bylaw (CRD Bylaw 2490). This bylaw defines the requirements for connection, fees and use of sanitary sewers in specific CRD local service areas and electoral districts.

CRD Septage Disposal Bylaw (CRD Bylaw 2827) - regulates the discharge of septic tank contents and other wastes at CRD septage disposal facilities.

Hartland Landfill Tipping Fee and Regulation Bylaw (CRD Bylaw 3117) – regulates the disposal of wastes at the CRD's Hartland Road sanitary landfill.

Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?

List / Comment:
Guidebooks, info sheets, posters and bulletins have been developed for code of practice sectors to help explain the mandatory regulations and promote voluntary best management practices (BMP's) and product stewardship opportunities that will help to enhance contaminant reductions from each sector. These BMP's are based on pollution prevention (P2) principles.

Other RSCP P2 initiatives have included: formation of a DND/CRD liquid waste pollution prevention working group in 2000; development and implementation of a residential education component in 2002 including voluntary contaminant reduction measures and BMP's; development and distribution of sector-specific BMP's to denturists, furniture restorers, hotels/motels and paint and coatings operations (2004); general education on P2 practices, product stewardship initiatives and alternative disposal options during regular RSCP code and permit inspections.

The CRD's Hartland Road landfill accepts certain controlled (non-hazardous) industrial/commercial wastes for disposal and is currently developing a household hazardous waste collection program.

FORT NELSON

Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	No
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No

Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?

List / Comment:
Up until 2000 we aloud industry to dump in our system. We now have 1 or 2 private industrial waste sights.

KAMLOOPS

Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Do you undertake monitoring of effluent by sewer users to assess compliance?	No
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	None
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	Yes

Comment:
Source control review is underway in 2005, and installation of metered dumpsite will be done in 2005.

Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	
List / Comment: The City operates under sanitary sewer bylaw for collection and a Liquid Waste Management Plan for treatment and disposal.	
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	None

OTTAWA	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Comment: http://ottawa.ca/city_services/waterwaste/sewer_use/index_en.shtml	
Do you undertake monitoring of effluent by sewer users to assess compliance?	No
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: All of the above.	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Comment: Bylaw was significantly revised in the Fall of 2003	
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	
List / Comment: The City has a Take it Back Program and Household Hazardous Waste Depot.	

PEEL	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: Currently we have a sewer use surcharge agreement for those industries that are over the bylaw limits. Additional fees are charged based on monitored discharges and those companies under agreement are billed based on an executed agreement. Charges are significant and it is in attempt to get them back in compliance utilizing their own site treatment systems. Part of the surcharge fee is returned to them if they build their own treatment facilities. This method is employed to be proactive in getting industries to deal with their own wastewater effluent above the sewer use bylaws. Industries are regular inspected and monitored. Sampling frequencies vary from grab samples to monthly automated composite sampling. The industry pays the full cost for these programs. Peel's bylaw has the ability to lay charges which is sometimes employed for those companies that exceed the sewer use bylaw and fail to enter into a surcharge agreement. Negotiated with Airport Authority to reduce Glycol Discharge to treatment facility and look at onsite recycling instead of treatment which can cause operational difficulties.	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Comment: Mostly pertaining to limits and expanding the bylaw to acknowledge that we also except contaminated storm water run off, as long as it meets bylaw limits.	
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	

List / Comment: Surcharge agreements / Water Conservation Programs that reduce volume
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?
List / Comment: As part of our surcharge agreements industries are encouraged financially to come in to compliance to meet sewer use bylaw limits. Water Efficiency programs encourage water savings and reduced sewer bills as Sewage is billed at 85% of water consumption.

SUMMERSIDE

Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Comment: The enforcement of the By-laws are done by the engineering department with assistance from the staff of the treatment facility.	
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes
Comment: We do checks on businesses that we know have products that may affect our system.	
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: We have inspected a number of industrial plants in the Summerside area to insure proper discharge practices are being carried out. Example. fish plant, window plants, box plant.	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Comment: I am not aware of any changes to the By-law within the next 12 months	
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	
List / Comment: No not that I am aware of.	
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	
List / Comment: We from time to time visit plants in the area to give them ways to better dispose of the product they have that may help it the protection of our collection system.	

THUNDER BAY

Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Comment: Environment Division employs one person full-time as a Sewer Use Control Inspector	
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes
Comment: Spot monitoring is done where complaints or blockages occur	
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: We have had sewer surcharge agreements with 2-4 industries. Sewage haulers (septic tanks) require permits and fill out tracking forms. Presentations have been done to local dentist association and automotive garage association. Effluent checks done on restaurants.	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	Yes

Comment: Updates planned to add limits for organics, similar to Toronto's revised sewer use bylaw, ticketing provisions will be investigated	
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	
List / Comment: Waste Surveys , Best Management Practices are encouraged.	

TORONTO	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: All of the above. In addition, Pollution Prevention (P2) planning requirements for businesses discharging subject pollutants (as listed in the Appendix II of Municipal Code Chapter 681, Article I) to the sewers.	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Comment: However, minor amendments to the By-law is an ongoing process as and when the need arises.	
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	
List / Comment: Preparing P2 Plans is mandatory. However, we encourage businesses to implement the plans and reduce/ eliminate the discharge of subject pollutants.	

WATERLOO	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Comment: Seven positions are directly involved in the enforcement of the sewer use program.	
Do you undertake monitoring of effluent by sewer users to assess compliance?	Yes
Comment: Up to one hundred and fifty companies are routinely monitored based on the specific unit processes.	
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	
Comment: All of the activities described are routinely undertaken	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	No
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	
List / Comment: Pollution prevention is routinely discussed as part of the sewer use program activities and a Business Water Quality program is in place to assist companies in assessing the potential impacts of spills.	

WHITEHORSE	
Does your municipality have staff resources for which compliance and enforcement duties are part of their regular job duties?	Yes
Comment: Yes, the has a Bylaw department that will enforce Sewer related compliance issues. For Clarity, there is not a staff position solely for Sewer compliance issues but rather Bylaw Officers on duty of which some of their tasks may be related to Sewage.	
Do you undertake monitoring of effluent by sewer users to assess compliance?	No
Comment: The City does carry out a monitoring program of effluent however it is on a treatment basis and is focused on effluent in the sewage lagoons. This testing is done to ensure compliance with the City's water licence. There is no monitoring program by sewer users to assess their specific compliance with the Bylaw. However if the City becomes aware or suspects releases into the sanitary that are not in accordance with allowable limits or criteria the Bylaw considers this as an Unauthorized Release and then requires information and monitoring data from the party who is releasing. Party may also be responsible for penalization under the Bylaw.	
What compliance activities have you undertaken over the past two to four years: compliance agreements, surcharge agreements, inspections, sector discussions/ negotiations, other?	No
Comment: The sanitary crews do ongoing inspections of the sanitary system and may notice if effluent in certain areas does not appear normal in which case this would prompt some investigation. Where it is known that a user is discharging a substance into the sanitary that may not meet Bylaw release criteria the City will either accept or reject the discharge. If the discharge is accepted it may require a permit to discharge if it does not meet criteria but found to be acceptable on an isolated basis. Often times a proponent who wishes to discharge may reach an agreement with the City through negotiations. For example the City would require testing of the effluent then determine what types of conditions may be included in the permit to discharge. It is entirely possible that substances are being released into the sanitary that do not meet our Bylaw criteria however on going inspections by staff would indicate that that this has not been a significant problem. To this point the City has been dealing with unauthorized releases on a case-by-case basis.	
Does your organization have plans to make significant changes to the Sewer Use By-Law within the next 12 months?	No
Comment: I am thinking that after the release of the National MWWE Strategy (guideline), November 2006 may be an opportune time to incorporate changes to the Bylaw.	
Are there other By-Laws of the municipality that are significant in terms of management of wastewater effluent (quality, quantity, cost of treatment)?	
List / Comment: Sewer and Water Bylaw 99-02 are most relevant.	
Are there voluntary measures you encourage/ promote to industrial or other dischargers to the sewer system (e.g. pollution prevention, product stewardship, take-back programs)?	
List / Comment: Whitehorse has a relatively small industrial sector. The vast majority of wastewater quantities are residential and institutional type sewage generation. There have not been problems meeting effluent quality requirements in the City lagoons Therefore there has not been significant measures put in place to promote stewardship programs.	

APPENDIX D
Development of the Long List of Substances

Step1 – Use the Initial List of contaminants provided by the CCME

The project team started with this list of substances at the request of the CCME. The list was taken from Table A.6 – Categorization of Substances by Level of Process Treatment of the Task 1 - Review of MWWE Science and Research Report. (Hydromantis, *et al*., 2005)

Step 2 – Supplement the Initial List with substances contained in at least one of the 24 municipal sewer bylaws reviewed and 3 provincial model sewer bylaws reviewed.

Restricted substances and prohibited substances found in bylaws reviewed (and not already included in the Initial List) were added to the Initial List. Municipalities have various reasons for including substances in their sewer bylaws. For simplicity, all of the general prohibition clauses with descriptive text in bylaws were not included in the Master List spreadsheet.

Step 3 – Add any Level I or Level II substance contained in the Canada-United States Binational Toxic Strategy[15]*, not already included in the Master List.*

Level 1 substances have been found to be persistent and toxic, and bioaccumulative. Level II substances have been found to be persistent in the environment, and have the potential for bioaccumulative and toxicity. These substances were included because they have been identified as persistent, toxic substances.

Step 4 – Add any Tier I or Tier II substance contained in the Canada-Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem.[16]

Tier 1 substances have been found to be persistent and bioaccumulative. Tier II substances have been identified as having the potential for causing widespread impacts, or have already caused local adverse impacts on the Great Lakes environment. Tier I substances have been targeted for virtual elimination (as defined specifically in the COA). Tier II substances have been targeted for significant reduction. Although the Agreement pertains specifically to the Great Lakes Basin Ecosystem, the pollutants would be considered harmful in other environments as well.

Step 5 – Add any substance from the Canadian Environmental Protection Act Schedule 1 (updated schedule as of November 30, 2005).[17]

Under CEPA, a substance is considered toxic if it enters or may enter the environment in amounts that may pose a risk to: human health; the environment (such as fish or wildlife); the environment upon which life depends (such as water, soil, and air).[18] Schedule 1 substances

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[15] Great Lakes Binational Toxics Strategy, The (undated). Canada – United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes, (online) http://www.epa.gov/bns/index.html. Accessed February 23, 2006.

[16] Environment Canada. (2001). The Draft New Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, (online) http://www.on.ec.gc.ca/coa/2001/areas-concern-e.html. Accessed February 26, 2006

[17] Environment Canada (2005). Canadian Environmental Protection Act Environmental Registry – Toxic Substances List, (online) http://www.ec.gc.ca/CEPARegistry/subs_list/Toxicupdate.cfm. Accessed February 27, 2006.

[18] Ref: http://www.hc-sc.gc.ca/iyh-vsv/environ/cepa-lcpe_e.html. Accessed February 28, 2006

were included in the Master List, except for parameters considered to be a target for other phases (i.e. air, solid) were not included in the Master List. Parameters *excluded* were: asbestos, VOCs that participate in atmospheric photochemical reactions, CFCs, Gaseous Ammonia, CO_2, CH_4, NO, N_20, NO_2, SO_2, HFCs, PFCs, O_3, particulate matter, SF_6, $C_{17}H_{15}ClN_2O_3$ (banned in Canada), ethylene oxide (high volatilization, mainly air issue based on Environment Canada information), and effluent categories (e.g. effluents from textile mills using wet processing).

