

**CITY OF HAMILTON**

***PUBLIC WORKS DEPARTMENT  
Water and Wastewater Division***

<b>Report to:</b> Mayor and Members Committee of the Whole	<b>Submitted by:</b> Scott Stewart, C.E.T. General Manager Public Works Department
<b>Date:</b> June 19, 2006	<b>Prepared by:</b> Dale Millar Extension 2671

**SUBJECT: Sewer Use By-law 04-150 Review - Phase 2 and Phase 3  
(PW04050b) - (City Wide)**

---

**RECOMMENDATION:**

- (a) That the discharge limits for the treatable parameters identified under Phase 2 of the Sewer Use By-law Limit Discharge Review and as described in Report PW04050b remain unchanged in Sewer Use By-law 04-150, as amended ("Sewer Use By-law 04-150").
- (b) That the inclusion of organic compounds and the associated discharge limits recommended for all non-treatable parameters under Phase 3 of the Sewer Use By-law Limit Discharge Review, as described in Report PW04050b be incorporated in Sewer Use By-law 04-150.
- (c) That Sewer Use By-law 04-150 be amended to implement the new parameter discharge limits contained in subsection (b), in a form satisfactory to the City Solicitor.

---

Scott Stewart, C.E.T.  
General Manager  
Public Works

**EXECUTIVE SUMMARY:**

A review of the discharge limits contained in the City of Hamilton's Sewer Use By-law was undertaken following a three phase approach. Reports PW04050 and PW04050a addressed Phase 1 of the review and dealt with the parameters of Chlorides and Sulphates, as well as with general housekeeping issues. The proposed changes resulting from that Phase 1 review were approved by City Council and incorporated into

**SUBJECT: Sewer Use By-law 04-150 Review - Phase 2 and Phase 3 - (PW04050b) - (City Wide) - Page 2 of 7**

the current Sewer Use By-law, now being Sewer By-law No. 04-150, as amended (“Sewer Use By-law 04-150”).

Staff have reviewed the treatable/controllable parameters under Phase 2 and non-treatable parameters including metals and organics under Phase 3. The results of these reviews are provided in this report.

As was the case with the Phase 1 Review, the Phases 2 and 3 Review assessed the impact of discharge parameters to the receiving environment including Hamilton Harbour and Lake Ontario; the wastewater treatment plants’ operations and their treatment capabilities; the sewer infrastructure; quantity and quality of biosolids; and health and safety of sewage works employees. The study included a technical and scientific review and evaluation of identified parameters with respect to relevant regulations, guidelines, and goals. A comparison of other municipalities’ Sewer Use By-laws was also conducted particularly the By-laws of Toronto and Kingston that have sensitive areas of concern similar to Hamilton Harbour. See Appendices A, B and C.

Phase 2 of the review recommends the existing treatable/controllable parameter discharge limits in the City’s Sewer Use By-law should remain unchanged.

Phase 3 of the review proposes that six of the metal parameter discharge limits in the existing Sewer Use By-law should be lowered and that all other non-treatable parameter discharge limits should remain unchanged. Further, the Phase 3 review recommends that 27 organic parameters and associated discharge limits should be introduced into the By-law.

**BACKGROUND:**

The discharge of wastewater into the sanitary, combined, and storm sewer systems of the City of Hamilton is governed by the policies and procedures outlined in Sewer Use By-law 04-150. The By-law defines the characteristics of wastewater that are acceptable for discharge to sanitary, combined, and storm sewers by stipulating maximum levels for specific parameters, identification of wastes defined through Provincial legislation that are not acceptable for discharge, and specific criteria that need to be achieved for several special waste types.

