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Note to readers

Toronto Public Health (TPH) began its work on the Environmental Reporting, Disclosure and Innovation Program in 2005. As the program has developed, TPH has released several reports about chemicals in our local environment, reviews of other reporting programs and laws, consultations with stakeholders, and early drafts of this program.

This report consolidates information presented in previous reports and presents the most up-to-date outline of an Environmental Reporting, Disclosure and Innovation Program for the City of Toronto. Previous descriptions of this program should be considered draft. They are available along with other background information at www.toronto.ca/health/hphe/enviro_info.htm.

Executive Summary

Community right-to-know programs exist around the world and collect and publish information about chemicals being used or released by facilities. These reporting programs supplement other regulations aimed at reducing or managing chemicals by providing valuable data to governments, informing the public and stimulating businesses to prevent pollution.

Toronto City Council has made commitments to develop community right-to-know strategies and support the “greening” of local businesses through the Environmental Plan, the Action Plan for Cancer Prevention in the City of Toronto, and most recently in the Climate Change, Clean Air and Sustainable Energy Action Plan.

Over the past three years, Toronto Public Health (TPH) has carefully considered the need for a local community right-to-know program. TPH has researched substances in our local environment and identified 25 substances commonly used by industrial, commercial and institutional facilities that are of health concern. Based on research of similar programs in Canada and other countries, TPH has identified important gaps in the reporting and disclosure of information on these substances. TPH has also consulted City staff, other governments, businesses, residents, agencies representing workers, and health and environmental organizations about options that could work in Toronto.

Based on this research and discussion, the Medical Officer of Health (MOH) recommends that the City of Toronto implement an Environmental Reporting, Disclosure and Innovation Program, including a bylaw, that would track and reduce key toxic substances present in Toronto’s environment, and especially its air. The proposed program would require local businesses and City operations to track and publicly report their use and release of 25 substances of priority health concern, and support them in finding ways to reduce these hazardous substances. TPH has developed the Environmental Reporting, Disclosure and Innovation Program to meet Toronto’s needs. It draws from successful reporting programs in Canada and the United States, such as Canada’s National Pollutant Release Inventory, Massachusetts’ Toxics Use Reduction Act and the Toxics Right-to-Know Bylaw in the town of Eugene, Oregon.

TPH and the Economic Development, Culture and Tourism (EDCT) Division will coordinate delivery of the program to the business community to accelerate implementation of environmental improvements, and stimulate innovation and growth of the green economy. TPH will also collaborate with other divisions including the Toronto Environment Office and Toronto Water, as well as Environment Canada, the provincial government, businesses and other stakeholders.

Stakeholder feedback indicates that residents, community organizations and worker agencies strongly support mandatory reporting and disclosure, while the business community tends to favour a voluntary approach. The MOH supports mandatory reporting to ensure that all affected facilities are engaged, and sufficient, reliable data are collected. Although the proposed Environmental Reporting, Disclosure and Innovation Program includes a bylaw, it reflects many of the business community’s suggestions for how best to implement the program in a way that minimizes burden and maximizes benefits for affected facilities. For example, reporting would be phased in over several years to enable TPH to inform smaller facilities about the chemicals and

how to track them. The program also includes web-based reporting and will help facilities learn new pollution prevention approaches.

The proposed program will complement – not duplicate – efforts at the federal, provincial and municipal level to reduce our exposure to chemicals in workplaces and our environment. TPH has reviewed existing regulations as well as the proposed framework for a new Ontario Toxics Reduction Strategy that was released by the provincial government in August 2008. The proposed provincial policy would require new data and planning regarding chemical usage, but has higher reporting thresholds than proposed in Toronto’s program and is aimed at a subset of the large manufacturing facilities currently covered by the NPRI. On its own, it would not collect the chemical data that Toronto needs nor would it engage the wider variety and smaller size of industries in our city. TPH therefore continues to see the need for the Environmental Reporting, Disclosure and Innovation Program to gather and disclose important data on local sources of pollution and assist Toronto’s businesses to make environmental improvements. TPH sees many common approaches and shared areas of interest between our local program and the provincial strategy, and will continue to work with provincial colleagues to identify opportunities for collaboration.

This technical report includes information on the rationale and benefits of the Environmental Reporting, Disclosure and Innovation Program and includes a draft bylaw, a phased-in implementation schedule, information on the 25 priority substances and a summary of recent stakeholder consultations.

Table of Contents

Executive Summary	i
1.0 Introduction	2
2.0 Background	3
3.0 Benefits of Local Reporting and Disclosure	5
3.1 Tracking substances of greatest health concern in Toronto	5
3.2 Stimulating facilities to pursue pollution prevention	6
3.3 Collecting important, local information that is currently not gathered	8
3.4 Complementing existing and proposed chemical regulations and initiatives	8
3.5 Contributing to the greening of our local economy	10
3.6 Encouraging ideas and environmental innovation	12
3.7 Providing local information to Torontonians	12
4.0 Overview of Stakeholder Consultation	13
4.1 Summary of feedback from January 2008 consultation	13
5.0 Overview of the Environmental Reporting, Disclosure and Innovation Program	15
6.0 A New Bylaw	15
6.1 Who has to report	17
6.2 Reporting Thresholds	17
7.0 Program Implementation	18
7.1 Training and supports for facilities	18
7.2 Phased-in Data Tracking and Reporting	19
7.3 Bylaw Enforcement	21
7.4 Data Reporting and Management	21
7.5 Disclosure of Information	22
7.6 Evaluation	22
8.0 Next Steps	23
Appendices.....	25
References	24
Appendix 1: Health Rationale for 25 Priority Chemical Substances	26
Appendix 2: Draft Environmental Reporting and Disclosure Bylaw	46
Appendix 3: Feedback from January 2008 Stakeholder Consultations	57
Appendix 4: Evaluation Framework for Environmental Reporting, Disclosure and Innovation Program	70

1.0 Introduction

Toronto City Council has made commitments to expand community right-to-know to empower the public to know the location, sources and health effects of toxic substances in our city. Following these commitments, the Board of Health recommended in 2005 that the Medical Officer of Health (MOH) explore community right-to-know strategies, including regulation, that the City could implement.

Following extensive research and consultation with stakeholders, the MOH supports new efforts in Toronto to lower our exposure to 25 priority substances that are used and released by industrial, commercial and institutional facilities. Toronto Public Health (TPH) has developed an Environmental Reporting, Disclosure and Innovation Program, which would require local businesses and City operations to track their use and release of these substances, publicly report them, and find ways to reduce their use and release. This report presents the rationale and implementation plan for an Environmental Reporting, Disclosure and Innovation Program, and includes a draft bylaw.

Reporting programs accompanied by support for companies to make environmental improvement, have been shown to reduce hazardous substances in the environment, foster business innovation and improve communication between facilities using chemicals and their neighbouring communities. TPH has incorporated many elements from successful reporting programs in Canada and the United States, and in particular will partner with Environment Canada to link reporting and data management to proven National Pollutant Release Inventory (NPRI) systems. The program also reflects many of the business community's suggestions to minimize burden for affected facilities, including training, web-based reporting and phased-in enforcement.

The proposed program would address many of the health challenges unique to an urban centre like Toronto. For example, the majority of facilities using or releasing the priority substances are small or medium-sized, and are located within or close to residential neighbourhoods. The long-term cumulative exposure to substances from many facilities in close proximity to where people live creates significant potential for adverse health impacts.

The program also delivers on the City's commitments laid out in its *Climate Change, Clean Air and Sustainable Energy Action Plan*. The plan includes commitments to new monitoring programs for toxic substances, increased public access to information about the use and release of substances, and expanded pollution prevention supports to stimulate the "greening" of local businesses and industry.

Under the Climate Change, Clean Air and Sustainable Energy Action Plan, TPH sees opportunities to align the Environmental Reporting, Disclosure and Innovation Program with other corporate initiatives through, for example, the routine exchange of information between City divisions, common messaging to the business community and consideration of economic incentives targeted to small and medium-sized businesses, particularly in our manufacturing sector.

2.0 Background

The Environmental Reporting, Disclosure and Innovation Program has its origins in the City's 2000 Environmental Plan, in which City Council unanimously recommended that Toronto develop a community right-to-know bylaw that empowers community members to know the location, sources and health effects of toxic substances in their community. A right-to-know strategy was also included in the 2002 "Action Plan for Cancer Prevention in the City of Toronto" adopted by Council that year.

At its January 17, 2005 meeting, the Board of Health recommended that the MOH consider practical and effective community right-to-know strategies, including regulation, that the City could implement.

On June 19, 2006, the MOH presented the Board with a report entitled "Access to Environmental Information: Preventing Pollution, Avoiding Risks" that reviewed opportunities for increasing access to information on chemicals. The MOH concluded that despite existing reporting regulations and voluntary programs, there is a significant lack of data on toxic chemical emissions from Toronto facilities, and that additional reporting could stimulate pollution prevention to reduce potential exposure to these substances. The Board of Health requested further work and consultation with stakeholders on options for future action.

In June 2007, City Council unanimously endorsed its Climate Change, Clean Air and Sustainable Energy Action Plan. This plan included a recommendation to "request the Board of Health to develop a proposed reporting program for the use and release of toxic air contaminants and explore the reporting of greenhouse gas emissions." The plan also included recommendations to support the greening of local businesses and industry.

The Board of Health recommended at its July 9, 2007 meeting that the MOH consult with the City Solicitor and key stakeholders and report on a proposed bylaw that would require facilities to report to the City on the use and emissions of specified substances of priority health concern.

Most recently, the MOH presented the elements of an Environmental Reporting, Disclosure and Innovation Program, including a draft bylaw, to the Board of Health at its July 3, 2008 meeting. The Board of Health supported the MOH's recommendation to await further details of the new provincial toxics strategy and requested an update on the Environmental Reporting, Disclosure and Innovation Program be presented in October 2008. The provincial government released its draft toxics reduction strategy in August 2008 and it is described in this report.

Community right-to-know programs exist around the world and collect and publish information about chemicals being used or released by facilities. These reporting programs complement other regulations aimed at reducing or managing chemicals by providing valuable data to governments, informing the public and stimulating businesses to prevent pollution.

Reporting programs can stimulate chemical reductions for several reasons. First, reporting requires facilities to carefully track chemicals. This provides a facility (a term that includes businesses, institutions and the City's own buildings) with detailed data to help them identify inefficiencies and opportunities for improvements. Secondly, governments and industry

associations commonly provide additional guidance to businesses to identify and implement measures to reduce chemicals or find safer alternatives. Finally, disclosing data introduces public scrutiny and enables communities to become informed and engaged in local health issues, which further motivates companies to reduce chemicals.

The National Pollutant Release Inventory (NPRI) is Canada's primary reporting program. The United States has a similar national Toxics Release Inventory (TRI). Some states (e.g. Massachusetts and New Jersey) and municipalities (New York City and Eugene, Oregon) also have reporting programs that go beyond national requirements. Examples of facilities reporting to the NPRI include factories, electricity generation facilities and the City's water and wastewater treatment plants.

Reporting programs can stimulate chemical reductions for several reasons. First, reporting requires facilities to carefully track chemicals. This provides a facility with detailed data to help them identify inefficiencies and opportunities for improvements. Secondly, governments and industry associations commonly provide additional guidance to businesses to identify and implement measures to reduce chemicals. Finally, disclosing data introduces public scrutiny and enables communities to become informed and engaged in local health issues, which further motivates companies to reduce chemicals.

In Canada, the NPRI has been credited with lowering emissions by 27 per cent (Harrison, K. and W. Antweiler, 2003) since it began in 1993. In the United States, emissions reported to the Toxics Release Inventory have decreased by 46 per cent between 1988 and 1999. The Massachusetts Toxics Use Reduction Act enabled the state to meet its goal of reducing toxic waste generation by 50 per cent in just 10 years (Massachusetts Department of Environmental Protection, 2003).