<u>Step 6</u> – Add any additional substance not on the CEPA Schedule 1 list but on the CEPA Priority Substance List (PSL) 1 or PSL 2, and found to be toxic as defined by CEPA.

These substances were included because they may be good candidates for source control, depending on their lifecyle.

APPENDIX E
Characterization of Substances on the Long List of Substances

The following factors and sources were used to characterize the long list of substances.

1. Human health effects

The reference source used for this category were two tables in the Hydromantis *et. al.* (2005) report[19], prepared for the Science Sub-Committee of the CCME Development Committee for the MWWE Canada-Wide Strategy. Substances were included in this category in the Master List if they were included in Table A.1 columns: "GCDWQ – Guidelines for Canadian Drinking Water Quality"; or "DWSPL – Drinking Water Source Protection List" of the Hydromantis *et. al.* report. The report rationalized that if there are drinking water guidelines or concerns with the human health effects of a substance, then the human health effects would be applicable to sewer discharges as well. Human health effects could include cancer in humans, but is limited to cancer in humans.

2. Known or possible carcinogen

The primary source of information for this category was also the Hydromantis, *et al.* (2005) report. These two tables indicated which parameters were known or possible carcinogens. A further review of the CEPA PSL 1 and PSL 2 lists was undertaken to determine whether there were any additional substances which had been confirmed as known or probable carcinogens.

3. Toxic, as defined by CEPA

The reference source used to identify toxic substances was the Schedule 1 CEPA toxic list, dated October 2005. Although there are several definitions for 'toxic' in the literature, this category was limited to CEPA-toxic substances.

4. Persistent

The primary reference source used to identify persistent substances was the Hydromantis, *et al.* report.[20]

All substances from the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (Tier I and Tier II lists) and the Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes (Level I and Level II lists) were classified as persistent.

[19] Hydromantis Inc., Minnow Environmental Inc., University of Waterloo (Dept. of Civil Engineering). (June 2005.) Review of the State of Knowledge of Municipal Effluent Science and Research. Final Report – Task 1: Review of Effluent Substances. (prepared for the Development Committee for the MWWE Canada-Wide Strategy – Canadian Council of Ministers of the Environment)

[20] Hydromantis Inc., Minnow Environmental Inc., University of Waterloo (Dept. of Civil Engineering). (June 2005.) Review of the State of Knowledge of Municipal Effluent Science and Research. Final Report – Task 1: Review of Effluent Substances. (prepared for the Development Committee for the MWWE Canada-Wide Strategy – Canadian Council of Ministers of the Environment)

In addition, all metals with guidelines for biosolids, as per the *"Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land"* (Ontario Ministry of the Environment and Ontario Ministry of Agriculture, Food and Rural Affairs, 1996), were classified as persistent substances. The guidelines contain specific quality criteria for 11 heavy metals and apply to biosolids used as fertilizer/soil or soil conditioner.

5. Bioaccumulative

The primary reference source used to identify bioaccumulative substances was the Hydromantis, *et al.* report.[21] All Tier I substances of the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem were classified as bioaccumulative substances. Other substances in the Canada-Ontario Agreement and the Canada-United States Binational Toxics Strategy are not all exclusively bioaccumulative.

6. Protection of the Collection System

The primary sources of information for the protection of the collection system category were municipalities consulted in this project, as well as professional judgement. Substances and parameters were included in this category for their ability to cause issues such as corrosion and explosions in the sewer collection system, or for sewer maintenance considerations.

7. Protection of the Wastewater Process

The two primary sources of information for this category were municipalities consulted in this project and the Ontario MOE reference *"Development Document for Prohibitions and Effluent Discharge Limits to Sanitary and Combined Sewers in 1988 Model Sewer Use By-Law"*.[22] The MOE document lists a number of parameters which can be detrimental to the biological treatment process, and these substances were included.

8. Protection of Worker and Public Safety

Substances were included in the "Protection of Worker and Public Safety" category based primarily on communication with and/or documentation from municipalities. In addition, the consolidated reference for the Ontario Ministry of the Environment, *Indirect Industrial Discharge Limits for Volatile Organic Compounds*, DRAFT was referenced as well as two documents prepared by the Greater Vancouver Regional District (G*VRD Sewer Use Bylaw Review: Background Paper and Recommendations – Discharge Limit Evaluation (DRAFT No. 1) and GVRD Sewer Use Bylaw Review: Background Paper and Recommendations – Discharge Limit Evaluation (DRAFT No. 2).*

A full detailed study on all substances which may or may not be a risk to worker and public safety was beyond the scope of this project.

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[21] Hydromantis Inc., Minnow Environmental Inc., University of Waterloo (Dept. of Civil Engineering). (June 2005.) Review of the State of Knowledge of Municipal Effluent Science and Research. Final Report – Task 1: Review of Effluent Substances. (prepared for the Development Committee for the MWWE Canada-Wide Strategy – Canadian Council of Ministers of the Environment)

[22] Ontario Ministry of the Environment. (August 25, 1989). Development Document for Prohibitions and Effluent Discharge Limits to Sanitary and Combined Sewers in 1988 Model Sewer Use By-Law (Draft).

9. Protection of Biosolids Quality

Several reference sources were used to determine which substances have been confirmed to persist in biosolids and should be included under the "Protection of Biosolids Quality" category (i.e. the resulting solids produced from the wastewater treatment process). The first source used was communication with and/or documentation from municipalities on parameters included in their bylaws to protect the biosolids quality. The second reference source used was the Ontario MOE *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land"* document. The 11 metals with quality criteria identified in the Guidelines were included in the "Protection of Biosolids Quality" category.

Biosolids concentration limits established by the United States Environmental Protection Agency (U.S. EPA) and European Union authorities were also considered. Based on research conducted by U.S. EPA, dioxins, furans, and PCBs have been found in biosolids and concentration limits for biosolids are being considered by the U.S. EPA.[23] These substances were included under the "Protection of Biosolids" category.

European Limits have been established for Dioxins, Furans, PCBs, di(2-ethylhexyl)phthalate, NPE and its ethoxylates, PAHs, and Toluene (National Research Council, 2002). These substances were included in the "Protection of Biosolids Quality", as well as individual PAHs in the Master List.

10. Protection of the Receiving Environment/Effluent Quality

For this category, if a municipality indicated that a particular substance on the Master List was included to protect the receiving environment or effluent quality, the substance was included. In addition, Master List substances with a Canadian Environmental Quality Guideline for the Protection of Aquatic Life (CCME, 2005) were classified in this category.

[23] U.S. Environmental Protection Agency. (2002). Exposure Analysis for Dioxins, Dibenzofurans, and CoPlanar Polychlorinated Biphenyls in Sewage Sludge, (online) http://www.epa.gov/waterscience/biosolids/tbd.pdf. Accessed March 1, 2006.

APPENDIX F
Screening Criteria to Create the Master List of Substances

Following are two groups of screening criteria, the first group was applied to the long list of substances to create the Master List of Substances. The second group of criteria was discussed with the Steering Committee but were not applied since these require policy discussion by the Development Committee.

Group 1: Screening Criteria Applied

Following are the screening criteria applied to the long list for substances potentially released to combined and sanitary sewers.

1. Remove any substances that are not contained in the Task 1 Science Report and do not have identified characteristics of concern (i.e. persistent, bioaccumulative, etc.)

- Rationale:
    - Some substances are on the list as a result of their presence in bylaws reviewed, but have not been identified as having characteristics of concern through research for this project (i.e. the CCME Science Report or other research sources).

2. Remove substances that have only 'other' human health effects noted, but are not carcinogenic and are not included for protection of the collection system, wastewater process, biosolids quality, or effluent quality.

- Rationale
    - Direct exposure of humans to wastewater effluents is limited.
    - Carcinogenic substances may be of concern for aquatic animal health

3. Remove parameters that are used in the disinfection process for drinking water treatment and that are regulated by drinking water standards (i.e. free chlorine, total chlorine and chloramines).

- Rationale:
    - Chlorine demand in sewers is high, so free chlorine is unlikely to be present in sewers
    - Similarly, total chlorine residual is unlikely to be present in sewers.
    - Chloramination is used as a drinking water disinfection process to minimize the production of trihalomethanes. Chlorinated substances will enter the municipal sewer system via the potable water system but in controlled amounts.
    - Chloramines are on Schedule 1 of CEPA with respect to wastewater effluents, which is not applicable to sewer use source controls.

Group 2: Screening Criteria For Discussion by the Development Committee

The following two criteria were not applied to the long list of substances. They are provided following for information and discussion purposes.

4. Remove substances that have been banned in Canada. These substances include aldrin, dieldrin, and endrin, heptachlor + heptachlor epoxide and mirex. These substances are in either the Canada-Ontario Agreement or the Binational Toxics Strategy; mirex is also a CEPA Schedule 1 substance.

- Rationale:
    - As banned substances, they are unlikely to be discharged to sanitary sewer systems. If they are used in processes by dischargers, management regimes are in place to address the problem and so sewer use bylaw provisions would be redundant.
    - These substances may be present as atmospheric contaminants, and therefore can enter combined sewer systems as a result of atmospheric deposition and rain runoff. In this case, exceedances of bylaw limits are unenforceable.
- Counter-argument for excluding this criterion:
    - Redundancy within municipal sewer use bylaws for banned substances provides additional regulatory support to the issue of banned substances and allows municipalities to participate in the enforcement.
    - Presence in bylaws encourages monitoring for these substances by industry and municipalities. Results of monitoring for sewer use bylaws would provide information on the success of the ban.

5. Remove substances that are slated for virtual elimination (i.e. relevant substances on CEPA Schedule 1, Tier 1 COA/Level 1 Binational Toxics Strategy substances). An exception for substances in common use in municipalities may be appropriate (specifically, for mercury).

- Rationale:
    - To virtually eliminate substances, controls are appropriate on products containing these substances and on processes relying on these substances. These types of controls are most effective when implemented by senior levels of government through international, national or provincial measures designed for the appropriate industry sector(s).
    - Environment Canada and some provinces are already addressing these substances through various measures. Inclusion in sewer use bylaws would be redundant.
- Counter-argument for excluding this criterion:
    - Several municipalities (e.g. Peel, Toronto, Ottawa) have indicated that they have included CEPA Schedule 1 substances and COA/Binational substances in their bylaws specifically because they are on these lists. (This criterion would not remove substances on these lists that are not subject to virtual elimination.)
    - Allows municipalities to use the sewer use bylaw as a means to monitor the substances and have the authority to regulate industries if these substances are found in effluent discharged to the sewer.
    - Inclusion may lead to guidance on permissible/ enforceable concentration limits to sewers. (One municipality surveyed has had queries from industry regarding what concentrations are permitted to be discharged.)