The By-law limits were originally based on the Ontario Ministry of the Environment, 1988 Model Sewer Use By-law. To assess if the parameter limits were still valid, the City retained a consultant, Conestoga Rovers & Associates, to perform a full review of the By-law in 2002. Conestoga Rovers & Associates developed a work program to conduct a Sewer Use By-law discharge limit review/study for the City. The proposed program was created in a three-phase approach, each phase consisting of a literature search, a detailed study of the wastewater treatment system, and data assessment/reporting. Phase 1 of this review was completed and the proposed changes were incorporated into the By-law in 2004 as indicated in reports PW04050 and PW04050a. Phase 2, dealing with treatable/controllable parameters, and Phase 3, dealing with non-treatable parameters were completed in late 2005. Following the completion of the reports, Public Information sessions were held to allow for public input.

**SUBJECT: Sewer Use By-law 04-150 Review - Phase 2 and Phase 3 - (PW04050b) - (City Wide) - Page 3 of 7**

To ensure a thorough review of all possible parameter impacts, using the same approach as that used for Phase I, the following five areas were assessed:

- Sewer infrastructure;
- Wastewater Treatment Plant (WWTP) operations and treatability;
- Quantity and quality of biosolids;
- Health and safety of sewer and WWTP workers; and
- Receiving environment.

The impact(s) of each parameter on the five areas noted above were assessed by reviewing:

- Historical City data from the components of the system where applicable, for example, the lab data of the influent and effluent of the three WWTPs (Dundas, Waterdown and Woodward);
- Evaluating each parameter with respect to relevant Provincial and Federal regulations, guidelines, and goals such as the Ontario Drinking Water Standards; Canadian Environmental Protection Act and the Canadian Water Quality Objectives;
- Comparison of Sewer Use By-law 04-150 with other municipal sewer use by-laws. (Please see Appendices A, B and C); and
- A technical and scientific literature review of each parameter and potential impacts on the system.

Based on all of the information gathered, the final recommendations on parameter discharge limits were made. Full details of the review and recommendations can be found in the two technical reports provided by Conestoga Rovers & Associates titled, "Phase II Sewer Use By-law Limit Discharge Review" and "Phase III Sewer Use By-law Limit Discharge Review".

**ANALYSIS/RATIONALE:**

The recommendations contained within this report have City wide implications.

Phase 2 - Treatable/Controllable Parameter Assessment

The focus of Phase 2 of the Sewer Use By-law 04-150 assessment was on parameters generally degraded or removed in conventional municipal wastewater treatment operations.

These parameters will be referred to as treatable parameters and include:

- i. animal and plant oil and grease;
- ii. biochemical oxygen demand;
- iii. total suspended solids;
- iv. total phosphorus;
- v. total Kjeldahl nitrogen; and
- vi. phenols.

The following parameters, although not treatable parameters, were also included under the Phase 2 review as they can be controlled to some extent in the wastewater treatment process:

- i. mineral and synthetic oil and grease;
- ii. pH; and

**SUBJECT: Sewer Use By-law 04-150 Review - Phase 2 and Phase 3 -  
(PW04050b) - (City Wide) - Page 4 of 7**

iii. temperature.

The treatable parameters were assessed individually with respect to their potential impacts on the five areas of impact which include sewer infrastructure; Wastewater Treatment Plant (WWTP) operations and treatability; quantity and quality of biosolids, health, and safety of sewer and WWTP workers; and the receiving environment.

The assessment was performed by a consultant and based on potential impacts and a comparison to selected sewer use by-laws of other municipalities (see Appendix A), the proposed recommendations are to maintain the current By-law discharge limits for the above-noted parameters.

Phase 3 - Non-treatable Parameter Assessment

The focus of Phase 3 of the Sewer Use By-law 04-150 assessment was on parameters that are not degraded, transformed or removed in conventional wastewater treatment. The primary consideration for these parameters was therefore on impacts to the environment from effluent discharges to receiving waters and the utilization of biosolids such as the application on agricultural land. The parameters were selected based on the existence of current discharge limits either for the City of Hamilton or for other selected municipalities, the relevance of the parameter to the City of Hamilton situation, or if the presence of the parameter in the environment is a developing issue or one of increasing importance.

Metals are typically found in municipal wastewater at trace to low concentration levels and are conserved in the wastewater treatment process with the predominant fate of almost all metals being removal bound to biosolids. The major sources of discharges of several metals are industrial effluents; however, a significant source of some metals are domestic effluents as trace quantities can be found in a variety of food and household products.