These successful programs, however, only track large facilities and emissions. In 2006, the most recent year for which data are available, only 352 Toronto facilities reported to the NPRI. Small and medium-sized facilities, which represent the majority of facilities in Toronto, do not report to the NPRI because current reporting thresholds are high.

In a large urban centre like Toronto it is important to consider the impact of total chemical emissions on human health. Although use or emissions of chemicals from individual small and medium-sized businesses may seem inconsequential or occur within existing standards, the long-term cumulative exposure to chemicals from many facilities in close proximity to where people live creates significant potential for adverse health impacts.

TPH has carefully considered the need for a local community right-to-know program. Over the past three years, TPH has researched chemicals in our local environment, researched similar programs in Canada and other countries, and consulted City staff, other governments, businesses, residents, agencies representing workers, and health and environmental organizations about options that could work in Toronto. Background information, including Board of Health reports and technical research, can be found at www.toronto.ca/health/hphe/enviro_info.htm.

In January 2008 the MOH released a framework for an Environmental Reporting, Disclosure and Innovation Program for public consultation. It proposed a new bylaw that would require local businesses and City operations to track and publicly report their use and release of 25 substances of priority health concern, and support for them to find ways to reduce these hazardous

substances. The MOH sought feedback on this approach, implementation issues, public disclosure and supports for affected businesses.

Throughout these consultations, stakeholders have communicated that for such a program to work, it must focus on substances of greatest health concern, minimize burden to affected facilities, ensure that the program supports business and the economic growth of Toronto, and provide public access to the information that is collected.

This report presents an Environmental Reporting, Disclosure and Innovation Program that reflects comments from stakeholders and research on approaches that will best address the health of Torontonians.

3.0 Benefits of Local Reporting and Disclosure

The Environmental Reporting, Disclosure and Innovation Program would have three key elements:

1. **Chemical use and emissions reporting.** A new bylaw would require affected facilities to report to the City each year if they use or release any of 25 priority substances above specified thresholds;
2. **Assistance for facilities.** The City would provide education programs, easy-to-understand reporting guidelines and tools to help facilities estimate data, report, and identify ways to reduce chemicals and prevent pollution; and
3. **Public access to information.** The City would make data available to businesses, governments, community agencies, workers and residents through a searchable website and annual summary reports.

This approach offers the City, its businesses and residents many benefits, including:

- tracking substances of greatest health concern in Toronto;
- stimulating facilities to pursue pollution prevention;
- complementing existing chemical regulations and initiatives;
- collecting important, local information that is currently not gathered;
- contributing to the greening of our local economy;
- encouraging ideas and environmental innovation; and
- providing local information to Torontonians.

3.1 Tracking substances of greatest health concern in Toronto

Although many chemicals are present in our environment from a variety of sources, the proposed program would focus on those that are of greatest concern for health in Toronto. TPH reviewed estimates of chemical emissions from facilities, local air quality data from Environment Canada and the Ministry of Environment, and referenced health benchmarks to identify 25 substances of priority health concern that would be tracked with this new program. These substances are identified in Figure 1. An Environmental Reporting, Disclosure and Innovation Program would collect important data that are currently missing for these substances. TPH estimates that in

Toronto, more than 80 per cent of emissions to air for TPH's 25 priority substances are not reported to the NPRI.

Figure 1: Priority substances to be tracked in the proposed program

Acetaldehyde	Formaldehyde
Acrolein	Lead
Benzene	Particulate matter 2.5 (PM _{2.5})
1,3-Butadiene	Manganese
Cadmium	Mercury
Carbon tetrachloride	Nickel
Chloroform	Nitrogen oxides (NO _x)
Chromium (hexavalent)	Polycyclic aromatic hydrocarbons (PAHs)
Chromium (non-hexavalent)	Tetrachloroethylene (perchloroethylene)
1,4-Dichlorobenzene	Trichloroethylene
1,2-Dichloroethane	Vinyl chloride
Dichloromethane	Volatile organic compounds (VOCs)
Ethylene dibromide	

These substances are commonly used in or released from industrial, commercial and institutional facilities, and occur in the Toronto environment at levels that may pose a risk to health. The potential health effects are most often associated with breathing in contaminated air. The effects of exposure differ from substance to substance but in general, concern about the health effects of exposure to air toxics arises from chronic (long-term) exposure potentially leading to serious health outcomes such as cancer and reproductive effects. In some cases the primary health concern may be associated with another route of exposure. Mercury, for example, is of primary concern to humans when it has accumulated in fish and the fish are then consumed by people. Appendix 1 summarizes TPH's approach to identifying these priority substances and provides an overview of each substance, its possible sources, routes of exposure, and the primary health outcomes from exposure.

3.2 Stimulating facilities to pursue pollution prevention

Pollution prevention refers to the use of processes and practices that minimize the creation of pollution or waste. It is more environmentally sustainable and economically beneficial than end-of-pipe measures that control pollution once it has been created.

For facilities using chemicals, pollution prevention strategies include substituting a less-toxic alternative for a hazardous substance, adjusting processes to use chemicals more efficiently, and recycling rather than disposing of chemicals. These strategies typically involve up-front investments but result in ongoing cost savings. Figure 2 presents two case studies of pollution prevention at Toronto companies.

Figure 2: Pollution prevention case studies

Bowne of Canada, Ltd.

Bowne of Canada, Ltd. of Toronto specializes in high-value document management and print solutions for financial and corporate clients across Canada. Its environmental review and process changes included:

- revisions to processes and investment in new equipment to minimize and recycle solvents used in washing and inks;
- annual reductions of 39,000 litres of chemicals, approximately 1,117,000 litres of water, and the elimination of 18 tonnes of VOCs; and
- eliminating Isopropyl Alcohol and exclusively using vegetable-based inks, which reduce its VOC emissions by 3,000 tonnes annually.

Through these changes, Bowne annually saves approximately \$143,000 in hazardous waste hauling charges, \$76,000 in chemicals purchase and \$1,400 in water charges.

S&C Electric Canada Ltd.

Since 1988, S&C Electric in Etobicoke used a hexavalent chrome seal in their paint-finishing operations to enhance corrosion protection. The company switched to a trivalent chrome seal in January 1999. This eliminated the need and expense of sodium metabisulfite to reduce the chrome and lowered their sulfuric acid usage by 82% and their caustic soda usage by 51% in their wastewater treatment operation. S&C also put in place systems to ensure environmental compliance and minimize internal resources for site inspections, which reduced resource time for on-site inspections and regulatory compliance. Also, there were fewer environmental, health and safety incidents.

Sources:

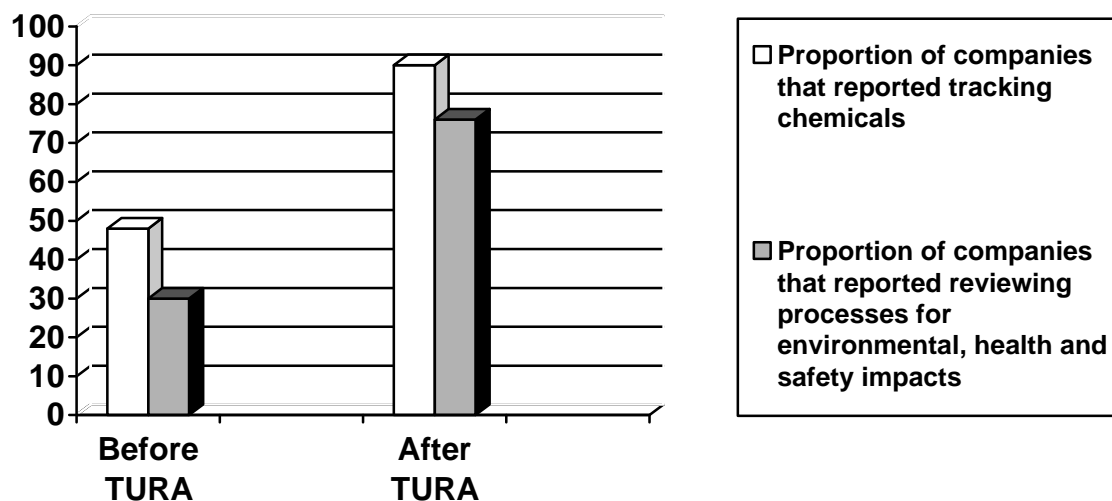
Bowne of Canada: <http://www.ec.gc.ca/pp/en/storyoutput.cfm?storyid=135>

S&C Electric: Canadian Manufacturers and Exporters <http://www.ic.gc.ca/epic/site/dir-ect.nsf/en/ww00951e.html>

Mandatory reporting often leads to the first ever assessment of chemical flows through a facility. This in turn can lead a facility to adopt environmentally-friendly technology and can often lead to cost savings and enhanced efficiency (United Nations Economic and Social Council, 2001). Reducing hazardous substances or substituting safer alternatives reduces costs associated with handling, disposal, worker health and safety and regulatory reporting.

The state of Massachusetts requires companies to report chemical use and release under its 1989 Toxic Use Reduction Act (TURA). In a 1996 survey of Massachusetts companies, 90 per cent reported that they were involved in tracking chemicals after TURA was in place, compared to 48 per cent before TURA (Abt Associates, 1997a), see Figure 3. Only 30 per cent of companies reported “reviewing changes in production processes for their environmental, health and safety impact” before TURA, but that proportion rose to 76 per cent after TURA was in place.

Figure 3: Change reported between 1990 and 1996 by Massachusetts companies as a result of the Massachusetts Toxics Use Reduction Act (TURA)¹



¹ Adapted from Abt Associates 1997a (Environment Canada 2006)

Helping small and medium-sized businesses to adopt pollution prevention is a key benefit of the Environmental Reporting, Disclosure and Innovation Program. Currently, many large companies that manufacture or handle chemicals have some tracking and pollution prevention programs in place. For the 2006 NPRI reporting year, approximately 30 per cent of the 9,000 Canadian facilities that reported indicated that they undertook some form of pollution prevention activity (Lopez, J et al., 2005). However, research and stakeholder feedback highlighted that small and medium-sized facilities often underestimate their environmental impact and seldom measure or track environmental data (Peters, Michael and R.K. Turner, 2004).

3.3 Collecting important, local information that is currently not gathered

The Environmental Reporting, Disclosure and Innovation Program would collect data on 25 priority substances from facilities in neighbourhoods throughout the city. No current or proposed regulations or voluntary initiatives provide such complete and systematic data.

The NPRI only provides regular and publicly accessible information from approximately 350 of the largest Toronto facilities, as would the proposed provincial toxics reduction strategy. By comparison, the Environmental Reporting, Disclosure and Innovation Program would track and disclose chemical use and emission data from 5,000 to 7,000 facilities of all sizes, which will help the City, residents and businesses measure progress in reducing pollution.

3.4 Complementing existing and proposed chemical regulations and initiatives

The proposed Environmental Reporting, Disclosure and Innovation Program would complement – not duplicate – reporting of existing federal, provincial and municipal regulations.

In June 2006, the MOH described how the program would fill important reporting gaps in chemical regulations in his report entitled, “Access to Environmental Information: Preventing Pollution, Avoiding Risks.” In response to perceptions about regulatory overlap identified during the January 2008 consultation, TPH contracted the Canadian Institute for Environmental Law and Policy (CIELAP) to review current and proposed chemical regulations. This review again confirmed no duplication in reporting. The CIELAP report can be found at www.toronto.ca/health/hphe/enviro_info.htm.

These reviews indicate that current NPRI reporting requirements offer the closest comparison to what TPH is proposing, and that the proposed Toronto approach deliberately mirrors aspects of the NPRI to avoid duplication for larger facilities. For NPRI reporters in Toronto, TPH would create a linkage with the federal One Window for National Environmental Reporting System (OWNERS) so reporting can be done simultaneously, without duplication. Some stakeholders specifically identified Ontario Environmental Protection Act requirements for facilities to possess Certificates of Approval (C of A) as an example of reporting overlap for air emissions. Most C of As require an annual status report to the province but do not require the detailed annual reporting of chemical usage and emissions that would be required under the proposed Toronto program.