APPENDIX G
Master List of Substances, with Characterization Information

Identifier	Substance	Refer to Note:	Schedule 1 - CEPA (November 30, 2005 version)	Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)	Level I or Level II Canada-US Binational Toxics Strategy (1997)	Substance Group (Pesticide, Chlorinated phenol, PAH, Dioxin/Furan) (Consider grouping individual parameters in the respective categories together, and setting a total limit for the respective category *Note: some individual parameters are noted based on screening-in criteria for the Master LIst, however, the full listing of individual parameters to be included in each category needs to be defined)	Human health effects (1)	Known or Possible Carcinogen (2)	Toxic to Environment, as per CEPA (3)	Persistent (2) (4)	Bio-accumulative (2)	Protection of Collection System (5)	Protection of Wastewater Process (5) (6)	Protection of Worker and Public Safety (5)	Protection of Biosolids Quality (5) (7) (8) (9)	Protection of Receiving Environment/Effluent Quality (5)
CCME - TOR	2,4-D	Note 10				Pesticide	X									X
	Acetaldehyde		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Acrolein		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Acrylonitrile	Note 11	CEPA-Sch.1					X	X							No CEQG for Aquatic Life
	Aldrin/dieldrin	Note 10		Tier I COA	Level I Binational Toxics	Pesticide	X	X		X	X					X
	Alkyl-lead	Note 14, Note 15		Tier I COA	Level I Binational Toxics					X	X					No CEQG for Aquatic Life
CCME - TOR	Aluminum	Note 10					X						X			X
CCME - TOR	Ammonia	Note 10	CEPA-Sch.1				X		X			X	X			X
CCME - TOR	Anthracene	Note 10		Tier II COA	Level II Binational Toxics	PAH				X					X	X
CCME - TOR	Arsenic	Note 11	CEPA-Sch.1				X	X	X	X			X		X	X
	Benzene	Note 10, Note 11, Note 18	CEPA-Sch.1				X	X	X			X		X	X	X
	Benzidine and benzidine dihydrochloride	Note 11	CEPA-Sch.1					X	X							No CEQG for Aquatic Life
CCME - TOR	Benzo(a)anthracene	Note 10		Tier II COA	Level II Binational Toxics	PAH				X	X				X	X
CCME - TOR	Benzo(a)pyrene	Note 10		Tier I COA	Level I Binational Toxics	PAH	X	X		X					X	X
	Biochemical Oxygen Demand												X			X
CCME - TOR	Bis(2-ethylhexyl)phthalate	Note 10	CEPA-Sch.1					X	X	X	X				X	X
	Bis(chloromethyl) ether	Note 11	CEPA-Sch.1					X	X							No CEQG for Aquatic Life
	Boron						X									X
	Bromochlorodifluoromethane		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Bromochloromethane		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Bromotrifluoromethane		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Butadiene (1,3-)	Note 11	CEPA-Sch.1				X	X	X							No CEQG for Aquatic Life
	Butoxyethanol (2-) (ethylene glycol monobutyl ether)		CEPA-Sch.1						X							No CEQG for Aquatic Life
CCME - TOR	Cadmium	Note 10	CEPA-Sch.1	Tier II COA	Level II Binational Toxics		X		X	X	X		X		X	X
	Carbon tetrachloride (tetrachloromethane)	Note 11	CEPA-Sch.1				X		X							X
	Chemical Oxygen Demand												X			No CEQG for Aquatic Life
CCME - TOR	Chlordane	Note 10		Tier I COA	Level I Binational Toxics	Pesticide	X	X		X	X					X
	Chloride						X						X			X
	Chlorinated paraffins	Note 16					X		X	X	X					No CEQG for Aquatic Life

Identifier	Substance	Refer to Note:	Schedule 1 - CEPA (November 30, 2005 version)	Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)	Level I or Level II Canada-US Binational Toxics Strategy (1997)	Substance Group (Pesticide, Chlorinated phenol, PAH, Dioxin/Furan) (Consider grouping individual parameters in the respective categories together, and setting a total limit for the respective category *Note: some individual parameters are noted based on screening-in criteria for the Master LIst, however, the full listing of individual parameters to be included in each category needs to be defined)	Human health effects (1)	Known or Possible Carcinogen (2)	Toxic to Environment, as per CEPA (3)	Persistent (2) (4)	Bio-accumulative (2)	Protection of Collection System (5)	Protection of Wastewater Process (5) (6)	Protection of Worker and Public Safety (5)	Protection of Biosolids Quality (5) (7) (8) (9)	Protection of Receiving Environment/Effluent Quality (5)
CCME - TOR	Chloroform	Note 10, Note 18					X	X		X				X		X
	Chloromethyl methyl ether	Note 11	CEPA-Sch.1					X	X							X
CCME - TOR	Chlorophenol (Phenols, chlorinated)	Note 10				Pesticide/Chlorinated Phenol	X					X	X			X
CCME - TOR	Chromium (hexavalent)	Note 10	CEPA-Sch.1			Captured under total Cr	X	X	X	X	X		X		X	X
CCME - TOR	Chromium (total)						X			X	X		X		X	X
CCME - TOR	Chromium (trivalent)	Note 10				Captured under total Cr	X			X	X		X		X	X
	Cobalt									X						X
CCME - TOR	Copper	Note 10					X			X			X		X	X
CCME - TOR	Cyanide	Note 10					X						X	X		X
CCME - TOR	DDT	Note 10	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Pesticide	X		X	X	X					X
	Dibenzofuran		CEPA-Sch.1			Dixoin/Furan			X							No CEQG for Aquatic Life
	Dibenzo-para-dioxin		CEPA-Sch.1			Dixoin/Furan			X							No CEQG for Aquatic Life
	Dibromotetrafluoroethane		CEPA-Sch.1						X							No CEQG for Aquatic Life
CCME - TOR	Dichlorobenzene (1,2-)	Note 10					X			X	X					X
	Dichlorobenzene (1,4)	Note 10, Note 18		Tier II COA	Level II Binational Toxics		X			X	X			X		X
	Dichlorobenzidine (3,3' -) (3,3-dichlorobenzene)	Note 14	CEPA-Sch.1	Tier II COA	Level II Binational Toxics			X	X	X	X					X
CCME - TOR	Dichloroethane (1,2-)	Note 10	CEPA-Sch.1				X	X	X							X
	Dichloroethylene (Cis-1,2-)						X									X
CCME - TOR	Dichlorophenol (2,4-)	Note 10				Pesticide/Chlorinated phenol	X									X
	Dichloropropylene (Trans-1,3-)	Note 12				Pesticide	X	X								X
CCME - TOR	Di-n-butyl phthalate	Note 10					X									X
	Dinitropyrene			Tier II COA	Level II Binational Toxics					X						No CEQG for Aquatic Life
CCME - TOR	Endosulfan	Note 10				Pesticide										X
	Endrin				Level II Binational Toxics	Pesticide	X			X						X
CCME - TOR	Ethylbenzene	Note 10, Note 18					X					X		X		X
CCME - TOR	Fluoranthene	Note 10				PAH					X				X	X
CCME - TOR	Fluorene	Note 10				PAH										X
CCME - TOR	Fluoride	Note 10	CEPA-Sch.1				X		X							X
	Formaldehyde		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Heptachlor (+heptachlor epoxide)	Note 10			Level II Binational Toxics	Pesticide	X	X		X						X
	Hexachlorobenzene		CEPA-Sch.1	Tier I COA	Level I Binational Toxics			X	X	X	X					X
	Hexachlorobutadiene (hexachloro-1-3-butadiene)	Note 10	CEPA-Sch.1		Level II Binational Toxics		X	X	X	X	X					X

Identifier	Substance	Refer to Note:	Schedule 1 - CEPA (November 30, 2005 version)	Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)	Level I or Level II Canada-US Binational Toxics Strategy (1997)	Substance Group (Pesticide, Chlorinated phenol, PAH, Dioxin/Furan) (Consider grouping individual parameters in the respective categories together, and setting a total limit for the respective category *Note: some individual parameters are noted based on screening-in criteria for the Master LIst, however, the full listing of individual parameters to be included in each category needs to be defined)	Human health effects (1)	Known or Possible Carcinogen (2)	Toxic to Environment, as per CEPA (3)	Persistent (2) (4)	Bio-accumulative (2)	Protection of Collection System (5)	Protection of Wastewater Process (5) (6)	Protection of Worker and Public Safety (5)	Protection of Biosolids Quality (5) (7) (8) (9)	Protection of Receiving Environment/Effluent Quality (5)
CCME - TOR	Iron	Note 10					X									X
CCME - TOR	Lead	Note 10	CEPA-Sch.1				X		X	X			X		X	X
CCME - TOR	Lindane (Hexachlorocyclohexane)	Note 10		Tier II COA	Level II Binational Toxics	Pesticide	X			X						X
CCME - TOR	MCPA	Note 10				Pesticide	X									X
CCME - TOR	Mercury	Note 10, Note 17	CEPA-Sch.1	Tier I COA	Level I Binational Toxics		X		X	X	X		X		X	X
	Methoxyethanol (2-)		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Methyl bromide		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Methylene chloride (dichloromethane)	Note 10, Note 11, Note 18	CEPA-Sch.1				X	X	X					X		X
	Methylenebis (4,4-) (2-chloraniline)			Tier II COA	Level II Binational Toxics					X						No CEQG for Aquatic Life
	Mirex	Note 10	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Pesticide	X		X	X	X					X
	Molybdenum	Note 10					X			X			X		X	X
CCME - TOR	Nickel	Note 10	CEPA-Sch.1						X	X			X		X	X
CCME - TOR	Nitrate	Note 10					X									X
	Nitrogen, Total Kjeldahl												X		X	X
	N-nitrosodimethylamine	Note 11	CEPA-Sch.1					X	X							No CEQG for Aquatic Life
CCME - TOR	Nonylphenol	Note 10	CEPA-Sch.1				X		X		X				X	X
CCME - TOR	Nonylphenol ethoxylate	Note 10	CEPA-Sch.1						X		X				X	X
	Octachlorostyrene			Tier I COA	Level I Binational Toxics					X	X					No CEQG for Aquatic Life
	Oil and grease - animal and vegetable											X	X			X
	Oil and grease - mineral and synthetic											X	X			X
	Oil and grease (total)											X	X			X
	PAHs	Note 11	CEPA-Sch.1	Tier II COA	Level II Binational Toxics	PAH	X	X	X	X					X	X
	PCBs (chlorobiphenyls)	Note 10, Note 17	CEPA-Sch.1	Tier I COA	Level I Binational Toxics			X	X	X	X				X	X
	PCDD (Dioxins)		CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Dixoin/Furan			X	X	X				X	No CEQG for Aquatic Life
	PCDF (Furans)		CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Dixoin/Furan			X	X	X				X	No CEQG for Aquatic Life
	Pentachlorobenzene	Note 10	CEPA-Sch.1		Level II Binational Toxics				X	X						X
	Pentachlorophenol	Note 10		Tier II COA	Level II Binational Toxics	Pesticide/Chlorinated phenol	X	X		X						X
CCME - TOR	pH (unitless)						X					X	X	X		X
CCME - TOR	Phenanthrene	Note 10		Tier II COA	Level II Binational Toxics	PAH				X					X	X
	Phenolics (4AAP - specific compound)	Note 10				Captured under total Phenols	X					X	X			X
CCME - TOR	Phenols, Total (or Phenolic compounds)	Note 10					X					X	X		X	X