The proposed recommendation is to lower the discharge limits for the following metals:

- i. Cadmium current limit of 1 mg/L be lowered to 0.7 mg/L;
- ii. Copper current limit of 3 mg/L be lowered to 2 mg/L;
- iii. Lead current limit of 5 mg/L to be lowered to 2 mg/L;
- iv. Mercury current limit of 0.1 mg/L be lowered to 0.01 mg/L;
- v. Molybdenum current limit of 5 mg/L be lowered to 1 mg/L;
- vi. Nickel current limit of 3 mg/L be lowered to 2 mg/L;
- vii. Selenium current limit of 5 mg/L be lowered to 1 mg/L.

The rationale for lowering the discharge limits of these specific metals came from consideration of the following factors: review of scientific and technical literature to assess potential impacts to the City's wastewater treatment and receiving environment; comparisons of current levels of the parameters in the City's three Wastewater Treatment Plant influents and effluents to relevant criteria, guidelines, standards, and goals; and comparison of discharge limits to sewer use by-laws for other municipalities (see Appendix B). For a detailed listing of the effects of each change and the benefits to the above criteria, please refer to the CRA Report.

It is recommended that the rest of the metals considered in the Phase 3 review maintain the current discharge limits contained in the Sewer Use By-law 04-150.

**SUBJECT: Sewer Use By-law 04-150 Review - Phase 2 and Phase 3 -  
(PW04050b) - (City Wide) - Page 5 of 7**

Also, it is recommended that Total Cyanide and Fluoride limits remain unchanged. The rationale behind this recommendation is consistency with the other selected sewer use by-laws, which have remained constant (see Appendix B). As such, it was inferred that there were no new additional issues concerning the levels of these parameters in municipal wastewater.

The recommendation to include select organic compounds was based on the potential for impacts to the receiving environment. Municipal wastewaters can contain a variety of persistent organic compounds typically at trace concentrations originating from domestic and commercial/industrial discharges. These compounds are generally slow to degrade or are not degraded in the wastewater treatment process and ultimately are released to the environment. The inclusion of discharge limits for these parameters in some of the selected sewer use by-laws of other municipalities (see Appendix C) was interpreted that reducing the levels of these substances given their persistence and potential for toxic effects when released to the environment is a recognized issue of concern and one of increasing importance.

Based on potential impacts identified above, it is recommended that the following organic compounds and associated discharge limits be included in the Sewer Use By-law:

- i. Benzene - 0.01 mg/L;
- ii. Chloroform - 0.04 mg/L;
- iii. 1,2-Dichlorobenzene - 0.05 mg/L;
- iv. 1,4-Dichlorobenzene - 0.08 mg/L;
- v. Cis-1,2-dichloroethylene - 4 mg/L;
- vi. Trans-1,3-dichloropropylene - 0.14 mg/L;
- vii. Ethylbenzene - 0.16 mg/L;
- viii. Methylene Chloride - 2 mg/L;
- ix. 1,1,2,2 Tetrachloroethane - 1.4 mg/L;
- x. Tetrachloroethylene - 1 mg/L;
- xi. Toluene - 0.016 mg/L;
- xii. Trichloroethylene - 0.4 mg/L;
- xiii. Total Xylenes - 1.4mg/L;
- xiv. Di-n-butyl phthalate - 0.08 mg/L;
- xv. Bis (2-ethylhexyl) phthalate - 0.012 mg/L;
- xvi. Aldrin/Dieldrin - 0.0002 mg/L;
- xvii. Chlordane - 0.1 mg/L;
- xviii. DDT - 0.0001 mg/L;
- xix. Hexachlorobenzene - 0.0001 mg/L;
- xx. Mirex - 0.1 mg/L;
- xxi. PCBs - 0.001 mg/L;
- xxii. 3-3-dichlorobenzidine - 0.002 mg/L;
- xxiii. Hexachlorocyclohexane - 0.1 mg/L;
- xxiv. Pentachlorophenol - 0.005 mg/L;
- xxv. Total PAHs - 0.005 mg/L.