TPH has also considered whether other chemical regulations to reduce priority substances overlap with the proposed Environmental Reporting, Disclosure and Innovation Program. TPH sees some common objectives but no overlap with certain policies. For example, federal regulations to minimize the use of tetrachloroethylene by drycleaners and minimize volatile organic compounds (VOCs) in certain products and processes will not address the full spectrum of facilities and sectors that may use and release VOCs and tetrachloroethylene in Toronto. Furthermore, the information that facilities collect under these federal requirements would help them to easily estimate usage and emissions for Toronto’s program. TPH would phase in its reporting requirements to allow collaboration with affected sectors to ensure integration with these federal programs.

On August 27, 2008, the Ontario government released a framework for a new provincial strategy to reduce the use and emissions of chemicals. The framework was posted for public review on the Environmental Registry and on the Ministry of Environment webpage at <http://www.ene.gov.on.ca/en/toxics/index.php>. As currently proposed, the provincial strategy would require facilities with 10 or more employees to publicly report chemical usage. Like the NPRI, reporting thresholds for most chemicals would be 10,000kg, with lower thresholds for some very toxic substances. The strategy would phase in reporting for approximately 475 substances and, for 320 of these substances, require facilities to prepare toxics reductions plans and disclose detailed “materials accounting” data on chemical inputs and outputs. The strategy would affect facilities involved in mining and certain manufacturing sectors. The provincial government is seeking input on this strategy, including the types of support facilities would find most helpful to reduce or eliminate these chemicals.

The proposed provincial strategy expands existing legislation in important ways, particularly by requiring tracking and disclosure of chemical usage, the development of toxics management plans, and by helping businesses make environmental improvements. However, by adopting the NPRI reporting thresholds and focusing on mining and manufacturing industries, it focuses only on certain large facilities with high chemical usage. This may be an appropriate province-wide policy, but its impact and benefits at an urban level such as Toronto’s would be limited. In effect, businesses most impacted will likely be a subset of the approximately 350 Toronto facilities that

currently report to the NPRI, so the program will neither sufficiently fill data gaps nor engage the majority of facilities in Toronto.

That said, the provincial strategy and the Environmental Reporting, Disclosure and Innovation Program share several key elements that would contribute to potential collaboration and mutual success. For example, both approaches aim to reduce the use and release of chemicals of concern, include education and capacity-building for businesses and will publicly disclose data. TPH and Ministry staff will continue to explore opportunities to collaborate on technical issues, education for facilities and the public, and supports for the business community.

3.5 Contributing to the greening of our local economy

A survey of companies participating in the Massachusetts Toxic Use Reduction Act (TURA) demonstrated economic benefits from environmental reporting and disclosure (see Table 1). Between 1990 and 1997, the total cost to all companies from TURA was estimated to be \$76.6 million and the total benefits to be \$90.5 million. This estimate did not include additional benefits, such as human health and ecological benefits from reducing chemical exposure, increased revenue to businesses, and the value of the TURA data to the public. At the facility level, only 40 per cent of facilities reporting to TURA experienced a change in overall costs as a result of TURA activities; of those, 64 per cent reported net reduction in costs, while 8 per cent reported a mix of increases and reductions.

In New Jersey, which has a state-wide reporting program, the Department of Environmental Protection has observed that environmental data saves most companies much more than it costs to collect (Natan, T. et al , 1996).

Table 1: Economic costs and benefits to facilities between 1990 and 1997 under Massachusetts Toxics Use Reduction Act¹

Costs*	
Compliance costs - includes form preparation, pollution prevention plan development, TURA fees	\$49.4 million
Capital investments	\$27.1 million
Total costs	\$76.6 million
Benefits*	
Savings in operating costs	\$88.2 million
Federal grants to TURA program for TUR activities in Massachusetts	\$ 2.3 million
Total benefits	\$90.5 million

¹Adapted from Abt Associates 1997b

*Includes only monetized costs and benefits

TPH recognizes that the economic benefits of pollution prevention typically necessitate some additional costs by facilities. Technological changes commonly require upfront investments that are paid off through increased efficiencies. The Toronto Region Sustainability Program, which helps manufacturers identify pollution prevention options, indicates significant return on investment, and a payback time from implementing certain improvements can be less than a year (Ontario Centre for Environmental Technology Advancement, 2005).

Facilities new to reporting may incur initial costs for estimating chemicals and reporting to the program. For national programs like the United States TRI and the Australian National Pollutant Inventory, estimates on the burden facilities bear to report to national programs vary from 1-8 hours per chemical, and hundreds of dollars for small facilities to an average of \$3,000 for larger companies (United States Environmental Protection Agency, 2005; Australian Department of Environment and Heritage, 2005). Experience indicates that costs decrease significantly after the first reporting year, as facilities become familiar with the reporting and submission process.

In comparison, the costs for reporting to the Environmental Reporting, Disclosure and Innovation Program are likely to be lower. Toronto's program is simpler than national programs, which track hundreds of chemicals from large operations and require lengthy and complex forms. Most facilities affected by the Environmental Reporting and Disclosure are smaller and likely to use or release up to four priority substances. TPH would aim to minimize any initial burden of reporting by supporting facilities throughout the process through guidance materials, workshops and web-based "calculators." The program is phased-in to allow facilities time to learn how to report.

There is no evidence from other reporting programs to indicate that reporting toxics use and release could hamper the City's strategic directions such as growth, creativity, labour force development, transportation, or promotion of Toronto. TPH will work closely with Economic Development, Culture and Tourism and other City divisions to coordinate the Environmental Reporting, Disclosure and Innovation Program with other new initiatives, such as the Climate Change, Clean Air and Sustainable Energy Action Plan, the Green Economic Development Strategy, the Prosperity Agenda and the Pearson Eco-Business Zone. All of these programs are examples of new initiatives that foster the growth of new "green" businesses, support environmental innovation, expand key industry sectors and enhance information sharing between businesses. The Environmental Reporting, Disclosure and Innovation Program could add value to these efforts in several ways:

- It would gather data on the 25 substances of greatest health concern, which could help identify priorities or opportunities for the City's other "greening" programs.
- It would collect data that will enable the City, businesses and the community to track environmental progress.
- It would engage the public in the greening of Toronto's economy. Public awareness on environmental issues and concerns over pollution and chemicals have increased demand for environmentally-friendly products and services. This demand provides incentives for local businesses, from large manufacturers to small auto body shops, to evaluate their processes and make environmental improvements.
- It would create opportunities for TPH and other City divisions to explore incentives for businesses to encourage and reward their participation in various initiatives.
- It would foster regular communication between the City and Toronto businesses, particularly small and medium-sized facilities. Business stakeholders such as the Toronto Industry Network, the Toronto Board of Trade and the Toronto Association of Business Improvement Areas identified their preference for streamlined, clear communication with the City on this and other programs. As an example, the Environmental Reporting, Disclosure and Innovation Program could link into services such as BizPal (www.toronto.ca/business/index.htm) to expand this "one window" link with governments, and to the Toronto City Summit Alliance "Greening Greater Toronto" initiative to facilitate region-wide communications and innovation.

3.6 Encouraging ideas and environmental innovation

New information on hazardous chemicals in our neighbourhoods and the participation of Toronto's small and medium-sized businesses provides exciting opportunities for creative and innovative environmental solutions. In the United States, for example, data from the Toxics Release Inventory (TRI) has enabled the public to be more informed participants in discussions with local industries. In some states this has led to the creation of "good neighbour campaigns" where residents partner with local facilities and city councils to initiate environmental improvements and promote joint community events that renew support for small industry. This program can also harness the creativity of small and medium-sized businesses, who typically begin with less understanding of their chemical usage and environmental impacts and less access to pollution prevention ideas than larger facilities. The Environmental Reporting, Disclosure and Innovation Program can open communication channels with the small business sector and invite creative thinking on collaboration and environmental initiatives.

3.7 Providing local information to Torontonians

Public access to information (the community's "right to know") is key to stimulating pollution prevention and consistent with City Council's commitments to openness and transparency.

Making data publicly available can stimulate pollution prevention because information can help government regulators identify environmental priorities and work with companies to develop pollution prevention programs (Bierle, Thomas C., 2003). Also, companies' desire to improve their image to shareholders, regulators and the public also drives environmental improvement, often beyond that which might be stimulated without public disclosure (Afsah, Shakeb et al, 2000).

Over 400 Toronto residents submitted comments on the January 2008 program proposal, indicating their desire for easy access to information collected through this new program. Toronto Public Health would develop a searchable database and publish annual reports that will present data, maps and contextual health and environmental information.

Residents and businesses have urged TPH to provide the information in a way that is accessible and understandable to all users, and reduces the possibility for misinterpretation. For accessibility and clarity, TPH would provide an annual report on the internet and public libraries that compiles and interprets the data, and will provide summaries in the top languages spoken in Toronto. Residents would also be able to search an internet database for facility data that would be linked to third-party information on the chemicals and their potential health and environmental impacts. TPH would consider ways to make this database accessible to residents for whom English is not their first language, such as partnering with community agencies on public education programs. In addition, facilities would be invited to submit information about pollution prevention programs to provide context to the data that is published.

TPH appreciates concerns expressed by some stakeholders that the disclosure of information could compromise corporate confidentiality or disclose information that could be used for criminal purposes. The draft bylaw contains a provision for the protection of information that may be deemed confidential under the *Municipal Freedom of Information and Protection of Privacy Act* (MFIPPA). With regards to security issues, Environment Canada staff indicate no security concerns with disclosing NPRI data. In fact, reporting programs are often seen to

increase safety because industries can use data to identify opportunities to substitute hazardous substances for less toxic ones, making their sites inherently safer in the event of an emergency. In the United States, for example, a recent review of federal Risk Management Plans identified that many facilities reduce or eliminate hazardous substances as a way of reducing the risks that may result from an accident or terrorist attack (Orum, Paul, 2006).

4.0 Overview of Stakeholder Consultation

TPH has consulted extensively with businesses, residents, community organizations, agencies representing workers, governments and City staff throughout the development of the proposed Environmental Reporting, Disclosure and Innovation Program (see Figure 4). Consultation to date has included interviews, focus groups and meetings.

4.1 Summary of feedback from January 2008 consultation

As part of the consultation process, in January 2008 the MOH released a draft framework for a reporting and disclosure program to stakeholders for a 30-day comment period. The framework reflected previous feedback from stakeholders. The consultation process and stakeholder responses from this consultation as well as details about incorporation of the feedback into the proposed Environmental Reporting, Disclosure and Innovation Program are described in Appendix 3.

The MOH received 540 written submissions on the proposal:

- 461 from residents
- 33 from community organizations, including health and environmental groups and ratepayer associations
- 6 from agencies representing workers, such as unions and occupational health clinics
- 30 from businesses or business associations
- 10 from City agencies, boards, commissions, corporations and divisions (ABCCDs).