Identifier	Substance	Refer to Note:	Schedule 1 - CEPA (November 30, 2005 version)	Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)	Level I or Level II Canada-US Binational Toxics Strategy (1997)	Substance Group (Pesticide, Chlorinated phenol, PAH, Dioxin/Furan) (Consider grouping individual parameters in the respective categories together, and setting a total limit for the respective category *Note: some individual parameters are noted based on screening-in criteria for the Master LIst, however, the full listing of individual parameters to be included in each category needs to be defined)	Human health effects (1)	Known or Possible Carcinogen (2)	Toxic to Environment, as per CEPA (3)	Persistent (2) (4)	Bio-accumulative (2)	Protection of Collection System (5)	Protection of Wastewater Process (5) (6)	Protection of Worker and Public Safety (5)	Protection of Biosolids Quality (5) (7) (8) (9)	Protection of Receiving Environment/Effluent Quality (5)
CCME - TOR	Phosphorus (total)												X			X
	Polybrominated biphenyls		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Polychlorinated terphenyls		CEPA-Sch.1						X							No CEQG for Aquatic Life
CCME - TOR	Pyrene	Note 10				PAH					X				X	X
CCME - TOR	Quinoline	Note 10														X
CCME - TOR	Selenium	Note 10					X			X			X		X	X
CCME - TOR	Silver	Note 10					X						X			X
	Sulphates as SO4						X					X	X			No CEQG for Aquatic Life
CCME - TOR	Sulphide (as H2S)	Note 10					X					X	X	X		X
	Suspended Solids, Total											X	X			X
	Temperature (degrees C)						X					X	X			X
	Tetrachlorobenzene (1,2,3,4- and 1,2,4,5-)	Note 10	CEPA-Sch.1		Level II Binational Toxics				X	X						X
	Tetrachloroethane (1,1,2,2 -)	Note 18						X						X		X
CCME - TOR	Tetrachloroethylene	Note 10, Note 18	CEPA-Sch.1				X		X					X		X
	Thallium	Note 10														X
	Tin												X		X	No CEQG for Aquatic Life
	Titanium (total)												X		X	No CEQG for Aquatic Life
CCME - TOR	Toluene	Note 10, Note 18					X					X		X	X	X
	Toxaphene	Note 10, Note 14		Tier I COA	Level I Binational Toxics		X	X		X	X					X
	Tributyl tin	Note 10, Note 14		Tier II COA	Level II Binational Toxics					X						X
	Tributyltetradecylphosphonium chloride		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Trichloroethane (1,1,1-) (methyl chloroform)		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Trichloroethylene	Note 10, Note 13, Note 18	CEPA-Sch.1				X	X	X					X		X
CCME - TOR	Trichlorophenoxyacetic acid (2,4,5-)	Note 10				Pesticide	X									X
	Vinyl chloride (chloroethylene)		CEPA-Sch.1						X							No CEQG for Aquatic Life
	Xylene (o-)	Note 18				Captured under Xylenes	X					X		X	X	X
	Xylenes (total)	Note 18 (refers to o-xylene)					X					X	X	X	X	X
CCME - TOR	Zinc	Note 10					X			X			X		X	X

See Notes to Appendix G on next page

NOTES TO APPENDIX G

GENERAL
CEQG - Canadian Environmental Quality Guideline
NPE - nonylphenol and its ethoxylates
PAH - Polynuclear Aromatic Hydrocarbons

IDENTIFIER TERMINOLOGY
CCME - TOR' - Original list of substances provided in the Terms of Reference "Model Sewer Use Bylaw and Instruments for Source Reduction" CCME Project #380-2006.

SPECIFIC NOTES

(1) Task 1 - Review of MWWE Science and Research report. Hydromantis, et al. June 2005. Parameters included in this category if checked on either of the following Table A.1 columns: "GCDWQ - Guidelines for Canadian Drinking Water Quality" ; "DWSPL - Drinking Water Source Protection List". Rationale that if there are guidelines established, these parameters have human health effects and human health effects are applicable to sewer discharges as well. Human health effects could include cancer, but would not be limited to cancer in humans.

(2) As per research in Report "Review of the State of Knowledge of Municipal Effluent Science and Research - Final Report - Task 1: Review of Effluent Substances" Hydromantis et al, 2005, unless otherwise noted (refer to notes beside specific parameters.

(3) The CEPA Definition of "Toxic": Under the Act, a substance is considered "CEPA-toxic" if it enters or may enter the environment in amounts that may pose a risk to: human health; the environment (such as fish or wildlife); the environment upon which life depends (such as water, soil, and air). Ref: http://www.hc-sc.gc.ca/iyh-vsv/environ/cepa-lcpe_e.html (accessed February 28, 2006)
Not included in Master List - Parameters considered to be a target for other phases (i.e. air, solid) and not of prime concern for the wastewater sector (e.g. asbestos – more solid particulate issue; VOCs that participate in atmospheric photochemical reactions, CFCs, Gaseous Ammonia, CO2, CH4, NO, N20, NO2, SO2, HFCs, PFCs, O3, particulate matter, SF6, C17H15ClN2O3 (banned in Canada)), ethylene oxide, and general categories (e.g. effluents from textile mills using wet processing).

(4) For the metals listed under category 'Protection of Biosolids", also considered these metals in the "persistent" in the environment category.

(5) Based on communication with and/or documentation from municipalities, unless otherwise noted (refer to notes beside specific parameters).

(6) Ref: "Development Document for Prohibitions and Effluent Discharge Limits to Sanitary and Combined Sewers in 1988 Model Sewer Use By-Law.". Ministry of the Environment. August 25, 1989.

(7) Metals selected include metals with criteria identified in "Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land". Ontario Ministry of the Environment and Ontario Ministry of Agriculture, Food and Rural Affairs. March 1996.

(8) Based on research conducted by United States Environmental Protection Agency. Dioxins, Furans, and PCBs have been found in biosolids and limits are being established. These substances are included under the "Protection of Biosolids" category.

(9) European Limits have been established for Dioxins, Furans, PCBs, di(2-ethylhexyl)phthalate, NPE and its ethoxylates, PAHs, and Toluene. Website link: http://www.epa.gov/ost/biosolids/nas/complete.pdf . These substances are included in "Protection of Biosolids Quality" screening criteria, as well as individual PAHs noted in the Master List.

(10) Task 1 - Review of MWWE Science and Research report. Hydromantis, et al. June 2005. Included in "Protection of Receiving Environment" category if Report notes that CCME established a Canadian Water

Quality Guidelines for the Protection of Aquatic Life (first default) or there is a US EPA national Recommended Water Quality Criteria (second default).

(11) Based on additional research by Marbek. This substance is a known or probable carcinogen, as per Environment Canada Priority Substance List assessments.

(12) This parameter is a pesticide mainly used in farming. Carcinogenic information obtained from Agency for Toxic Substances and Disease Registry website: http://www.atsdr.cdc.gov/tfacts40.html

(13) Environment Canada PSL 1 Assessment: "Based on the weight of evidence of carcinogenicity in experimental animals, trichloroethylene is classified as “probably carcinogenic to humans”, i.e., as a substance for which there is believed to be some chance of adverse health effects at any level of exposure." Ref: http://www.ec.gc.ca/substances/ese/eng/psap/PSL1_trichloroethylene.cfm

(14) Substance not listed as "persistent" in Task 1 Science Report (Hydromantis, 2005). Substance is listed in this Master List under the "persistent" category, because it is a Level I or Level II Substance of the Canada-United States Binational Toxics Strategy, or substance is listed in this Master List under the "persistent" category, because it is a Tier I or Tier II Substance on the Canada-Ontario Agreement.

(15) Substance not listed as "bioaccumulative" in Task 1 Science Report (Hydromantis, 2005). Substance is listed in this Master List under the "bioaccumulative" category, because it is a Tier I Substance of the Canada-Ontario agreement.

(16) Chlorinated paraffins have been declared as "toxic" to human health, by Environment Canada under CEPA. Ref: http://www.ec.gc.ca/substances/ese/eng/psap/PSL1_chlorinated_paraffins.cfm. CPs are proposed as candidates for virtual elimination.

(17) Mercury and PCBs are commonly identified in sewer use bylaws. While slated for virtal elimination, these substances currently still have common sources within communities.

(18) Substance is listed in the Draft 1999 "Indirect Industrial Discharge Limits for Volatile Organic Compounds" (Ontario Ministry of the Environment, M. B. Campbell, November 1996, Revised July 1997)

APPENDIX H
Approach to Establishing Discharge Limits

This section describes the steps, the rationale for the steps and the guidance materials used for the steps. As mentioned in the body of the report, this approach is adapted from that of the City of Ottawa. Four key modifications to the approach were made:

1) The step pertaining to application of method detection limits to toxic substances (Step 4 of the City of Ottawa approach) has been modified and included in Step 7;
2) The step pertaining to worker health and safety has been moved to Step 6 to prevent modification upwards of these parameters by other steps;
3) An additional step was added to consider substances reported to have a threshold inhibitory effect on activated sludge wastewater treatment processes; and
4) An additional step has been added for substances where insufficient information is available for application of the approach.

It should be noted that the City of Ottawa approach is applied within a context of other information and consultation steps and so the original approach was well-suited for their needs.

Modifications to the references have also been made from provincial guidelines to national guidelines.

The steps in the approach applied include:

Step 1 – Identify the Canadian Water Quality Guidelines for the Protection of Aquatic Life (October 2005, or more recent) for parameters with guidelines established.

- This is a conservative first step, as it does not consider treatment, dilution in the collection system, or mixing zones in the receiving water environment.

- The use of these guidelines is consistent with the principle of pollution prevention at source.

- National guidelines are used. Where applicable, jurisdictions could modify this step with application of provincial water quality guidelines. Some jurisdictions already have guidelines for substances not included in the CWQG.

Step 2 – Determine what concentration is achievable through pre-treatment at source using established Best Demonstrated Available Technologies (BDAT), excluding substances slated for virtual elimination. Raise limit where required.

- Note that a decision by the Steering Committee on whether to include substances slated for virtual elimination is pending.

- If substances requiring virtual elimination are included in the Model Sewer Use Bylaw, as a general approach, this step would not be applied to those substances. This step takes into consideration pre-treatment technology capability. Application of this step assumes the use and release of the contaminant is unavoidable and that pre-treatment is acceptable. Treatment is not source reduction and it results in residue

wastes, releases to air or trace releases to water that contain the substance of concern. Pre-treatment will not support the goal of virtual elimination, and so substitution or other pollution prevention approaches are appropriate for these substances.

- While this step will not be applied, as a general approach, to substances slated for virtual elimination, some exceptions may apply. For example, mercury is a Tier 1 COA substance. However, the use of mercury by dentists is ongoing and dental amalgam separators are common pre-treatment devices. Thus, mercury is an exception to the exclusion of substances slated for virtual elimination from this step. PCBs is another exception to the exclusion.

- The U.S. Environmental Protection Agency document "*Manual – Ground-Water and Leachate Treatment Systems*" (1995) has been used as a reference source by the municipalities of Ottawa (2004) and Winnipeg (in their 2006 bylaw review). Although this reference is over 10 years old, no other consolidated reference was identified by the study team.

- If a higher concentration limit than identified in Step 1 is noted in the BDAT Report, adopt the higher concentration limit.

Step 3 – Compare limit established in previous steps to the inhibitory concentration for the activated sludge process[24]. This step will provide verification that concentrations for key substances found to affect the biological activated sludge process are not permitted to be discharged at inhibitory levels. Lower the limit where required.

- If the inhibitory concentration for a parameter is lower than the concentration limit developed in the previous steps, decrease the limit to the inhibitory concentration for activated sludge biological treatment processes.

- The 2005 Hydromantis *et. al. "Tasks 2 and 3: Review of Existing and Emerging Technologies" prepared for the Canadian Council of Ministers of the Environment* was the reference source used for inhibitory substances and threshold inhibitory concentrations.

Step 4 - Compare limit to the Guidelines for Canadian Drinking Water Quality. Raise the limit where required.

- If the drinking water quality guideline for a parameter is higher than the concentration limit developed in the previous steps, increase the limit to the drinking water quality guideline.

- This step prevents the requirements for sewage quality from exceeding drinking water quality requirements.