**SUBJECT: Sewer Use By-law 04-150 Review - Phase 2 and Phase 3 -  
(PW04050b) - (City Wide) - Page 6 of 7**

**ALTERNATIVES FOR CONSIDERATION:**

The alternative available to the City of Hamilton is to leave the Sewer Use By-law 04-150 unchanged. By doing so the City's By-law would not be up to the current standards set by other municipal sewer use by-laws. In keeping all of the metal limits the same there is impacts to the biosolids created at the City's wastewater treatment plants as the majority of metals in wastewater treatment are taken up in the biosolids. Finally, if organic parameters continue to not be regulated in the Sewer Use By-law, there will continue to be negative impacts to receiving waters.

**FINANCIAL/STAFFING/LEGAL IMPLICATIONS:**

Financial/Staffing

The recommended changes to the Sewer Use By-law, specifically the addition of organic parameters, will create the need for additional wastewater sampling and laboratory analysis to be performed by Public Works staff.

Legal

If the recommendations contained in this report are approved, the Sewer Use By-law 04-150 will need to be amended.

**POLICIES AFFECTING PROPOSAL:**

The City policy that influenced the review was Vision 2020.

**RELEVANT CONSULTATION:**

Seven public open houses were held in October 2005. The open houses were each two hours in length and were held in the following locations: Hamilton City Hall, the Ancaster Community Centre/Rotary Centre, Sackville Hill Seniors Centre, and the Municipal Services Centres of Dundas, Flamborough, Glanbrook, and Stoney Creek. In addition to City staff, the consultant retained to perform the By-law review attended all of the open houses.

Participants at the open houses provided comments which were reviewed and considered by City staff. The main comments received dealt with possible impacts on industry and the health and safety of City staff.

Input was received from the following City Departments:

Public Health Services - Health Protection was consulted and indicated support for the findings in the report. They also recommended a commitment be made to implement an industrial pollution prevention program. This program is being developed.

Public Works - Waste Management was also consulted. They retained a consultant to complete a respirometry study on landfill leachate from five City landfills **which currently discharge to the City's sanitary sewer system**. The results of the study indicate there are no concerns regarding the acceptance of landfill leachate at the Woodward Avenue Wastewater Treatment Facility

City Manager's Office - Legal Services Division commented on the report and gave input with respect to legal issues.

**SUBJECT: Sewer Use By-law 04-150 Review - Phase 2 and Phase 3 -  
(PW04050b) - (City Wide) - Page 7 of 7**

**CITY STRATEGIC COMMITMENT:**

By evaluating the “**Triple Bottom Line**”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

**Community Well-Being is enhanced.**  **Yes**  **No**

The proposed recommendations allow the City to better control the discharge of the parameters indicated which contributes to better water quality for consumption and recreational purposes.

**Environmental Well-Being is enhanced.**  **Yes**  **No**

The proposed recommendations allow the City to monitor and control these parameters to protect the receiving environment.

**Economic Well-Being is enhanced.**  **Yes**  **No**

The proposed recommendations help ensure discharges to the City of Hamilton’s sewer system do not cause costly plant upsets. The quality of the biosolids is also protected so the City can continue to land apply biosolids and not be forced to use more expensive disposal options.

**Does the option you are recommending create value across all three bottom lines?**

**Yes**  **No**

The option does create value across all three bottom lines as noted above.

**Do the options you are recommending make Hamilton a City of choice for high performance public servants?**

**Yes**  **No**

The option recommended does make Hamilton a City of choice for high performance public servants as City staff would be more effective in managing the allowable discharges to the City’s infrastructure and thus provide better protection for the wastewater treatments plants and their staff as well as the environment.