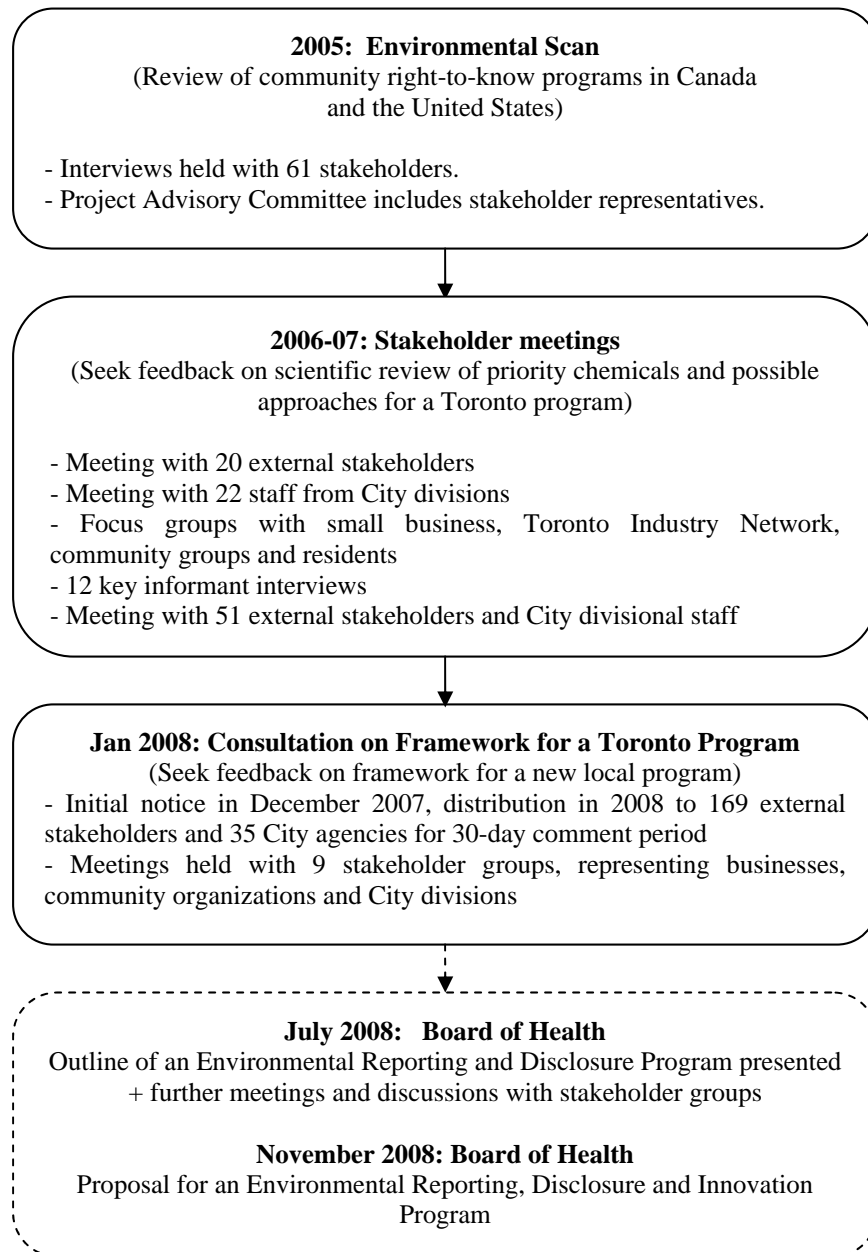
Residents, community organizations and worker agencies overwhelmingly supported the proposed program. The most common reasons given were protecting health, promoting environmental sustainability, improving workplace safety, informing choice, educating and influencing businesses, and enhancing policy. Many offered suggestions for ensuring that the information was made easily available to users.

Most businesses and business associations supported the program's intent but opposed the introduction of a bylaw on a local level. Many expressed the need for further clarification on certain elements of the program. Businesses cited duplication with existing reporting laws, overlap with the goals of current regulations, and economic and administrative burden as their reason for opposing a new bylaw. Despite this, many businesses offered helpful suggestions for engaging businesses within and outside of a regulatory approach. Overall, City ABCCDs support the program's intent, but some favoured voluntary initiatives over a bylaw.

Stakeholder response to the January 2008 consultation document clearly demonstrates a high level of interest in environmental reporting and disclosure. While there is disagreement between businesses and the community regarding the best approach for Toronto, most stakeholders

support the program's goals to reduce exposure to priority pollutants and encourage environmental innovation. Although the proposed Environmental Reporting, Disclosure and Innovation Program includes a bylaw, it reflects many of the business community's suggestions for how best to implement the program in a way that minimizes burden and maximizes benefits for affected facilities. Suggestions included, for example, streamlined reporting, support for smaller businesses and partnering with businesses to conduct training and outreach.

Figure 4: Overview of stakeholder consultation to date



5.0 Overview of the Environmental Reporting, Disclosure and Innovation Program

TPH has developed the Environmental Reporting, Disclosure and Innovation Program to meet Toronto's needs. It draws from successful reporting programs in Canada and the United States, such as Canada's National Pollutant Release Inventory, Massachusetts' Toxics Use Reduction Act and the Toxics Right-to-Know Bylaw in the town of Eugene, Oregon. Figure 5 provides an overview of the program, which is comprised of a new bylaw and supporting elements.

6.0 A New Bylaw

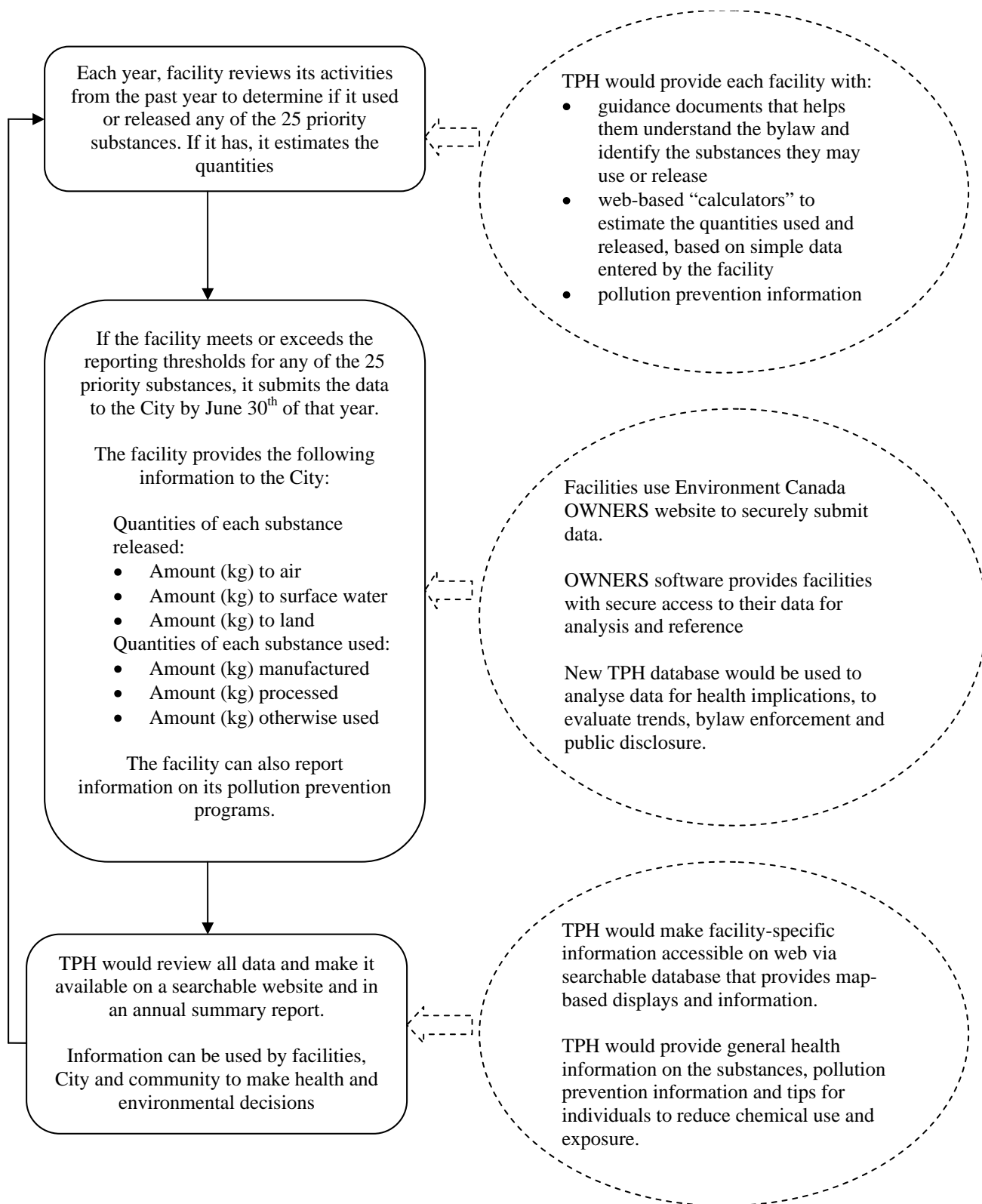
A key part of the program is a new bylaw that would require facilities to submit annual data to the City on their use and release of any of the 25 priority substances in amounts above specified thresholds. Legal Services has prepared a draft bylaw, which is attached as Appendix 2.

The bylaw identifies the priority substances, their reporting thresholds, what information must be reported, which facilities and activities are exempt from reporting, plans for public access to the information, and penalties.

Under the bylaw, a facility would review its processes each year to see if it used any of the 25 priority substances or if it released any of them to the environment. TPH would provide resources such as electronic tools and written guidance to help a facility identify whether it uses or releases any of the 25 chemicals and whether or not it needs to report. If the company used or released any of the substances above a certain amount (known as a "reporting threshold"), then it will have to provide this information to the City.

Facilities using or releasing any of the 25 substances in amounts which exceed thresholds would have to report quantities of each chemical released into the environment (air, surface water and land) and quantities of each chemical used (defined in the bylaw as "manufactured, processed or otherwise used").

Figure 5: Overview of an Environmental Reporting, Disclosure and Innovation Program



6.1 Who has to report

Any facility that uses or releases any of the priority substances may have to report. The need to report depends on the amounts and sources of substances used or released. As an example, facilities in the following sectors may have to report because they typically use or release one or more of the priority substances:

- food and beverage manufacturing
- clothing manufacturing
- printing and publishing
- chemical manufacturing
- wood industries
- other manufacturing
- chemical distribution
- waste management and remediation
- medical and diagnostic laboratories
- automotive repair and maintenance
- laundry services, including dry cleaning
- funeral services

Some types of facilities and certain uses of substances would be exempted from the reporting requirements of the program. The bylaw has two types of exemptions:

- Sector exemptions - homes and specific types of businesses, such as stores, medical offices and construction sites would not have to report;
- Source exemptions - a business would not have to report substances used or released from specific sources within their facility, such as routine janitorial or maintenance activity, vehicle emissions, space and water heating, and personal use by employees.

TPH considered several factors to determine what exemptions would be appropriate, including how much the chemical or the type of business likely contributes to pollution or personal exposure and minimizing reporting for “minor” uses. In addition, stakeholder feedback in January 2008 resulted in some revisions to the exemptions. For example, TPH has mirrored the NPRI by exempting vehicle repair shops that perform routine maintenance like oil changes or brake repairs but would require reporting from those that carry out painting and remanufacturing, like auto body shops. Hotels continue to be exempt, except for those that operate laundry or drycleaning operations: these are now included in the program.

6.2 Reporting Thresholds

Schedule “A” of the draft bylaw identifies the chemical reporting thresholds. TPH reviewed other reporting programs in North America and Europe and considered the nature of our city’s businesses and our program goals to determine the thresholds that would trigger reporting for facilities. TPH considered two types of thresholds commonly used in other programs: number of employees and chemical quantities.

Canada's NPRI, the Massachusetts TURA and most other reporting programs only require data from large facilities, defined as having the equivalent of 10 or more full-time employees. TPH is not proposing a threshold based on number of employees because it wants to track and reduce substances from smaller facilities in Toronto. While a single facility may not have a large impact, taken together they can have significant environmental impacts.

The NPRI has a substance reporting threshold of 10,000 kg for most of the chemicals tracked, and lower thresholds for the most toxic substances, such as lead (50 kg) and mercury (5 kg). As a result of these high employee and substance thresholds, only 3 per cent of Toronto facilities using chemicals report to the NPRI. New York City and Eugene, Oregon have reporting thresholds as low as 1kg. TPH is proposing a reporting threshold of 100 kg per year for most substances, which is 100 times lower than the NPRI. Chemicals considered to be extremely hazardous would have lower thresholds.