[24] CCME proposed standard is secondary treatment or equivalent. Activated sludge process is a common secondary wastewater treatment process. Further sludge and liquid treatment process requirements have not been defined by CCME to date. Refer to Table 13 - 2005 Hydromantis *et. al* report *"Tasks 2 and 3: Review of Existing and Emerging Technologies"* for substances listed as having a threshold inhibitory effect on activated sludge processes. Other substances are also listed as having an inhibitory effect on anaerobic digestion and nitrification processes.

- The Health Canada "*Canadian Summary of Guidelines for Canadian Drinking Water Quality*" was the reference source.

- Based on a cursory scan of the Guidelines, there are a significant number of parameters in the existing Master List that have no Canadian Drinking Water Quality guidelines established. In these cases, no guideline is assumed and this step is not applied.

Step 5 - Compare limit to contaminant concentrations found in typical domestic wastewater. Raise the limit where required.

- If the concentration of a parameter in typical domestic wastewater is higher than the limits identified in the previous steps, increase the limit for that parameter to ensure that typical domestic sewage meets the sewer limits.

- The proposed reference source for concentrations of typical contaminants found in untreated domestic wastewater composition is the Metcalf and Eddy (2003) "*Wastewater Engineering Treatment and Reuse*" (Table 3-15). This reference source contains concentrations for biochemical oxygen demand (BOD), total suspended solids (TSS), nitrogen, phosphorus, chloride, sulphate, oil and grease, total VOCs, and pathogens.

- The Metcalf and Eddy reference provides typical concentrations for low, medium, and high strength wastewater, based on approximate wastewater per capita flow rates. (Appendix I indicates the medium and high strength concentrations from this reference.)

- Ideally, sampling results for domestic wastewater information from a wide range of Canadian municipalities would be used to compare limits established in the previous steps of this methodology to typical domestic wastewater concentrations. However, based on communication with the Project Steering Committee, it is understood that information from various municipalities has not been consolidated to date.

Step 6 - Consider maximum discharge concentration that will provide protection against inhalation health risk exposure to sewer and wastewater treatment plant workers. Lower the limit where required.

- Health and safety considerations take priority over treatability limits determined through Best Demonstrated Available Technologies (BDAT). If the health and safety concentration limit for a parameter is lower than the limit established in Step 2, adopt the lower concentration limit.

- The draft Ministry of the Environment (MOE) Document entitled "*Indirect Industrial Discharge Limits for Volatile Organic Compounds*" was used as a reference.

Step 7 – Identify the 10x method detection limit (MDL). Raise the limit where required.

- If the 10xMDL is higher than the concentration limit identified in the previous steps, adopt the 10xMDL limit.

- The adoption of the 10x MDL ensures that sampling results are legally defensible in court.

- Two reference sources were used for collection of 10xMDL concentrations:

    - City of Toronto Wastewater Quality Laboratories - 2006 MDLs.[25] Rationale: this is a large laboratory located in a municipality with a comprehensive sewer use bylaw. The laboratory is assumed to be equipped with advanced testing equipment and methods Winnipeg has used the Toronto Wastewater Laboratories MDLs for guidance in their 2006 bylaw review currently underway.
    - The Ontario MOE Publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (MOE, 1999). Rationale: this is an older reference document that may be used in cases where no Toronto MDL exists, and a MDL is available in the MOE document. It has been referenced by Winnipeg, and Ottawa (2004). Based on communication with the Canadian Association for Environmental Analytical Laboratories (CAEAL)[26], no similar guidance document exists at the national level. Through the CAEAL website, there is a listing of laboratories which test for various parameters, however, these labs are not required to post their method detection limits. Substances tested by laboratories will vary by lab, by province, and between facilities within cities.

Step 8 – Use other available sources.

- For those parameters for which there is insufficient information to establish a concentration limit using the first six steps of this approach, other information sources will be examined. Specifically two information sources will be referenced:
    - The database of concentration limits collected on 27 Canadian municipality bylaws; and
    - The database of the characteristics of substances, as documented in the spreadsheet for the long list of substances.

- Firstly, examine limits in existing bylaws surveyed and select a concentration limit based on rationale from the municipality or professional judgment where rationale is not available.

- Where existing bylaws surveyed do not identify the parameter, one of two paths will be recommended, based on the characteristics of the substance:
    - Inclusion on the Prohibited Substances list
    - Exclusion from the Model Sewer Use Bylaw.

[25] MDLs for this study were based on personnel communication with Raymond McCurdy, City of Toronto Wastewater Laboratories, March 2006. MDLs not available on line at the time of this report.

[26] Personal communication with Ken Middlebrook, CAEAL, March 8, 2005

APPENDIX I
Limits for the Core Substance List

							Refer to Marbek (2006) Summary Document for detailed description of the Method of Approach to Establishing Limits													
				Reason for Inclusion in Core Group of Substances for Model Sewer Use Bylaw			STEP 1		STEP 2	STEP 3	STEP 4		STEP 5		STEP 6	STEP 7		STEP 8	RESULT			
Substance	**Schedule 1 - CEPA (November 30, 2005 version)**	**Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**	**Level I or Level II Canada-US Binational Toxics Strategy (1997)**	**Inhibits Wastewater Treatment - effect on activated sludge processes (Note 1) + chloride, sulphate, sulphide, ammonia (Note 2)**	**Worker Safety - 10 VOCs noted in Draft OMOE Document "Indirect Industrial Discharge Limits for VOCs" (1997) for Worker Safety + ammonia, H2S, cyanide (Note 3)**	**Biosolids Protection (Note 4)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (FRESHWATER) (Note 5)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (MARINE) (Note 5)**	**Best Demonstrated Appropriate Technology (BDAT) (Note 6)**	**Threshold Inhibitory Effect for Activated Sludge Treatment (Note 1)**	**Canadian Guidelines for Drinking Water Quality (Maximum Acceptable Concentration) (Note 7)**	**Canadian Guidelines for Drinking Water Quality (Aesthetic Objectives) (Note 7)**	**Medium Strength Untreated Domestic Wastewater (Note 8)**	**High Strength Untreated Domestic Wastewater (Note 8)**	**Worker Protection (Note 3, Note 9)**	**MOE Jan. 1999 Method Detection Limit (MDL) (Note 10)**	**City of Toronto Wastewater Quality Laboratory 2006 Method Detection Limit (MDL) (Note 11)**	**Limits, as per other municipal bylaws**	**Preliminary Concentration Limit**	**Units**	**Summary Rationale for Concentration Limit, as per approach utilized to establishing limit**	**Comments**
Ammonia	CEPA-Sch.1			Inhibitory inorganic compound on biological process	Worker safety parameter		0.019 as unionized ammonia	-	-	-	-	-	25	45	24 (per Vancouver 2001 Discharge Limit Evaluation Doc, however, not in bylaw)	0.25 as Nitrogen	0.008		24	mg/L	Worker safety, as per Vancouver 2001 Draft No. 1 Discharge Limit Evaluation Document.	Not included in Vancouver final Bylaw, based on rationale that in neutral to acidic wastewater, ammonia gas is not of concern. However, pH of wastewater could be >7. Therefore, proposed for Core Group.
Arsenic	CEPA-Sch.1			Inhibitory effect on activated sludge		OMOE Biosolids Parameter	0.005	0.0125	5	0.1	0.025	-	-	-	-	0.005	0.006		0.1	mg/L	Threshold inhibitory effect on activated sludge treatment	Range of 0.4 - 1 mg/L in bylaws reviewed.
Benzene	CEPA-Sch.1			Inhibitory effect on activated sludge	OMOE - VOC limit for worker safety		0.37	0.11	0.14	125	0.005	-	-	-	0.01	0.0005	0.001		0.01	mg/L	Worker safety	Included in Core Group for worker safety.
Benzidine and benzidine dihydrochloride	CEPA-Sch.1			Inhibitory effect on activated sludge			-	-	-	5 (benzidine only)	-	-	-	-	-	-	-		-	mg/L		**Insufficient info to establish limit**

				Reason for Inclusion in Core Group of Substances for Model Sewer Use Bylaw			Refer to Marbek (2006) Summary Document for detailed description of the Method of Approach to Establishing Limits													
							STEP 1		STEP 2	STEP 3	STEP 4		STEP 5		STEP 6	STEP 7		STEP 8	RESULT			
Substance	**Schedule 1 - CEPA (November 30, 2005 version)**	**Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**	**Level I or Level II Canada-US Binational Toxics Strategy (1997)**	**Inhibits Wastewater Treatment - effect on activated sludge processes (Note 1) + chloride, sulphate, sulphide, ammonia (Note 2)**	**Worker Safety - 10 VOCs noted in Draft OMOE Document "Indirect Industrial Discharge Limits for VOCs" (1997) for Worker Safety + ammonia, H2S, cyanide (Note 3)**	**Biosolids Protection (Note 4)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (FRESHWATER) (Note 5)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (MARINE) (Note 5)**	**Best Demonstrated Appropriate Technology (BDAT) (Note 6)**	**Threshold Inhibitory Effect for Activated Sludge Treatment (Note 1)**	**Canadian Guidelines for Drinking Water Quality (Maximum Acceptable Concentration) (Note 7)**	**Canadian Guidelines for Drinking Water Quality (Aesthetic Objectives) (Note 7)**	**Medium Strength Untreated Domestic Wastewater (Note 8)**	**High Strength Untreated Domestic Wastewater (Note 8)**	**Worker Protection (Note 3, Note 9)**	**MOE Jan. 1999 Method Detection Limit (MDL) (Note 10)**	**City of Toronto Wastewater Quality Laboratory 2006 Method Detection Limit (MDL) (Note 11)**	**Limits, as per other municipal bylaws**	**Preliminary Concentration Limit**	**Units**	**Summary Rationale for Concentration Limit, as per approach utilized to establishing limit**	**Comments**
Biochemical Oxygen Demand							-	-	-	-	-	-	190	350	-	2	1	300 - 600	300	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. 300 mg/L is medium/high strength untreated domestic wastewater concentration; limit in 3 provincial bylaws reviewed; and common limit in municipal bylaws. Municipal range 300 - 600 mg/L. Overstrength agreements for higher limits.
Cadmium	CEPA-Sch.1	Tier II COA	Level II Binational Toxics	Inhibitory effect on activated sludge		OMOE Biosolids Parameter	0.000017	0.00012	0.2	1	0.005	-	-	-	-	0.002	0.0003		0.2	mg/L	BDAT	Range from prohibited to 4 mg/L in bylaws reviewed.
Chloride				Inhibitory inorganic compound on biological process			-	-	-	-	-	<=250	50	90	-	2	0.01	1500	1500	mg/L	Municipal bylaws reviewed.	Limit of 1500 mg/L in all bylaws w/ limit.
Chloroform					OMOE - VOC limit for worker safety		0.0018	-	0.046	-	0.1 (total THMs)	-	-	-	0.04	0.0005	0.0005		0.04	mg/L	Worker safety	
Chromium (total)				Inhibitory effect on activated sludge		OMOE Biosolids Parameter	-	-	0.37	-	0.05	-	-	-	-	0.01	0.0003		0.37	mg/L	BDAT	This is an order of magnitude lower than bylaws reviewed. Range of 1 - 5 mg/L in bylaws w/ limits, with Cr prohibited in 1 bylaw.