PW04050(B) - Appendix "A"

COMPARISON OF SEWER USE BY-LAW DISCHARGE LIMITS

<i>Parameter (mg/L) <sup>(1)</sup></i>	<i>Hamilton (Proposed 2006)</i>	<i>Hamilton (1989)</i>	<i>Toronto (2002)</i>	<i>Windsor (1993)</i>	<i>Kingston (2000)</i>	<i>Halton Region <sup>(2)</sup> (proposed 2002)</i>	<i>Region of Waterloo (1992)</i>	<i>Vancouver Regional District (Proposed 2001)</i>	<i>MOE 1988 Model</i>	<i>MOE 1998 Model <sup>(2)</sup> (proposed)</i>
Oil & Grease – animal and vegetable	150	150	150	120	150	150	100	150 (300, 600) <sup>(3,4)</sup>	150	150
Oil & Grease – mineral and synthetic	15	15	15		15	15	15	15 <sup>(5)</sup>	15	15
Biochemical Oxygen Demand	300	300	300	400	300	300	300	500	300	300
Total Phosphorus	10	10	10	30	10	10	10	NV <sup>(6)</sup>	10	10
Total Suspended Solids	350	350	350	500	350	350	350	600 (1200, 2400) <sup>(5)</sup>	350	350
Total Kjeldahl Nitrogen	100	100	100	100	100	100	100	NV	NV	100
Phenols	1	1	1	1	1	1	1	1	1	1
pH	5.5 to 9.5	5.5 to 9.5	6 to 11.5	5.5 to 10.5	6 to 10.5	6 to 10	5.5 to 9.5	5.5 to 12	6 to 10.5	6 to 11.5
Temperature (°C)	65	65	60	65	60	65	65	65		60

Notes:

1. all parameter values in mg/L unless indicated otherwise
2. draft By-Law
3. defined as total oil and grease

4. defined as hydrocarbon oil and grease
5. 2 hour composite and grab sample
6. no value

PW04050(B) - Appendix "B"

COMPARISON OF SEWER USE BY-LAW DISCHARGE LIMITS FOR METALS AND ANIONS

<i>Parameter (mg/L) <sup>(1)</sup></i>	<i>Hamilton (Proposed 2006)</i>	<i>Hamilton (1989)</i>	<i>Toronto (2002)</i>	<i>Windsor (1993)</i>	<i>Kingston (2000)</i>	<i>Halton Region <sup>(3)</sup> (proposed 2002)</i>	<i>Region of Waterloo (1992)</i>	<i>Vancouver Regional District (Proposed 2001)</i>	<i>MOE 1988 Model</i>	<i>MOE 1998 Model <sup>(3)</sup> (proposed)</i>
Aluminum	50	50	50	50	50	50	50	50		
Antimony	5	5	5	5 – 1 <sup>(2)</sup>	5	5	5	-	5	10
Arsenic	1	1	1	1	1	1	1	1	1	1
Bismuth	5	5	-	5 – 1	-	-	5	-		-
Cadmium	0.7	1	0.7	2 – 0.5	0.7	1	0.5	0.2	0.7	0.7
Total Chromium	5	5	2	5 – 1	4	3	5	4	5	5
Cobalt	5	5	5	5 – 1	5	5	5	5	5	5
Copper	2	3	2	5 – 1	5	3	3	2	3	3
Iron	50	50	-	-	-	50	50	10		-
Lead	2	5	1	5 – 1	1	3	5	1	2	2
Manganese	5	5	5	5 – 3	5	5	5	5		-
Mercury	0.01	0.1	0.01	0.1	0.01	0.05	0.1	0.05	0.05	0.05
Molybdenum	1	5	5	5 – 3	5	5	5	1	5	5
Nickel	2	3	2	5 – 1	2	3	3	2	3	3
Selenium	1	5	1	5 – 1	1	5	5	1	5	5
Silver	5	5	5	5 – 1	5	5	5	1	5	5
Tin	5	5	5	5 – 1	5	5	5	-	-	-
Titanium	5	5	5	5 – 1	5	5	5	-	-	-
Vanadium	5	5	-	5 – 1	-	-	5	-	-	-
Zinc	3	3	2	5 – 1	2	3	3	3	3	3
Cyanide	2	2	2	-	2	2	2	-	2	2
Fluoride	10	10	10	-	10	10	10	-	10	10