7.0 Program Implementation

TPH would coordinate the implementation of the Environmental Reporting, Disclosure and Innovation Program. TPH would partner with Economic Development, Culture and Tourism and other City divisions, as well as other governments, the business community, worker agencies and community organizations to implement the program. For example, TPH would:

- consult affected business sectors to create training resources and deliver outreach programs for affected facilities;
- link with other City divisions to ensure that education strategies support implementation of other programs and policies, and to streamline contact with businesses;
- draw on worker and community representatives to ensure the engagement of workers and residents;
- partner with the Ontario Ministry of the Environment to coordinate implementation of Toronto's program with the proposed provincial Toxics Reduction Strategy; and
- collaborate with Environment Canada's NPRI team to identify successful outreach, data management and communication approaches.

7.1 Training and supports for facilities

TPH will help facilities understand the bylaw, track and report chemical usage and releases, and help them identify pollution prevention opportunities. Many industry associations, businesses, worker agencies and community groups have offered their help to TPH to create and deliver information to affected businesses and the community. TPH will therefore work in partnership with stakeholders such as the Toronto Industry Network, the Toronto Board of Trade, the Toronto Association of Business Improvement Areas and labour organizations to develop easy-to-understand information and deliver it by mail, online, in industry publications, and through meetings and training workshops with facilities.

TPH is developing two key tools to accompany the bylaw that will assist facilities:

- A "bylaw guidance document" that includes questions and answers about the bylaw, who must report and what information must be reported, and common sources and activities that involve the 25 priority substances. A draft version of the bylaw guidance document,

entitled “Understanding the Environmental Reporting and Disclosure Bylaw” is available at www.toronto.ca/health/hphe/enviro_info.htm; and

- A “guide to reporting” that would include lists of tools to help facilities estimate quantities of chemicals, and instructions for electronic reporting. TPH would update it each year to reflect user feedback and technological innovations, such as new tools to estimate emissions. It could be made available in different formats (e.g. CD-ROM, website, hard copy) to enable facility operators to comply with the program.

TPH will also produce sector-specific pollution prevention guidance documents to provide facilities with detailed information about the substances they may use and options for environmental best practices. TPH is consulting with technical experts, local business representatives, Toronto and Region Conservation Authority, Toronto Water and Economic Development, Culture and Tourism, on how to best develop and market these guides.

TPH will also explore opportunities to partner with academic institutions to train workers and businesses. The Nova Scotia Eco-Efficiency Centre at Dalhousie University, the University of Minnesota Technical Assistance Program and the Massachusetts Toxics Use Reduction Institute are examples of successful partnerships between universities, government and the private sector that train university students and provide businesses with pollution prevention advice. The Ontario government also identified this as a possible element of its proposed Toxics Reduction Strategy, and TPH staff will discuss collaboration with provincial colleagues.

7.2 Phased-in Data Tracking and Reporting

TPH recommends that the bylaw be passed in 2009 and come into effect in 2010. In 2009, TPH will begin development of the data management system and facility guidance materials, and conduct preliminary outreach to the affected facilities to make them aware of the program and reporting requirements. Full-scale implementation will begin when the bylaw takes effect in 2010.

Certain facilities would be required to track data beginning in 2010. Reporting requirements would begin in 2011 and be phased in through 2013. This will give time to facilities, particularly small and medium-sized ones, to learn about the bylaw and ways to track and estimate chemicals. It also allows TPH to develop its outreach programming for facilities and the public, educate facilities about the program, and align with the work of the provincial government on its toxics reduction strategy.

The phase-in would be sector-based and facilities would be identified using the North American Industry Classification System (NAICS), a categorization system developed jointly by Canada, the United States and Mexico. In the first year, TPH would require reporting from sectors that are predominantly comprised of larger facilities or have more pollution prevention and data estimation tools available to them, as they would require the least amount of preparation time. TPH anticipates that between 2011 and 2013 as many as 2,500 facilities would begin reporting each year. When the program is fully implemented there could be as many as 5,000 to 7,000 facilities engaged. Data tracking and reporting would be phased-in as follows (see also Figure 6):

2009 – Education begins

Education to all facilities will begin in 2009 and be ongoing. TPH and its partners would deliver information to all facilities about the purpose of the bylaw, how to determine if they are using the priority substances and how to determine reporting thresholds. The first phase would also include

additional supports to the “Phase One Facilities” that would be required to collect data in 2010 for reporting in 2011.

2010 – Bylaw comes into effect. Phase One Facilities begin data tracking

The following sectors would be required to collect data on 2010 chemical usage and emissions in 2010, so they are able to report in 2011:

- food and beverage manufacturing
- printing and publishing
- chemical manufacturing
- wood industries
- power generation
- water and wastewater treatment

2011 – Phase One Facilities report data; Phase Two Facilities begin data tracking:

Phase One Facilities would use web-based reporting to submit 2010 data by June 30, 2011. TPH would aim to publish this data by the end of 2011. Education would continue for all facilities, particularly the following sectors that would begin collecting 2011 data:

- chemical wholesale
- waste management and remediation services
- medical and diagnostic laboratories
- dry cleaning and laundry services
- automotive repair and maintenance
- funeral services

2012 – Phase One and Two Facilities report data; remaining facilities begin data tracking:

Phase One and Two Facilities submit their 2011 data by June 30, 2012. Phase Three Sectors, which includes all remaining facilities, would begin tracking 2012 data. This includes the “other manufacturing” sector, which is comprised of paper manufacturing, primary metal manufacturing, machinery manufacturing and other industries.

2013 – All affected facilities reporting annual data

All affected facilities would be required to report by June 30, 2013.

Figure 6: Phased-in data tracking and reporting schedule

2009	2010	2011	2012	2013
Education for facilities and public begins	Bylaw comes into effect. First year of data tracking: Phase One Facilities track 2010 data	First year of data reporting: Phase One Facilities report 2010 data by June 30, 2011 Phase Two Facilities track 2011 data 2010 data published	Phase One and Phase Two Facilities report 2011 data by June 30, 2012 Phase Three Facilities track 2012 data 2011 data published	All affected facilities report 2012 data by June 30, 2013 2012 data published

7.3 Bylaw Enforcement

TPH would enforce the bylaw's requirement to report in a way similar to the approach Environment Canada uses to enforce the NPRI. TPH would conduct "desktop audits" of the facilities that report and which are expected to report. This desktop audit would be conducted by TPH staff trained to review the accuracy and completeness of data reporting by the facilities. If data from a facility require clarification or if TPH believes that a facility should have reported, enforcement staff would contact the facility or conduct an on-site inspection to obtain additional information. If the information is not obtained, enforcement would escalate to a warning or, under the *Provincial Offences Act*, a facility may be issued a ticket or a summons to appear in court.

The bylaw requires companies to retain the information for a minimum of five years from the date the report is submitted and, upon request, provide it to the Medical Officer of Health for audit purposes. Facilities would be contacted by TPH staff, if needed, to clarify the information.

A company that knowingly submits inaccurate data or does not submit the data requested by the Medical Officer of Health would be guilty of an offence and is liable for a fine of not more than \$5,000 for a first offence; \$25,000 for a second offence; or \$100,000 for a third or subsequent offence.

7.4 Data Reporting and Management

TPH, in partnership with Environment Canada's NPRI team, will create a web-based system and database to provide information to facilities and the public, to accept data from facilities, and to publish the data in a way that is easy for the public to search and understand. Using the Internet for reporting and disclosure should enable facilities and residents with limited computer access to participate in the program.

A new TPH website would serve as the primary point-of-contact for all users of the program. Facilities would use the website to find easy-to-understand information about the bylaw and to

calculate chemical usage and release estimates based on entering simple data or linking to tools provided.

For facilities that meet or exceed the reporting thresholds, the website will link them to Environment Canada's One Window for National Environmental Reporting System (OWNERS) to submit their data electronically. OWNERS is a web-based system used by Environment Canada, provincial and municipal governments and private sector organizations to collect environmental data from industry for programs like the NPRI and provincial air quality regulations (www.owners.gc.ca/home_e.html). The system allows businesses to login to a website to enter data into forms and securely submit the results to the government. Facilities can also login anytime to consult their records. Using OWNERS will enable existing NPRI reporters to simultaneously report to the NPRI and the City, and will save the City the costs associated with creating a new, secure reporting system. Environment Canada will hold all data and TPH will access it for analysis, publication and enforcement.

The community and businesses would use new City webpages to search for data on a facility, a chemical or a neighbourhood, and view the data using map-based software. TPH would provide links to toxicological and health information on the substances, pollution prevention notes from the reporting facilities, and summarize information so it is easier to understand. Users would also find information about other sources of pollution, how to reduce their personal use of chemicals, and links to other environmental information related to the City.

7.5 Disclosure of Information

The data collected through the Environmental Reporting, Disclosure and Innovation Program would be collected, used and disclosed in accordance with the *Municipal Freedom of Information and Protection of Privacy Act* (MFIPPA).

The data will be used to support business innovation and TPH research, education, and health policy. TPH will, subject to privacy restrictions, if any, that may apply, create an online system that will enable individuals and community groups to search for information reported to Toronto Public Health under the proposed bylaw. For example, users could search data by facility name, chemical, neighbourhood or other attributes. A mapping tool would present the information in geographic format. Where permitted, the website would link users of the site to pollution prevention information provided by the facilities. In addition, the website would provide health and environmental information about the reportable priority substances. The information would also be made available in print format and summaries translated into several languages to make it as accessible as possible to those with limited computer access.

7.6 Evaluation

A framework for evaluation has been developed based on the "program logic model" shown in Appendix 4. A logic model is a tool that outlines how a program would be evaluated, which helps to identify at the outset what indicators and data to collect.

The stated goal of the by-law is to protect the health of Toronto residents by reducing their exposures to toxic substances. TPH would evaluate progress towards this goal by measuring indicators such as levels of air toxics present in Toronto's air, numbers of facilities who report, trends in reported data and the public's interest in this information, which would be gauged, for

example, by number of hits on the city's web pages related to reports on the Environmental Reporting, Disclosure and Innovation Program.

8.0 Next Steps

It is important that action be taken to reduce exposure to the 25 priority substances in Toronto and to assist local businesses to pursue environmental best practices. The Medical Officer of Health recommends that the Board of Health and City Council adopt the proposed Environmental Reporting, Disclosure and Innovation Program.

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Appendices

- Appendix 1: Health Rationale for 25 Priority Chemical Substances
- Appendix 2: Draft Environmental Reporting and Disclosure Bylaw
- Appendix 3: Feedback from January 2008 Stakeholder Consultation
- Appendix 4: Evaluation Framework

Appendix 1: Health Rationale for 25 Priority Chemical Substances

In an urban environment like Toronto, the public's health may be affected by a number of environmental factors, including chemicals that local businesses and government operations use or emit to our air, land or water. Facilities in Toronto release toxic substances in quantities ranging from a fraction of a tonne to over 5,000 tonnes per year. These substances also vary in their toxicity. Some substances are extremely toxic such that even very small quantities can pose a significant health risk if present, while others are less worrisome even when present in larger quantities. Exposure to toxic substances may contribute to a range of health concerns. These include, for example, neurological symptoms, respiratory illness and cancer.

Toronto Public Health (TPH) conducted research and consulted with City staff and external stakeholders about options to reduce health risks from pollution through enhanced reporting and access to environmental information (also known as "Community Right-to-Know"). It was established that there is a need for environmental reporting in Toronto.