				Reason for Inclusion in Core Group of Substances for Model Sewer Use Bylaw			Refer to Marbek (2006) Summary Document for detailed description of the Method of Approach to Establishing Limits													
							STEP 1		STEP 2	STEP 3	STEP 4		STEP 5		STEP 6	STEP 7		STEP 8	RESULT			
Substance	**Schedule 1 - CEPA (November 30, 2005 version)**	**Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**	**Level I or Level II Canada-US Binational Toxics Strategy (1997)**	**Inhibits Wastewater Treatment - effect on activated sludge processes (Note 1) + chloride, sulphate, sulphide, ammonia (Note 2)**	**Worker Safety - 10 VOCs noted in Draft OMOE Document "Indirect Industrial Discharge Limits for VOCs" (1997) for Worker Safety + ammonia, H2S, cyanide (Note 3)**	**Biosolids Protection (Note 4)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (FRESHWATER) (Note 5)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (MARINE) (Note 5)**	**Best Demonstrated Appropriate Technology (BDAT) (Note 6)**	**Threshold Inhibitory Effect for Activated Sludge Treatment (Note 1)**	**Canadian Guidelines for Drinking Water Quality (Maximum Acceptable Concentration) (Note 7)**	**Canadian Guidelines for Drinking Water Quality (Aesthetic Objectives) (Note 7)**	**Medium Strength Untreated Domestic Wastewater (Note 8)**	**High Strength Untreated Domestic Wastewater (Note 8)**	**Worker Protection (Note 3, Note 9)**	**MOE Jan. 1999 Method Detection Limit (MDL) (Note 10)**	**City of Toronto Wastewater Quality Laboratory 2006 Method Detection Limit (MDL) (Note 11)**	**Limits, as per other municipal bylaws**	**Preliminary Concentration Limit**	**Units**	**Summary Rationale for Concentration Limit, as per approach utilized to establishing limit**	**Comments**
Cobalt						OMOE Biosolids Parameter	-	-	-	-	-	-	-	-	-	0.01	0.0006	5 mg/L - all bylaws w/ limit	5	mg/L	Municipal bylaws reviewed.	
Copper				Inhibitory effect on activated sludge		OMOE Biosolids Parameter	0.002-0.004	-	1.3	1	-	<=1.0	-	-	-	0.01	0.0004		1	mg/L	Threshold inhibitory effect on activated sludge treatment	
Cyanide				Inhibitory effect on activated sludge	Worker safety parameter		0.005 as free CN-	-	-	0.1	0.2	-	-	-	1.0 as total CN (per Vancouver 2001 Discharge Limit Evaluation Doc)	0.005 as HCn	0.056 as total CN		1.0 as total Cn	mg/L	Worker safety, as per Vancouver 2001 Discharge Limit Evaluation Document.	
Dichlorobenzene (1,2-)				Inhibitory effect on activated sludge			0.0007	0.042	0.088	5	0.2	<=0.003	-	-	-	0.0005	0.0005		0.088	mg/L	BDAT	
Dichlorobenzene (1,4)		Tier II COA	Level II Binational Toxics	Inhibitory effect on activated sludge	OMOE - VOC limit for worker safety		0.026	-	0.09	5	0.005	<=0.001	-	-	0.47	0.0005	0.0005		0.09	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Ethylbenzene					OMOE - VOC limit for worker safety		0.09	0.025	0.057	-	-	<= 0.0024	-	-	0.16	0.0005	0.001		0.057	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Hexachlorobenzene	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Inhibitory effect on activated sludge			-	-	0.055	5	-	-	-	-	-	0.00001	-		0.055	mg/L	BDAT	Contained in two bylaws reviewed. Range from prohibited to 0.0001 mg/L in bylaws.
Lead	CEPA-Sch.1			Inhibitory effect on activated sludge		OMOE Biosolids Parameter	0.001-0.007	-	0.28	0.1	0.01	-	-	-	-	0.02	0.002		0.1	mg/L	Threshold inhibitory effect on activated sludge	Lower than majority of bylaws reviewed. Range of 0.2 - 5.0 mg/L in bylaws with limits.

				Reason for Inclusion in Core Group of Substances for Model Sewer Use Bylaw			Refer to Marbek (2006) Summary Document for detailed description of the Method of Approach to Establishing Limits														
							STEP 1		STEP 2	STEP 3	STEP 4		STEP 5		STEP 6	STEP 7		STEP 8	RESULT			
Substance	**Schedule 1 - CEPA (November 30, 2005 version)**	**Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**	**Level I or Level II Canada-US Binational Toxics Strategy (1997)**	**Inhibits Wastewater Treatment - effect on activated sludge processes (Note 1) + chloride, sulphate, sulphide, ammonia (Note 2)**	**Worker Safety - 10 VOCs noted in Draft OMOE Document "Indirect Industrial Discharge Limits for VOCs" (1997) for Worker Safety + ammonia, H2S, cyanide (Note 3)**	**Biosolids Protection (Note 4)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (FRESHWATER) (Note 5)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (MARINE) (Note 5)**	**Best Demonstrated Appropriate Technology (BDAT) (Note 6)**	**Threshold Inhibitory Effect for Activated Sludge Treatment (Note 1)**	**Canadian Guidelines for Drinking Water Quality (Maximum Acceptable Concentration) (Note 7)**	**Canadian Guidelines for Drinking Water Quality (Aesthetic Objectives) (Note 7)**	**Medium Strength Untreated Domestic Wastewater (Note 8)**	**High Strength Untreated Domestic Wastewater (Note 8)**	**Worker Protection (Note 3, Note 9)**	**MOE Jan. 1999 Method Detection Limit (MDL) (Note 10)**	**City of Toronto Wastewater Quality Laboratory 2006 Method Detection Limit (MDL) (Note 11)**	**Limits, as per other municipal bylaws**	**Preliminary Concentration Limit**	**Units**	**Summary Rationale for Concentration Limit, as per approach utilized to establishing limit**	**Comments**
																					treatment	
Mercury	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Inhibitory effect on activated sludge		OMOE Biosolids Parameter	0.000026	0.000016	0.15	0.1	0.001	-	-	-	-	0.0001	0.00001		0.1	mg/L	Threshold inhibitory effect on activated sludge treatment	Range of 0.005 - 0.1 mg/L in bylaws reviewed. T.O. is 0.01 mg/L, The ISO standard 11143 for amalgam separators does not set out any specification for measuring the mercury content of effluent water nor is the mercury content of influent or effluent water mentioned at any point in the specification.
Methylene chloride (dichloromethane)	CEPA-Sch.1				OMOE - VOC limit for worker safety		0.0981	-	0.089	-	0.05	-	-	-	0.21	0.0013	0.0006		0.0981	mg/L	CWQG	Included for worker safety. Worker safety limit is less stringent than CWQG limit. Use CWQG limit.
Molybde-num						OMOE Biosolids Parameter	0.073	-	-	-	-	-	-	-	-	0.01	0.0005	5 mg/L - Toronto	5	mg/L	Municipal bylaws reviewed.	Protect biosolids quality.
Nickel	CEPA-Sch.1			Inhibitory effect on activated sludge		OMOE Biosolids Parameter	0.025 - 0.150	-	0.55	1	-	-	-	-	-	0.02	0.0006		0.55	mg/L	BDAT	Lower than majority of bylaws reviewed. Range of 0.5 - 5.0 mg/L in bylaws with limits.
Nitrogen, Total Kjeldahl							-	-	-	-	-	-	40	70	-	0.25 as Nitrogen	0.16	50 - 100	70	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. High-strength untreated domestic ww concentration - 70 mg/L. Range of 50 - 100 mg/L in bylaws with limits.
Oil and grease - animal and vegetable							-	-	-	-	-	-	-	-	-	1	-		85	mg/L	O & G limit (total) minus O & G (mineral and synthetic)	

				Reason for Inclusion in Core Group of Substances for Model Sewer Use Bylaw			Refer to Marbek (2006) Summary Document for detailed description of the Method of Approach to Establishing Limits													
							STEP 1		STEP 2	STEP 3	STEP 4		STEP 5		STEP 6	STEP 7		STEP 8	RESULT			
Substance	**Schedule 1 - CEPA (November 30, 2005 version)**	**Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**	**Level I or Level II Canada-US Binational Toxics Strategy (1997)**	**Inhibits Wastewater Treatment - effect on activated sludge processes (Note 1) + chloride, sulphate, sulphide, ammonia (Note 2)**	**Worker Safety - 10 VOCs noted in Draft OMOE Document "Indirect Industrial Discharge Limits for VOCs" (1997) for Worker Safety + ammonia, H2S, cyanide (Note 3)**	**Biosolids Protection (Note 4)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (FRESHWATER) (Note 5)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (MARINE) (Note 5)**	**Best Demonstrated Appropriate Technology (BDAT) (Note 6)**	**Threshold Inhibitory Effect for Activated Sludge Treatment (Note 1)**	**Canadian Guidelines for Drinking Water Quality (Maximum Acceptable Concentration) (Note 7)**	**Canadian Guidelines for Drinking Water Quality (Aesthetic Objectives) (Note 7)**	**Medium Strength Untreated Domestic Wastewater (Note 8)**	**High Strength Untreated Domestic Wastewater (Note 8)**	**Worker Protection (Note 3, Note 9)**	**MOE Jan. 1999 Method Detection Limit (MDL) (Note 10)**	**City of Toronto Wastewater Quality Laboratory 2006 Method Detection Limit (MDL) (Note 11)**	**Limits, as per other municipal bylaws**	**Preliminary Concentration Limit**	**Units**	**Summary Rationale for Concentration Limit, as per approach utilized to establishing limit**	**Comments**
Oil and grease - mineral and synthetic							-	-	-	-	-	-	-	-	-	1	1.5	15 mg/L - Toronto	15	mg/L	Municipal bylaws reviewed.	Specific limit required to control discharge of mineral and synthetic O&G
Oil and grease (total)							-	-	-	-	-	-	90	100	-	1	1.9	100 - 150	100	mg/L	Municipal bylaws reviewed.	High-strength domestic wastewater concentration - 100 mg/L. Range of 100 - 150 mg/L in bylaws reviewed. Overstrength agreements for higher limits.
PCBs (chlorobiphenyls)	CEPA-Sch.1	Tier I COA	Level I Binational Toxics				-	-	-	-	-	-	-	-	-	0.00005	0.0004 as Total PCBs	Prohibited - various bylaws	0.004	mg/L	10x City of Toronto Laboratory MDL	Toronto limit is 0.001 mg/L; several bylaws list PCBs as prohibited.
pH (unitless)							6.5 - 9	7.0 - 8.7	-	-	-	6.5 - 8.5	-	-	-	-	-	6.0 - 11.5 - Toronto	6.0 - 11.5	Unitless	Model provincial bylaws and other municipal bylaws reviewed.	Worker safety and infrastructure protection
Phenols, Total (or Phenolic compounds)				Inhibitory effect on activated sludge			0.004 (mono- & dihydric)	-	0.039 (as Phenol)	200 (as Phenol)	-	-	-	-	-	0.002 (as Phenol)	0.0001	0.05 - 50	1	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Range of 0.05 - 50 mg/L in bylaws reviewed. Common limit of 1 mg/L in 12 bylaws with total phenol limit.
Phosphorus (total)							Depends on water body quality	-	-	-	-	-	7	12	-	0.1	0.01	10 - 100	12	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. Range of 10 - 100 mg/L in bylaws reviewed. 12 mg/L high strength untreated domestic wastewater concentration. Overstrength agreements for higher limits.
Selenium						OMOE Biosolids Parameter	0.001	-	0.82	-	0.01	-	-	-	-	0.005	0.009		0.82	mg/L	BDAT	