Notes:

1. Parameter units are mg/L

2. The first number in the range applies to discharge volumes equal to or less than 500,000 litres per day and the second number to volumes greater than 500,000 litres

3. Draft By-Law

## COMPARISON OF SEWER USE BY-LAW DISCHARGE LIMITS FOR ORGANIC COMPOUNDS

<i>Parameter (mg/L) <sup>(1)</sup></i>	<i>Hamilton (Proposed 2006)</i>	<i>Hamilton (1989)</i>	<i>Toronto (2002)</i>	<i>Windsor (1993)</i>	<i>Kingston (2000)</i>	<i>Halton Region <sup>(3)</sup> (proposed 2002)</i>	<i>Region of Waterloo (1992)</i>	<i>Greater Vancouver Regional District (Proposed 2001)</i>	<i>MOE 1988 Model</i>	<i>MOE 1998 Model <sup>(3)</sup> (proposed)</i>
Benzene	0.01	-	0.01	-	0.01	0.01	-	0.1	-	0.01
Chloroform	0.04	-	0.04	-	0.04	0.04	-	-	-	0.04
1,2-Dichlorobenzene	0.05	-	0.05	-	0.05	-	-	-	-	-
1,4-Dichlorobenzene	0.08	-	0.08	-	0.08	0.08	-	-	-	0.47
Cis-1,2-dichloroethylene	4	-	4	-	4	-	-	-	-	-
Trans-1,3-dichloropropylene	0.14	-	0.14	-	0.14	-	-	-	-	-
Ethylbenzene	0.16	-	0.16	-	0.16	0.16	-	-	-	0.16
Methylene Chloride	2	-	2	-	0.21	2	-	-	-	0.21
1,1,2,2-Tetrachloroethane	1.4	-	1.4	-	0.04	-	-	-	-	0.04
Tetrachloroethylene	1	-	1	-	0.05	1	-	-	-	0.05
Toluene	0.016	-	0.016	-	0.016	0.016	-	-	-	0.27
Trichloroethylene	0.4	-	0.4	-	0.07	0.4	-	-	-	0.07
Total Xylenes	1.4	-	1.4	-	0.94	-	-	-	-	0.52 (o-xylene)
Di-n-butyl phthalate	0.08	-	0.08	-	0.08	-	-	-	-	-
Bis (2-ethylhexyl) phthalate	0.012	-	0.012	-	0.012	-	-	-	-	-
Nonylphenols	-	-	0.001	-	0.001	-	-	-	-	-
Nonylphenol ethoxylates	-	-	0.01	-	0.01	-	-	-	-	-
Aldrin/Dieldrin	0.0002	-	0.0002	-	0.0002	-	-	-	-	-
Chlordane	0.1	-	0.1	-	0.1	-	-	-	-	-
DDT	0.0001	-	0.0001	-	0.0001	-	-	-	-	-
Hexachlorobenzene	0.0001	-	0.0001	-	0.0001	-	-	-	-	-
Mirex	0.1	-	0.1	-	0.1	-	-	-	-	-
PCBs	0.001	-	0.001	-	0.001	-	-	-	-	-
3-3-dichlorobenzidine	0.002	-	0.002	-	0.002	-	-	-	-	-
Hexachlorocyclohexane	0.1	-	0.1	-	0.1	-	-	-	-	-
Pentachlorophenol	0.005	-	0.005	-	0.005	-	-	-	-	-
Total PAHs	0.005	-	0.005	-	0.005	-	-	0.05	-	-
Total BTEX	-	-	-	-	-	-	-	1	-	-
Chlorophenols	-	-	-	-	-	-	-	0.05	-	-

## Notes:

1. Parameter units are mg/L
2. The first number in the range applies to discharge volumes equal to or less than 500,000 litres per day and the second number to volumes greater than 500,000 litres
3. Draft By-Law