The need to increase environmental reporting was identified based on the conclusion that current reporting is not capturing the majority of emissions in Toronto. The gaps in reporting were estimated by a team led by Marshall Macklin Monaghan and Dr. Harvey Shear of the University of Toronto. Data that were readily accessible to the public were used to estimate the total emissions and the gaps in reporting of emissions for substances of concern.¹ The study method and findings are described in detail in the report "Substances of Concern, Release and Transfer Reporting in Toronto: Analysis of Gaps" available at http://www.toronto.ca/health/hphe/enviro_info.htm. The analysis estimates of the amounts of individual substances released (emitted),² transferred and used, by sector. No estimates were made of storage of substances because no databases or methods were available to provide estimates.

Furthermore, TPH examined a variety of chemical substances that may be released from institutional, commercial and industrial operations in the city and identified toxic substances of priority health concern. These substances occur in the Toronto environment at levels that may pose a risk to health. (TPH, 2007)

Human Exposure

Exposure to contaminants can occur through inhalation, ingestion and absorption through the skin. The "exposure pathway" describes how a contaminant that is released by a source can travel through the environment to reach the human body. Although contaminants may be released to water, land, or air, releases to air are often of greatest concern. One reason is that individuals are consistently exposed to contaminants via this pathway as they must constantly inhale the air. In some cases, the primary health concern may be associated with another route of exposure. Mercury, for example, is of primary concern to humans when it has accumulated in fish and the fish are then consumed by people.

¹ Substances of concern are defined as those substances that are reported to the National Pollutant Release Inventory.

² Releases – refers to the amount of chemicals or toxic substances that are released from sites into the environment through:

- a) Air emissions from point sources (example, stacks), operational losses, fugitive emissions, spills and accidents;
- b) Discharges to surface water either through direct discharge, leaks or spills; or
- c) Discharge or disposal to land within the site.

The extent of exposure in combination with various individual attributes (for example, lung size) determine the dose that finally ends up in the body. Recent studies have indicated that some of the established priority substances have been measured in people. The United States Centre for Disease Control (US CDC) published exposure data related to a series of chemicals or classes of chemicals in their Third National Report on Human Exposure to Environmental Chemicals. The report measured 148 chemicals in the American population, and established that levels of cadmium, lead, mercury, and PAHs could be detected. In their report Toxic Nation: A Report on Pollution in Canadians, Environmental Defence measured cadmium, lead, mercury and VOC levels in a smaller sample of Canadian individuals, finding detectable levels of all these substances in each participant. Statistics Canada will shortly be conducting The Canada Health Measures Survey which intends to measure mercury, lead and cadmium, and which may give a better indication of health risk for residents of Toronto.

Human Health and Air Pollution

Over the last decade, a large body of scientific evidence has accumulated which confirms that acute exposure to low levels of air pollution, such as those experienced in Toronto, can produce a wide range of health outcomes including reduced lung function, acute bronchitis, asthma attacks, an increase in the number of emergency room visits and hospitalizations for respiratory and cardiovascular conditions, and elevated mortality rates.

Several long-term studies have indicated that chronic exposure to low levels of air pollution can increase the risk of developing lung cancer and ischemic heart disease. Chronic exposure can also permanently affect lung function, elevate mortality rates, and reduce life expectancy as well (Pope, 2002; Gauderman, 2000; Hoek, 2002). A large number of these studies have indicated that children, the elderly and those with pre-existing conditions, such as asthma, diabetes, and congestive heart failure, are more susceptible to the negative impacts of air pollution (Gent, 2003; Gauderman, 2000; Gong, 1997; McConnell, 2003; Steib, 2002).

Air pollution may be thought of as contributing to a 'pyramid' of health effects, where the least common but most serious health outcomes are represented as the peak of the pyramid, and the less severe but more frequent health outcomes such as asthma symptom days and respiratory infections make up progressively larger-sized levels below that peak.

Toronto Public Health estimates that air pollution contributes to about 1,700 premature deaths and 6,000 hospitalizations in the City on an annual basis (TPH, 2004). The current mortality estimate is based on the health risk associated with exposure to ozone, nitrogen dioxide, carbon monoxide, sulphur dioxide, and fine particles (PM_{2.5}). Nitrogen oxides and fine particles have either been identified as priority substances, or are a product of priority substances.

The remainder of the 25 priority substances are considered air toxics. These occur in the air in much smaller amounts than 'criteria' pollutants, but which are much more potent in terms of adverse impacts. In general, concern about the health effects of exposure to air toxics arises from long-term (chronic) exposure leading to serious health outcomes such as cancer and reproductive effects.

Cancer and Environmental Pollutants

Many of the 25 priority substances are associated with risk of developing cancer. Cancer is of particular concern as it is second only to circulatory disease as the leading cause of death in Toronto. Between 1991

and 1995, cancer was responsible for an average of 4,620 deaths each year in Toronto. While some increase in cancer incidence as attributable to an ageing population, approximately 40% of new cancer cases occur in Toronto residents who are between the ages of 20 and 64. Cancer rates in young adults aged 20-44 years are also on the rise. Cancer in childhood is rare but it is the most common illness-related cause of death in children ages 1 to 19 years. While there has been a significant improvement in the survival rate of children with cancer in the last twenty years, there has been no consistent decrease in the incidence of childhood cancers in Canada.

A number of “known and probable human carcinogens” (defined in Table 1) are present in outdoor air and in other media to which the general population is regularly exposed. In communities with important point sources of carcinogens, the risk of lung cancer is proportional to the proximity of the household to these point sources even after adjusting for tobacco and occupational exposures (TPH, 2002).

Table 1: Carcinogenicity defined by the International Agency for Research on Cancer (International Agency for Research on Cancer, 2006)

Group	Classification	Definition
1	Carcinogenic to humans	Sufficient evidence of carcinogenicity in humans
2A	Probably carcinogenic to humans	Limited evidence in humans, and sufficient evidence in experimental animals
2B	Possibly carcinogenic to humans	Limited evidence in humans and less than sufficient in experimental animals or Inadequate evidence in humans and sufficient evidence in experimental animals
3	Not classifiable as to carcinogenicity to humans	Inadequate evidence in humans inadequate or limited evidence in experimental animals
4	Probably not carcinogenic to humans	Evidence suggests a lack of carcinogenicity in humans and in experimental animals

Priority Substances

The substances of priority health concern identified by TPH (TPH, 2007), are found in Toronto's environment at levels which may be associated with adverse effects. These adverse effects differ considerably from substance to substance, although cancer is a health outcome of concern related to many of the priority substances.

Approach to Establishing Health Priorities for Enhanced Environmental Reporting In Toronto

Two complementary approaches were used to identify priority substances for enhanced environmental reporting based on the potential health impact to Toronto residents. (see Process to Identify Priority Substances of Health Concern for Enhanced Environmental Reporting: Technical Summary (<http://www.toronto.ca/health/hphe>)).

1. Estimated emissions data were assessed using a health-based ranking scheme

TPH applied a ranking scheme based on the Toxic Equivalency Potential (TEP) approach to estimates of chemical emissions from facilities in Toronto. The TEP method originated at the University of Berkeley, California (Hertwich et al., 2001) and was developed to compare the potential health impact of substances by combining the amount of the substance released with its toxicity. The method uses estimates of the amount of substances released and then:

- Considers the movement of the substance (from point of release to contact with a person);
- Factors in the toxicity of the substance (cancer and non-cancer effects); and
- Provides a risk score (to enable comparison of substances with different toxicities).

In this risk scoring system, all releases of substances are converted into a common unit of TEP (relative either to benzene [for carcinogens] or to toluene [for non-carcinogen]). The TEPs generated for each substance can be compared between substances, businesses, sectors, years, and policy-scenarios, thereby providing a toxicity-weighted ranking of the releases. Table 2 presents the substances of priority health concern based on the amount released to air, their TEP value (their relative toxicity to benzene for carcinogens and toluene for non-carcinogens), and their resultant TEP scores. The higher the TEP score number, the higher the health risk associated with release of the substance. Each value is followed by a number in brackets. This number is the ranking of the substance relative to the 96 substances that were included in this analysis.

TPH found that much of the risk associated with air emissions in Toronto can be attributed to three substances: mercury, cadmium, and lead. These three substances are released in relatively small quantities in Toronto's air. However, they are very toxic substances.³ When both emissions and potential for health impacts are considered in a ranking of Toronto's air emissions, cadmium, mercury and lead are the most important priorities for reduction.

³ Cadmium and lead are carcinogens. Mercury and lead are neurotoxins.

Table 2: Substances of Priority Health Concern presented with the Amount Released to Air, Toxic Equivalency Potential (TEP) Values, TEP-Scores¹, and Relative Rank².

Priority Substance of Health Concern	Amount Released (Rank)	TEP-Carcinogen	TEP Score ¹ for Carcinogens (Rank)	TEP-Non Carcinogen	TEP Score ¹ for Non-Carcinogens (Rank)
	A (tonnage)	B	=AxB	C	=AxC
VOCs	43400(1)	n/a	n/a	n/a	n/a
Nitrogen Oxides	6900 (2)	n/a	n/a	2.2	35,000,000 (8)
PM _{2.5}	2400 (6)	n/a	n/a	17	90,000,000 (4)
Tetrachloroethylene	2 (14)	1	480,000 (4)	65	32,000,000 (9)
Dichloromethane	165 (18)	0.2	73,000 (5)	7	2,600,000 (18)
Lead	36 (29)	28	2,200,000 (2)	580000	47,000,000,000 (2)
Formaldehyde	24 (30)	0.02	1,000 (11)	16	840,000 ()
Mercury	13 (38)	n/a	n/a	5000000	140,000,000,000 (1)
Cadmium	8 (40)	26000	430,000,000 (1)	190000	3,200,000,000 (3)
Chromium (non-hexavalent)	5 (43)	n/a	n/a	n/a	n/a
Trichloroethylene	3 (50)	0.05	260 (12)	0.6	3,200 (50)
Nickel	1 (55)	3	6,000 (9)	3200	6,800,000 (14)
Manganese	1 (56)	n/a	n/a	780	1,600,000 (20)
Chromium (hexavalent)	1 (58)	130	200,000 (5)	3100	35,000,000 (7)
Benzene	0.1 (67)	1	210 (13)	8	1,700 (53)
Carbon Tetrachloride	n/ed	270	n/ed	2300	n/ed
Acrolein	n/ed	n/a	n/ed	1600	n/ed
Vinyl chloride	n/ed	2	n/ed	68	n/ed
Chloroform	n/ed	2	n/ed	14	n/ed
Acetaldehyde	n/ed	0.01	n/ed	9	n/ed
1,2-Dichloroethane	n/ed	3	n/ed	4	n/ed
1,4-Dichlorobenzene	n/ed	1	n/ed	2	n/ed
1,3-Butadiene	n/ed	0.5	n/ed	2	n/ed
Ethylene dibromide	n/ed	n/a	n/ed	n/a	n/ed
PAHs	n/ed	6300 ³	n/ed	n/a	n/ed

n/a No TEP available

n/ed No emissions data available

¹ TEP Score = Amount Released (converted to pounds) × TEP (carcinogen; non-carcinogen)

² Substances were ranked against the total list of substances released in Toronto. Ninety six substances were assessed. Ranks are presented in brackets ().

³ Benzo(a)pyrene used as a surrogate for the group of substances

2. Current air quality data were compared to health-based benchmarks

TPH obtained air quality data from Environment Canada and the Ontario Ministry of the Environment (OMOE).⁴ We used air quality data of samples taken in Toronto to assess whether there were any toxic substances in Toronto air at concentrations that exceeded health-based benchmarks. We used the health-based benchmarks developed by California Environmental Protection Agency (CalEPA) and the OMOE (described below).⁵

A substance was considered a priority if the maximum air concentration measured in Toronto's air exceeded either the CalEPA health-based benchmarks or OMOE ambient air quality criteria (AAQC).⁶ Table 3 presents the substances of priority health concern with the exposure ratio for the substance's concentration in Toronto's air compared to a health-based benchmark. The benchmark that is exceeded is also presented in Table 3.