							Refer to Marbek (2006) Summary Document for detailed description of the Method of Approach to Establishing Limits														
				Reason for Inclusion in Core Group of Substances for Model Sewer Use Bylaw			STEP 1		STEP 2	STEP 3	STEP 4		STEP 5		STEP 6	STEP 7		STEP 8	RESULT			
Substance	**Schedule 1 - CEPA (November 30, 2005 version)**	**Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**	**Level I or Level II Canada-US Binational Toxics Strategy (1997)**	**Inhibits Wastewater Treatment - effect on activated sludge processes (Note 1) + chloride, sulphate, sulphide, ammonia (Note 2)**	**Worker Safety - 10 VOCs noted in Draft OMOE Document "Indirect Industrial Discharge Limits for VOCs" (1997) for Worker Safety + ammonia, H2S, cyanide (Note 3)**	**Biosolids Protection (Note 4)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (FRESHWATER) (Note 5)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (MARINE) (Note 5)**	**Best Demonstrated Appropriate Technology (BDAT) (Note 6)**	**Threshold Inhibitory Effect for Activated Sludge Treatment (Note 1)**	**Canadian Guidelines for Drinking Water Quality (Maximum Acceptable Concentration) (Note 7)**	**Canadian Guidelines for Drinking Water Quality (Aesthetic Objectives) (Note 7)**	**Medium Strength Untreated Domestic Wastewater (Note 8)**	**High Strength Untreated Domestic Wastewater (Note 8)**	**Worker Protection (Note 3, Note 9)**	**MOE Jan. 1999 Method Detection Limit (MDL) (Note 10)**	**City of Toronto Wastewater Quality Laboratory 2006 Method Detection Limit (MDL) (Note 11)**	**Limits, as per other municipal bylaws**	**Preliminary Concentration Limit**	**Units**	**Summary Rationale for Concentration Limit, as per approach utilized to establishing limit**	**Comments**
Silver				Inhibitory effect on activated sludge			0.0001	-	0.29	5	-	-	-	-	-	0.01	0.0003		0.29	mg/L	BDAT	Several bylaws have adopted limit order of magnitude higher.Range of 0.5 - 5.0 mg/L in bylaws reviewed.
Sulphates as SO4				Inhibitory inorganic compound on biological process			-	-	-	-	-	<=500	30	50	-	5	0.03	1500 mg/L - all bylaws w/ limit	1500	mg/L	Provincial and municipal bylaws reviewed.	Sulphate limit of 1500 mg/L is protective of concrete sewer pipe, as per Vancouver January 2002 Draft No. 2 Discharge Limit Evaluation Document.
Sulphide (as H2S)				Inhibitory inorganic compound on biological process	Worker safety parameter		-	-	14 (assume as S 2-)	-	-	<=0.05 as H2S	-	-	0.3 (per Vancouver 2001 Discharge Limit Evaluation Doc)	0.02 as H2S	0.005		0.3 as H2S	mg/L	Worker safety, as per Vancouver rationale in Draft 2001 Rationale Doc.	Limit of 1.0 mg/L (as S 2-) adopted by Vancouver to "maintain level playing field with other jurisdictions" (per Draft No. 2 - 2002 Revised Vancouver Document)
Suspended Solids, Total							-	-	-	-	-	-	210	400	-	3	2	300 - 600	300	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. Medium - high strength domestic ww concentration - 300 mg/L. Range of 300 - 600 mg/L in bylaws reviewed. Overstrength agreements for higher limits.
Temperature (degrees C)							Narrative only	< +/-1C	-	-	-	<=15 degrees C	-	-	-	-	-	60 Deg C - Toronto	60	Degrees C	Protection of infrastructure	
Tetrachloroethane (1,1,2,2 -)					OMOE - VOC limit for worker safety		-	-	0.057	-	-	-	-	-	0.04	0.001	-		0.04	mg/L	Worker safety	
Tetrachloroethylene	CEPA-Sch.1				OMOE - VOC limit for worker safety		0.111	-	0.056	-	0.03	-	-	-	0.05	0.0005	0.0006		0.05	mg/L	Worker safety	

				Reason for Inclusion in Core Group of Substances for Model Sewer Use Bylaw			Refer to Marbek (2006) Summary Document for detailed description of the Method of Approach to Establishing Limits													
							STEP 1		STEP 2	STEP 3	STEP 4		STEP 5		STEP 6	STEP 7		STEP 8	RESULT			
Substance	**Schedule 1 - CEPA (November 30, 2005 version)**	**Tier I or Tier II Canada Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2002)**	**Level I or Level II Canada-US Binational Toxics Strategy (1997)**	**Inhibits Wastewater Treatment - effect on activated sludge processes (Note 1) + chloride, sulphate, sulphide, ammonia (Note 2)**	**Worker Safety - 10 VOCs noted in Draft OMOE Document "Indirect Industrial Discharge Limits for VOCs" (1997) for Worker Safety + ammonia, H2S, cyanide (Note 3)**	**Biosolids Protection (Note 4)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (FRESHWATER) (Note 5)**	**Canadian Water Quality Guidelines for Protection of Aquatic Life (MARINE) (Note 5)**	**Best Demonstrated Appropriate Technology (BDAT) (Note 6)**	**Threshold Inhibitory Effect for Activated Sludge Treatment (Note 1)**	**Canadian Guidelines for Drinking Water Quality (Maximum Acceptable Concentration) (Note 7)**	**Canadian Guidelines for Drinking Water Quality (Aesthetic Objectives) (Note 7)**	**Medium Strength Untreated Domestic Wastewater (Note 8)**	**High Strength Untreated Domestic Wastewater (Note 8)**	**Worker Protection (Note 3, Note 9)**	**MOE Jan. 1999 Method Detection Limit (MDL) (Note 10)**	**City of Toronto Wastewater Quality Laboratory 2006 Method Detection Limit (MDL) (Note 11)**	**Limits, as per other municipal bylaws**	**Preliminary Concentration Limit**	**Units**	**Summary Rationale for Concentration Limit, as per approach utilized to establishing limit**	**Comments**
Toluene					OMOE - VOC limit for worker safety		0.002	0.215	0.08	-	-	<=0.024	-	-	0.27	0.0005	0.002		0.08	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Trichloroethylene	CEPA-Sch.1				OMOE - VOC limit for worker safety		0.021	-	0.054	-	0.05	-	-	-	0.07	0.0005	0.0006		0.054	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Xylenes (total)					OMOE - VOC limit for worker safety (o-xylene)		-	-	0.32	-	-	<=0.3	-	-	0.52 (for o-xylene)	0.0005	-		0.32	mg/L	Worker safety	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Zinc				Inhibitory effect on activated sludge		OMOE Biosolids Parameter	0.03	-	1	0.03	-	<= 5.0	-	-	-	0.01	0.002		0.03	mg/L	Threshold inhibitory effect on activated sludge treatment	

See Notes to Appendix I on next page

NOTES TO APPENDIX I

(1) Listed in Table 13 - 2005 Hydromantis et. Al report "Tasks 2 and 3: Review of Existing and Emerging Technologies" as having a threshold inhibitory effect on activated sludge processes. CCME proposed standard is secondary treatment or equivalent. Further sludge and liquid treatment process requirements not defined to date. Refer to report for other substances listed as having an inhibitory effect on anaerobic digestion and nitrification processes.

(2) Draft OMOE 1989 Development Document for 1988 Model Sewer Use By-law, as 1 of 14 metals and inorganic compounds able to inhibit biological treatment processes (organics not considered)

(3) Greater Vancouver Regional District, Policy & Planning Department. (September 2001). GVRD Sewer Use Bylaw Review: Background Paper and Recommendations – Discharge Limit Evaluation (DRAFT No. 1). Greater Vancouver Regional District, Policy & Planning Department. (January 2002). GVRD Sewer Use Bylaw Review: Background Paper and Recommendations – Discharge Limit Evaluation (DRAFT No. 2).

(4) Ontario Ministry of the Environment. (1996). Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land

(5) Canadian Council of Ministers of the Environment. (2005). Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Table. Updated 2005. Winnipeg, CCME.

(6) United States Environmental Protection Agency, Centre for Environmental Research Information. (January 1995). Manual: Groundwater and Leachate Treatment Systems. Cincinnati, Ohio 45268. EPA/625/R-94/005.

(7) Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment. (2004). Summary of Guidelines for Canadian Drinking Water Quality.

(8) Metcalf & Eddy. (2003). Wastewater Engineering, Treatment and Reuse. Fourth Edition. McGraw Hill.

(9) Ontario Ministry of the Environment. Prepared by M.B. Campbell, Urban and Rural Section. (November 1996, Revised July 1997). Indirect Industrial Discharge Limits for Volatile Organic Compounds. DRAFT.

(10) Ontario Ministry of the Environment. (1999). Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater. Municipal/Industrial Strategy for Abatement (MISA). Toronto, Queens Printer.

(11) Personnel communication with Raymond McCurdy, City of Toronto Wastewater Laboratories, March 2006.

APPENDIX J
Simplified Database of Core Substances, Preliminary Limits and Rationale for Substance Inclusion in the Core List

Main Class	Substance	Preliminary Concentration Limit	Units	Summary Rationale for Concentration Limit, as per approach utilized to establishing limit	Comments
Inorganic	Ammonia	24	mg/L	Worker safety, as per Vancouver 2001 Draft No. 1 Discharge Limit Evaluation Document.	Not included in Vancouver final Bylaw, based on rationale that in neutral to acidic wastewater, ammonia gas is not of concern. However, pH of wastewater could be >7. Therefore, proposed for Core Group.
Inorganic	Arsenic	0.1	mg/L	Threshold inhibitory effect on activated sludge treatment	Range of 0.4 - 1 mg/L in bylaws reviewed.
Inorganic	Cadmium	0.2	mg/L	BDAT	Range from prohibited to 4 mg/L in bylaws reviewed.
Inorganic	Chloride	1500	mg/L	Municipal bylaws reviewed.	Limit of 1500 mg/L in all bylaws w/ limit.
Inorganic	Chromium (total)	0.37	mg/L	BDAT	This is an order of magnitude lower than bylaws reviewed. Range of 1 - 5 mg/L in bylaws w/ limits, with Cr prohibited in 1 bylaw.
Inorganic	Cobalt	5	mg/L	Municipal bylaws reviewed.	
Inorganic	Copper	1	mg/L	Threshold inhibitory effect on activated sludge treatment	
Inorganic	Cyanide	1.0 as total Cn	mg/L	Worker safety, as per Vancouver 2001 Discharge Limit Evaluation Document.	
Inorganic	Lead	0.1	mg/L	Threshold inhibitory effect on activated sludge treatment	Lower than majority of bylaws reviewed. Range of 0.2 - 5.0 mg/L in bylaws with limits.

Main Class	Substance	Preliminary Concentration Limit	Units	Summary Rationale for Concentration Limit, as per approach utilized to establishing limit	Comments
Inorganic	Mercury	0.1	mg/L	Threshold inhibitory effect on activated sludge treatment	Range of 0.005 - 0.1 mg/L in bylaws reviewed. T.O. limit is 0.01 mg/L. The ISO standard 11143 for amalgam separators does not set out any specification for measuring the mercury content of effluent water nor is the mercury content of influent or effluent water mentioned at any point in the specification.
Inorganic	Molybdenum	5	mg/L	Municipal bylaws reviewed.	Protect biosolids quality.
Inorganic	Nickel	0.55	mg/L	BDAT	Lower than majority of bylaws reviewed. Range of 0.5 - 5.0 mg/L in bylaws with limits.
Inorganic	Nitrogen, Total Kjeldahl	70	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. High-strength untreated domestic ww concentration - 70 mg/L. Range of 50 - 100 mg/L in bylaws with limits.
Inorganic	Phosphorus (total)	12	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. Range of 10 - 100 mg/L in bylaws reviewed. 12 mg/L high strength untreated domestic wastewater concentration. Overstrength agreements for higher limits.
Inorganic	Selenium	0.82	mg/L	BDAT	

Main Class	Substance	Preliminary Concentration Limit	Units	Summary Rationale for Concentration Limit, as per approach utilized to establishing limit	Comments
Inorganic	Silver	0.29	mg/L	BDAT	Several bylaws have adopted limit order of magnitude higher.Range of 0.5 - 5.0 mg/L in bylaws reviewed.
Inorganic	Sulphates as SO4	1500	mg/L	Provincial and municipal bylaws reviewed.	Sulphate limit of 1500 mg/L is protective of concrete sewer pipe, as per Vancouver January 2002 Draft No. 2 Discharge Limit Evaluation Document.
Inorganic	Sulphide (as H2S)	0.3 as H2S	mg/L	Worker safety, as per Vancouver rationale in Draft 2001 Rationale Doc.	Limit of 1.0 mg/L (as S^{2-}) adopted by Vancouver to "maintain level playing field with other jurisdictions" (per Draft No. 2 - 2002 Revised Vancouver Document)
Inorganic	Zinc	0.03	mg/L	Threshold inhibitory effect on activated sludge treatment	
Conventional Parameter	Biochemical Oxygen Demand	300	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. 300 mg/L is medium/high strength untreated domestic wastewater concentration; limit in 3 provincial bylaws reviewed; and common limit in municipal bylaws. Municipal range 300 - 600 mg/L. Overstrength agreements for higher limits.
Conventional Parameter	Oil and grease - animal and vegetable	85	mg/L	O & G limit (total) minus O & G (mineral and synthetic)	
Conventional Parameter	Oil and grease - mineral and synthetic	15	mg/L	Municipal bylaws reviewed.	Specific limit required to control discharge of mineral and synthetic O&G

Main Class	Substance	Preliminary Concentration Limit	Units	Summary Rationale for Concentration Limit, as per approach utilized to establishing limit	Comments
Conventional Parameter	Oil and grease (total)	100	mg/L	Municipal bylaws reviewed.	High-strength domestic wastewater concentration - 100 mg/L. Range of 100 - 150 mg/L in bylaws reviewed. Overstrength agreements for higher limits.
Conventional Parameter	Suspended Solids, Total	300	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Conventional parameter commonly monitered at wastewater treatment facilities. Medium - high strength domestic wastewater concentration - 300 mg/L. Range of 300 - 600 mg/L in bylaws reviewed. Overstrength agreements for higher limits.
Organic	Benzene	0.01	mg/L	Worker safety	Included in Core Group for worker safety.
Organic	Benzidine and benzidine dihydrochloride	-	mg/L	Insufficient information to establish limit	Included in Core Group for inhibitory effect on activated sludge treatment
Organic	Chloroform	0.04	mg/L	Worker safety	
Organic	Dichlorobenzene (1,2-)	0.088	mg/L	BDAT	
Organic	Dichlorobenzene (1,4)	0.09	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Organic	Ethylbenzene	0.057	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Organic	Hexachlorobenzene	0.055	mg/L	BDAT	Contained in two bylaws reviewed. Range from prohibited to 0.0001 mg/L in bylaws.
Organic	Methylene chloride (dichloromethane)	0.0981	mg/L	CWQG	Included for worker safety. Worker safety limit is less

Main Class	Substance	Preliminary Concentration Limit	Units	Summary Rationale for Concentration Limit, as per approach utilized to establishing limit	Comments
					stringent than CWQG limit. Use CWQG limit.
Organic	PCBs (chlorobiphenyls)	0.004	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Toronto limit is 0.001 mg/L; several bylaws list PCBs as prohibited.
Organic	Phenols, Total (Phenolic compounds)	1	mg/L	Model provincial bylaws and other municipal bylaws reviewed.	Range of 0.05 - 50 mg/L in bylaws reviewed. Common limit of 1 mg/L in 12 bylaws with total phenol limit.
Organic	Tetrachloroethane (1,1,2,2 -)	0.04	mg/L	Worker safety	
Organic	Tetrachloroethylene	0.05	mg/L	Worker safety	
Organic	Toluene	0.08	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Organic	Trichloroethylene	0.054	mg/L	BDAT	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Organic	Xylenes (total)	0.32	mg/L	Worker safety	Included for worker safety. Worker safety limit is less stringent than BDAT limit. Use BDAT limit.
Physical	pH (unitless)	6.0 - 11.5	Unit-less	Model provincial bylaws and other municipal bylaws reviewed.	Worker safety and infrastructure protection
Physical	Temperature (degrees C)	60	Deg-rees C	Protection of infrastructure	

Notes:

BDAT – Best Demonstrated Available Technology. United States Environmental Protection Agency, Centre for Environmental Research Information. (January 1995). *Manual: Groundwater and Leachate Treatment Systems.* Cincinnati, Ohio 45268. EPA/625/R-94/005.

Appendix K
Substances for Discussion by the Development Committee

Substance	Schedule 1 – CEPA (November 30, 2005 version)	Tier I or Tier II Canada Ontario Agreement (2002)	Level I or Level II Canada-US Binational Toxics Strategy (1997)	Substance Group (Pesticide, Chlorinated phenol, PAH, Dioxin/Furan) (Consider grouping individual parameters in the respective categories together, and setting a total limit for the respective category *Note: some individual parameters are noted based on screening-in criteria for the Master List, however, the full listing of individual parameters to be included in each category needs to be defined)
Master List Substances for Discussion – (i.e. CEPA Schedule 1, Tier 1 COA, and Level 1 Binational Toxic Strategy Substances not in the Core List)				
Acetaldehyde	CEPA-Sch.1			
Acrolein	CEPA-Sch.1			
Acrylonitrile	CEPA-Sch.1			
Aldrin/dieldrin		Tier I COA	Level I Binational Toxics	Pesticide
Alkyl-lead		Tier I COA	Level I Binational Toxics	
Benzo(a)pyrene		Tier I COA	Level I Binational Toxics	PAH
Bis(2-ethylhexyl)phthalate	CEPA-Sch.1			
Bis(chloromethyl) ether	CEPA-Sch.1			
Bromochlorodifluoromethane	CEPA-Sch.1			
Bromochloromethane	CEPA-Sch.1			
Bromotrifluoromethane	CEPA-Sch.1			
Butadiene (1,3-)	CEPA-Sch.1			
Butoxyethanol (2-) (ethylene glycol monobutyl ether)	CEPA-Sch.1			
Carbon tetrachloride (tetrachloromethane)	CEPA-Sch.1			
Chlordane		Tier I COA	Level I Binational Toxics	Pesticide
Chloromethyl methyl ether	CEPA-Sch.1			
Chromium (hexavalent)	CEPA-Sch.1			Captured under total Cr
DDT	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Pesticide
Dibenzofuran	CEPA-Sch.1			Dioxin/Furan
Dibenzo-para-dioxin	CEPA-Sch.1			Dioxin/Furan
Dibromotetrafluoroethane	CEPA-Sch.1			
Dichlorobenzidine (3,3' -) (3,3-dichlorobenzene)	CEPA-Sch.1	Tier II COA	Level II Binational Toxics	
Dichloroethane (1,2-)	CEPA-Sch.1			
Fluoride	CEPA-Sch.1			

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Formaldehyde	CEPA-Sch.1			
Hexachlorobutadiene (hexachloro-1-3-butadiene)	CEPA-Sch.1		Level II Binational Toxics	
Methoxyethanol (2-)	CEPA-Sch.1			
Methyl bromide	CEPA-Sch.1			
Mirex	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Pesticide
N-nitrosodimethylamine	CEPA-Sch.1			
Nonylphenol	CEPA-Sch.1			
Nonylphenol thoxylates	CEPA-Sch.1			
Octachlorostyrene		Tier I COA	Level I Binational Toxics	
PAHs	CEPA-Sch.1	Tier II COA	Level II Binational Toxics	PAH
PCDD (Dioxins)	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Dioxin/Furan
PCDF (Furans)	CEPA-Sch.1	Tier I COA	Level I Binational Toxics	Dioxin/Furan
Pentachlorobenzene	CEPA-Sch.1		Level II Binational Toxics	
Polybrominated biphenyls	CEPA-Sch.1			
Polychlorinated terphenyls	CEPA-Sch.1			
Tetrachlorobenzene (1,2,3,4- and 1,2,4,5-)	CEPA-Sch.1		Level II Binational Toxics	
Toxaphene		Tier I COA	Level I Binational Toxics	
Tributyltetradecylphosphonium chloride	CEPA-Sch.1			
Trichloroethane (1,1,1-) (methyl chloroform)	CEPA-Sch.1			
Vinyl chloride (chloroethylene)	CEPA-Sch.1			

APPENDIX L
Other Substances for Consideration by Municipalities in Sewer Use Bylaws

Substance	Schedule 1 – CEPA (November 30, 2005 version)	Tier I or Tier II Canada Ontario Agreement (2002)	Level I or Level II Canada-US Binational Toxics Strategy (1997)	Substance Group (Pesticide, Chlorinated phenol, PAH, Dioxin/Furan) (Consider grouping individual parameters in the respective categories together, and setting a total limit for the respective category *Note: some individual parameters are noted based on screening-in criteria for the Master List, however, the full listing of individual parameters to be included in each category needs to be defined)
Additional substances included in the Master List and not in the Core List (Refer to rationale for inclusion indicated in the Master List Spreadsheet)				
2,4-D				Pesticide
Aluminum				
Anthracene		Tier II COA	Level II Binational Toxics	PAH
Benzo(a)anthracene		Tier II COA	Level II Binational Toxics	PAH
Boron				
Chemical Oxygen Demand				
Chlorinated paraffins				
Chlorophenol (Phenols, chlorinated)				Pesticide/Chlorinated Phenol
Chromium (trivalent)				Captured under total Cr
Dichloroethylene (Cis-1,2-)				
Dichlorophenol (2,4-)				Pesticide/Chlorinated phenol
Dichloropropylene (Trans-1,3-)				Pesticide
Di-n-butyl phthalate				
Dinitropyrene		Tier II COA	Level II Binational Toxics	
Endosulfan				Pesticide
Endrin			Level II Binational Toxics	Pesticide
Fluoranthene				PAH
Fluorene				PAH
Heptachlor (+heptachlor epoxide)			Level II Binational Toxics	Pesticide
Iron				
Lindane (Hexachlorocyclohexane)		Tier II COA	Level II Binational Toxics	Pesticide
MCPA				Pesticide
Methylenebis (4,4-) (2-chloraniline)		Tier II COA	Level II Binational Toxics	
Nitrate				
Pentachlorophenol		Tier II COA	Level II Binational Toxics	Pesticide/Chlorinated phenol
Phenanthrene		Tier II COA	Level II Binational Toxics	PAH

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Phenolics (4AAP - specific compound)				Captured under total Phenols
Pyrene				PAH
Quinoline				
Thallium				
Tin				
Titanium (total)				
Tributyl tin		Tier II COA	Level II Binational Toxics	
Trichlorophenoxyacetic acid (2,4,5-)				Pesticide
Xylene (o-)				Captured under Xylenes