We identified substances that currently exceed health-based benchmarks in Toronto's air. These substances are often found in Toronto's air at levels that exceed one-in-a- million cancer risk and/or at a level at which unacceptable adverse effects may occur (such as neurotoxicity, reproductive effects, and effects on the kidney).

MOE health-based benchmark

The Ontario Ministry of the Environment air standards are based on scientific health data and were developed using a multi-step process involving priority setting, risk assessment, risk management and public consultation. The process aims to base MOE standards on the best scientific information available, to protect the most sensitive receptors, including children, and finally, to incorporate socio-economic considerations (OMOE, 2007). This method has identified a number of priority candidates for which air standards have been developed, or are being developed. The published information reports and draft documents indicate the levels, or health-based benchmarks, at which adverse effects to human health may be observed, and they extensively describe the scientific research (both human and animal data) which documents the specific health outcomes of each substance that may be observed when these benchmarks are exceeded.

⁴ The air data were provided by Tom Dann, Environment Canada. The air samples were taken between 2003 and 2005 at three NAPS stations in Toronto. The sample sizes were different for contaminant classes (VOC = 616; metals = 281; PAHs = 183). Criteria air contaminant concentrations were taken from the OMOE's annual summary on criteria air contaminants (CACs) in Ontario for 2005. The OMOE uses continuous monitoring instruments. There are five sample sites in Toronto. Only four of these samples were used because one is 444 metres above ground (CN Tower) and not considered relevant to human exposure. Mercury air concentrations were taken from Senes' 2000 Report on Ambient Air Monitoring and Source Testing at the St. John's Norway Crematorium. (Senes Consultants Limited, 2000). Only three samples were available.

⁵ The CalEPA toxicological database was used (unit risk and chronic reference exposure levels [CRELs]) because it is a reputable source of toxicological information and it provides more complete coverage of substances of concern. The OMOE ambient air quality criteria (AAQC) were used because of its regulatory relevance to Toronto.

⁶ The maximum air concentrations were used in this assessment because there were limited sample sites and it is known that the average concentrations at these sites can underestimate the air concentrations of contaminants to which people are exposed (TPH, 2005). Thus, TPH used the maximum air concentration measured in order to be health protective.

CalEPA health-based benchmarks

The CalEPA uses three health-based benchmarks to evaluate air quality:

- CalEPA Unit Risk describes the threshold level of a contaminant in the air at which exposure would be associated with less than one in a million excess cancer risk.
- Chronic Reference Exposure Levels (CREL) describes the threshold level of a contaminant in the air at which there would be no expected excess adverse non-cancer effects on human health in a population following chronic exposure.
- The Acute Reference Exposure (Acute REL) describes the threshold level of a contaminant at which there would be no expected excess adverse effects on non-cancer human health effects in a population following acute exposure.

Each of these benchmarks was developed through similar methods as for the OMOE – AAQC, using risk assessment methodology. The CalEPA however, has taken a more health protective approach when considering benchmarks for some of the priority substances. A technical support document provides further information on each one of the benchmarks and describes the derivation calculation procedures and the scientific research (both human and animal data) which support the standard for each chemical (CalEPA, 1999).

Table 3: Substances of Priority Health Concern presented with Measured Air Concentrations for 2003 to 2005, Exposure Ratios, and the health-based benchmarks exceeded.

Priority Substances	Exposure Ratio¹ (max)	Expose Ratio (mean)²	Benchmarks Exceeded³
Chromium (hexavalent)⁴	1150	2	CalEPA Unit Risk
Benzene	176	30	CalEPA Unit Risk
PAHs⁵	302	20	CalEPA Unit Risk
1,3-Butadiene	102	26	CalEPA Unit Risk
Formaldehyde	67	27	CalEPA Unit Risk; CalEPA CREL
1,4-Dichlorobenzene	41	2	CalEPA Unit Risk
Carbon tetrachloride	34	26	CalEPA Unit Risk
Cadmium		13	CalEPA Unit Risk; MOE Proposed AAQC
Acrolein	20	2	MOE AAQC; CalEPA CREL; CalEPA Acute REL
Acetaldehyde	15	6	CalEPA Unit Risk
Dichloromethane	14	0.9	CalEPA Unit Risk
Tetrachloroethylene	12	2	CalEPA Unit Risk
Ethylene dibromide	7	3	CalEPA Unit Risk
Trichloroethylene	6	0.6	CalEPA Unit Risk; MOE Proposed AAQC
Nickel compounds	4	0.8	CalEPA Unit Risk
Vinyl chloride	4	0.8	CalEPA Unit Risk
Chloroform	3	0.6	CalEPA Unit Risk
NO_x	3	0.3	MOE AAQC
1,2-Dichloroethane	3	0.8	CalEPA Unit Risk
PM_{2.5}	2	0.3	MOE AAQC
Manganese	2	0.08	CalEPA CREL
Lead	0.4	0.07	None
Mercury	0.00018	0.00016	None
Chromium (non-hexavalent)	n/a	n/a	n/a
VOCs	n/a	n/a	n/a

n/a No health-based benchmark available

¹ Exposure Ratio = Maximum measured air concentration ÷ health based benchmarks. The highest exposure ratio is presented, if multiple benchmarks were exceeded.

² Exposure Ratio = Mean measured air concentration ÷ health based benchmarks.

³ CalEPA Unit Risk = California Environmental Protection Agency Unit Risk;
CalEPA CREL = California Environmental Protection Agency Chronic Reference Exposure Levels (Acute when indicated);
MOE AAQC = Ontario Ministry of the Environment Ambient Air Quality Criteria

⁴ It was assumed that 15% of the total chromium air concentration was hexavalent chromium. CEPA 1994 states that 3 - 8 % of urban air concentrations of total chromium are Cr VI. The MMM estimates show that 13% of the total chromium air emissions are Cr VI. We selected 15% to be a health protective, reasonable estimate

⁵ Air concentration used is the sum of 20 individual PAHs. Benchmarks for benzo(a)pyrene used as a surrogate for the group of substances.

Benchmarks Extracted From:

MOE. 2005. Summary of O. Reg. 419/05 Standards and Point of Impingement Guidelines and Ambient Air Quality Criteria (AAQCs). Standards Development Branch. Ontario Ministry of the Environment. December 2005.

Air Quality in Ontario 2005 Report: December, 2006. MOE.

<http://www.ene.gov.on.ca/envision/techdocs/6041e.pdf>

CalEPA CRELs (chronic) http://www.oehha.ca.gov/air/chronic_rels/AllChrels.html

CalEPA Cancer Unit Risk http://www.oehha.ca.gov/air/hot_spots/pdf/TSDlookup2002.pdf

CalEPA CRELs (acute) http://www.oehha.ca.gov/air/acute_rels/allAcRELS.html

Priority Substances - Summary of health effects

The following section provides detailed information on each of the 25 priority substances. The 'rationale for selection' indicates which jurisdictional health benchmarks were exceeded. These health benchmarks refer to the air pathway and hence to the potential for health effects associated with chronic exposure via inhalation. For some chemicals, the rationale for selection as a priority substance was based on the potential for other pathways of exposure such as via environmentally-contaminated soil.

Acetaldehyde

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Acetaldehyde is possibly carcinogenic to humans. Risk to human health occurs when acetaldehyde in the air is inhaled. The entire human respiratory tract, including the lungs, is at risk for cancer induction by chronic exposure to low levels of inhaled acetaldehyde.

Possible sources: Acetaldehyde is used as an intermediate in the synthesis of other chemicals. It is a byproduct of incomplete wood combustion, pulp and paper production, stationary internal combustion engines and turbines and wastewater processing. It is also used in the production of perfumes, polyester resins and dyes. Furthermore, acetaldehyde is used as a fruit and fish preservative, a flavouring agent, a denaturant for alcohol, in fuel compositions, for hardening gelatine, and as a solvent in the rubber and tanning industries.

Acrolein

Rationale for selection: MOE AAQC, CalEPA CREL and CalEPA Acute REL Benchmarks Exceeded

Acrolein is primarily an irritant of the respiratory tract. Chronic exposure can lead to congestion of the respiratory system in addition to irritation of the eyes, nose and throat. Similar symptoms are displayed with short term exposure including tearing of the eyes, and irritation of the mucus membranes of the respiratory tract.

Possible sources: Acrolein is used as an intermediate in the manufacture of acrylic acid. It is used commercially and industrially in the formulation of herbicides, biocides, slimicides, and algicides; leather tanning, pharmaceutical production, and photography. Other sources include fossil fuel combustion, motor vehicle exhaust, tobacco smoke, burning of animal and vegetable fats, heating of lubrication oils, burning of wood and plastics, and aquatic and terrestrial pesticide use.

Benzene

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

There is sufficient evidence to indicate that benzene is carcinogenic to humans. Chronic exposure to benzene leads primarily to disorders of the blood. Benzene is a cancer initiator that has been clearly linked to acute myeloid leukemia (i.e. a cancer of the blood system). Benzene can enter the body by inhalation, ingestion and absorption through the skin.

Possible sources: Benzene is a constituent in motor fuels. It is used as a solvent for fats, waxes, resins, oils, inks, paints, plastics, and rubber; in the extraction of oils from seeds and nuts; and in photogravure

printing. It is also used as a chemical intermediate, in the manufacture of detergents, explosives, pharmaceuticals, and dyestuffs.

1, 3-Butadiene

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

1,3-Butadiene is probably carcinogenic to humans. It has been linked to cancers of the blood and lymph systems, including leukemia. It has also been linked to disorders of the heart, blood and lungs, and to reproductive and developmental effects. Risk to human health occurs predominately when 1, 3-Butadiene is inhaled.

Possible sources: 1,3-Butadiene is used in the production of synthetic plastics and rubber. It is also a by-product of manufacturing, processing, wastewater and combustion.

Cadmium

Rationale for selection: CalEPA Unit Risk and MOE Proposed AAQC Benchmarks Exceeded and High TEP ranking

Cadmium and cadmium compounds are carcinogenic to humans. Cadmium is most clearly linked to lung cancer by inhalation. Kidney disease and damage have also been associated with exposure by ingestion as well as inhalation. Cadmium was identified as one of the top priority toxic substances using the TEP ranking approach.

Possible sources: Cadmium is released into air from zinc, lead, or copper smelting. It is also used to manufacture pigments and batteries and in the metal plating and plastics industries. It is also released as a result of burning fossil fuels and in the incineration of municipal waste materials.

Carbon tetrachloride

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Carbon tetrachloride is possibly carcinogenic to humans. Individuals chronically exposed to carbon tetrachloride may be at an increased risk of cancer of the liver. The primary route of exposure is inhalation, as a result of breathing air contaminated with carbon tetrachloride.

Possible sources: Carbon tetrachloride is used primarily as an intermediate in the manufacture of refrigerant. It is also used to a lesser extent as an industrial solvent and metal degreasing agent.

Chloroform

(also known as Trichloromethane)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Chloroform is possibly carcinogenic to humans. Individuals chronically exposed to chloroform may be at an increased risk of both kidney and liver tumours. The risk of cancer is associated with exposure as a result of ingestion and inhalation of chloroform.

Possible sources: Most chloroform is used to manufacture HCFC-22 (a refrigerant for air conditioners). It may also be released into the air from a large number of sources related to its manufacture and use, as well as from its formation as a by product of chlorinating drinking water, wastewater and swimming pool water for disinfection purposes.

Chromium (non-hexavalent)

Rationale for selection: Aids in the tracking of Chromium (VI)

Chromium can be used and emitted in multiple forms. Hexavalent chromium (i.e. chromium VI) is much more toxic than other forms of chromium and it is the primary form emitted to air. Reporting of non-hexavalent chromium separately from hexavalent chromium enables the tracking of the different forms of chromium. During the industrial process one may convert to the other and emissions of non-hexavalent chromium are often associated with hexavalent emissions. Tracking of the different forms of chromium will stimulate pollution prevention activities in the areas that will afford the greatest risk reduction for Toronto residents.

Possible sources: Chromium is a metal used mainly for making steel and other alloys and it can be released during welding and cutting stainless steel. It also occurs in leather tanning, textile production, photography, stained glass working, chemicals used as a pigment in paints, inks, and plastics, as an anti-corrosion agent in protective coatings, and in chrome plating.

Chromium (VI) (also known as hexavalent chromium)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Chromium (VI) is carcinogenic to humans. It has been most clearly linked to lung cancer by inhalation in indoor and outdoor air.

Possible sources: Chromium is a metal used mainly for making steel and other alloys and it can be released during welding and cutting stainless steel. It also occurs in leather tanning, textile production, photography, stained glass working, chemicals used as a pigment in paints, inks, and plastics, as an anti-corrosion agent in protective coatings, and in chrome plating.

1,4-Dichlorobenzene (also known as para-Dichlorobenzene)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

1,4-Dichlorobenzene is possibly carcinogenic to humans. It has been linked to an increased risk of tumours of both the liver and kidneys. Individuals may experience this increased risk of cancer as a result of chronically breathing contaminated air containing 1,4-dichlorobenzene.

Possible sources: 1,4-Dichlorobenzene is used as an intermediate in chemical production, as a fumigant and a space deodorant.

1,2-Dichloroethane

(also known as Ethylene dichloride)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

1,2-Dichloroethane is possibly carcinogenic to humans. Individuals may experience this increased risk of cancer as a result of chronically breathing contaminated air containing 1,2- dichloroethane.

Possible sources: 1,2-Dichloroethane is primarily used in the production of vinyl chloride and other chemicals. It is also used as a solvent in closed systems for various extraction and cleaning purposes.

Dichloromethane

(also known as Methylene chloride)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Dichloromethane is possibly carcinogenic to humans. It has been linked to an increased risk of tumours of both the liver and kidneys. Individuals may experience this increased risk of cancer as a result of chronically breathing contaminated air containing dichloromethane.

Possible sources: Dichloromethane is used as a solvent in paint strippers and removers. It is used as a process solvent in the manufacture of drugs, pharmaceuticals, and filmcoatings. It is also used as a metal cleaning and finishing solvent in electronics manufacturing; aerosol propellant, and as an agent in urethane foam blowing. Dichloromethane sources also include landfills and wastewater processing.

Ethylene dibromide

(also known as dibromoethane)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Ethylene dibromide is probably carcinogenic to humans. It has been linked to an increased risk of a variety of cancers in many different organs. Individuals may experience this increased risk of cancer as a result of chronically being exposed to ethylene dibromide by any or all exposure routes. The exposure route of concern to TPH is breathing, as acceptable benchmarks for ethylene dibromide were exceeded in the air.

Possible sources: Ethylene dibromide is used as an intermediate for dyes, resins, waxes, and gums.

Formaldehyde

Rationale for selection: CalEPA Unit Risk and CalEPA CREL Benchmarks Exceeded

Formaldehyde is carcinogenic to humans. It is considered a weak initiator of cancer and a strong promoter of cancer. It is also a highly reactive substance that can be irritating to the nose, eyes, skin, throat and lungs at fairly low levels of chronic exposure. People with asthma may be more sensitive to the irritating effects of inhaled formaldehyde. Individuals may be at an increased risk of these health conditions after being chronically exposed to formaldehyde in the air.

Possible sources: Formaldehyde is used primarily to produce resins used in particleboard products and as an intermediate in the synthesis of other chemicals. It is released from stationary internal combustion

engines and turbines, pulp and paper plants, and other manufacturing facilities. It may also be released when it is used as a fumigant, soil disinfectant, embalming fluid, and leather tanning agent.

Lead

Rationale for selection: High TEP ranking

Lead was identified as a priority using the TEP ranking approach. Lead however, was not found to currently exceed any health-based benchmarks in Toronto's air. This is not unexpected. Due to the physical- chemical properties of lead it has been found in other media (soil, sediment and biota) at levels that exceed health-based benchmarks.

Exposure to lead can lead to health effects in almost every organ and system in the human body, including adverse effects on the reproductive, gastrointestinal, renal, cardiovascular, hematopoietic, immune and nervous systems. These health effects are consistent regardless of the route of exposure (inhalation or ingestion). Chronic exposure mainly affects the nervous system. Symptoms of exposure may include a decrease in neurological function, and damage of the brain and kidneys. Children are especially vulnerable to lead poisoning. Recent science shows that even low levels of exposure to lead have adverse impacts on neurobehaviour in children and on blood pressure in adults. Lead is probably carcinogenic to humans. Exposure to lead may lead to an increased risk of cancer of the kidneys.

Possible sources: Lead is used in the manufacture of batteries. It can be released during combustion of solid waste, coal and oils, and during iron and steel production and lead smelting.

Manganese

Rationale for selection: CalEPA CREL Benchmark Exceeded

Manganese primarily affects the nervous system and neurobehavioral functions in humans. Individuals who are chronically exposed to manganese may experience impairment of motor skills such as difficulty performing fast movements and maintaining balance. TPH is concerned with population exposure as a result of individuals chronically inhaling air contaminated with manganese.

Possible sources: Manganese is used in the production of steel and alloys, batteries, matches, fireworks and as a chemical intermediate. It is also released into the air by combustion of coal and oil and by power plants.

Mercury

Rationale for selection: High TEP ranking

Mercury was identified as a priority using the TEP ranking approach. However, mercury was not found to currently exceed health-based benchmarks in Toronto's air. This is not unexpected. Due to the physical-chemical properties, mercury has been found in other media (soil, sediment and biota) that exceed health-based benchmarks. Once mercury is released into the air it tends to settle in soil and sediments where it is changed to an organic form, methyl mercury, which biomagnifies or concentrates up the food chain, particularly the aquatic food chain. As a result, humans can be exposed to mercury (in the form of methyl mercury) when they consume fish and shellfish.

Mercury is of concern to human health as it can have harmful effects throughout the body. Most notably, mercury is known as a potent human neurotoxin however, exposure has also been linked to an increased risk of reproductive toxicity and cardiovascular disease. Adverse effects on the nervous system are of increased concern for the fetus, infant and child as these subgroups are particularly vulnerable.

Possible sources: Mercury is used in the production of thermometers, barometers, batteries, dental amalgams, fluorescent lights and lubrication oils. It is also released in the combustion of fossil fuels in electric power generation.

Nickel compounds

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Nickel compounds are carcinogenic to humans. Individuals who breathe in air contaminated with nickel are at an increased risk of developing diseases of the respiratory system. These diseases include chronic bronchitis, reduced lung function, and cancer of the lung and nasal sinus.

Possible sources: Nickel compounds are used for electroplating and the production of batteries, industrial plumbing, machinery parts, resistance wiring and chemical catalysts. They are also released from utility oil and coal combustion, nickel metal refining, and lead smelting.

Nitrogen oxides (NO_x)

Rationale for selection: MOE AAQC Benchmark Exceeded

NO_x is the term used to describe a category of chemicals known as nitrogen oxides. The main source of NO_x is human activity as a result of combustion of fossil fuels particularly from vehicles. NO_x is produced by all combustion processes in the presence of air. Nitrogen dioxide, NO₂, was identified as one of five common air pollutants of significant health concern that contributes to the burden of illness from air pollution in Toronto. Individuals are exposed by inhaling air that contains NO₂. NO₂ affects mainly the respiratory system. Exposure leads to a decrease in the lungs' ability to fight infection. Nitrogen dioxide concentrations are associated with daily mortality and hospital admissions as a result of respiratory disease. People with asthma and bronchitis, young children and adults with heart and respiratory disorders are especially sensitive to NO₂ exposure.

Possible sources: Nitrogen oxides are released as a by-product of combustion and from some chemical processes.

Particulate matter 2.5 (PM_{2.5})

Rationale for selection: MOE AAQC Benchmark Exceeded

Particulate matter (PM) is a term used to describe solid and liquid particles found in the air we breathe. These particles are composed of acid aerosols, organic chemicals, smoke, metal fumes, fly ash, dust and pollen. PM that is smaller than 2.5 microns in diameter is called PM_{2.5}. PM_{2.5} leads primarily to irritation of the eyes, throat and lungs. These particles may worsen the condition of those individuals who are afflicted by respiratory conditions, such as asthma, bronchitis, or lung disease, and also affects those with pre-existing cardiovascular disease. Children and the elderly have an increased sensitivity to PM. Particles may also reduce an individual's capacity to combat infection.

Possible sources: PM_{2.5} is released as a by-product of combustion and industrial processes.

Polycyclic aromatic hydrocarbons (PAHs)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded⁷

Polycyclic aromatic hydrocarbons are a group of chemicals that are formed as a result of incomplete burning of organic substances. PAHs are present in the environment as complex mixtures that are difficult to measure and identify. Some PAH-rich mixtures are carcinogenic and some are not. Similarly, some individual PAHs are carcinogenic, and some are not. Benzo[a]pyrene (B[a]P) was used as a surrogate for the group of PAHs when determining cancer potency, because it is the most toxic member of the PAH family of compounds. Individuals may be exposed to a number of PAHs through both ingestion and inhalation. Although food is the major source of exposure to PAHs, since PAHs are a more potent carcinogen when inhaled than ingested, the risk of lung cancer due to inhalation exposure may be higher than the risk of stomach cancer from oral intake.

Possible sources: PAHs are released as a by-product of combustion and certain industrial processes. They are a component of asphalt, coal tar and other bituminous products.

Tetrachloroethylene

(also known as perchloroethylene)

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Tetrachloroethylene is probably carcinogenic to humans. It has been linked to an increased risk of a variety of cancers in several systems of the human body, including both mononuclear cell leukemia and liver tumours. Individuals may experience this increased risk of cancer as a result of being chronically exposed to tetrachloroethylene by inhalation.

Possible sources: Tetrachloroethylene is widely used for dry-cleaning fabrics and textile processing. It is used as a chemical intermediate and in metal degreasing operations. It is also used in the manufacture of paint removers and printing inks, the formulation of adhesives and specialized cleaning fluids, and as aerosols and dye carriers.

Trichloroethylene

Rationale for selection: CalEPA Unit Risk and MOE Proposed AAQC Benchmarks Exceeded

Trichloroethylene is probably carcinogenic to humans. Individuals who are chronically exposed to low levels of trichloroethylene by inhalation, may experience an increased risk of liver, kidney or lung cancer. Chronic exposure may also lead to liver injury and acute central nervous system effects such as headaches and fatigue.

Possible sources: Trichloroethylene is used in industrial degreasing of metal parts, as a chemical intermediate, as an industrial solvent and in the production of consumer products such as paint strippers, adhesives and rug cleaning fluids.

⁷ Air concentration used is the sum of 20 individual PAHs. Benchmarks for benzo(a)pyrene used as a surrogate for the group of substances.

Vinyl chloride

Rationale for selection: CalEPA Unit Risk Benchmark Exceeded

Vinyl chloride is considered a human carcinogen. Exposure to vinyl chloride shows a strong and consistent association primarily with cancer of the liver. People may experience this increased risk of cancer as a result of breathing air contaminated with vinyl chloride.

Possible sources: Vinyl chloride is primarily used to make polyvinyl chloride (PVC) plastic which is then used to make a variety of plastic and vinyl products. A smaller portion of vinyl chloride is used in furniture and automobile upholstery, wall coverings, housewares and automotive parts.

Volatile organic compounds (VOCs)

Rationale for selection: Contributor to ground-level ozone

VOCs are a group of organic chemicals that easily evaporate into the air from their direct use, from products containing them, or as a by-product of industrial processes. VOCs react with other pollutants to create ozone, a major contributor to smog. Ozone has been associated with acute symptoms like coughing and wheezing as well as more chronic conditions such as asthma and chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema. In 2004, TPH reported that exposure to five common smog pollutants, including ozone, contributed to about 1,700 premature deaths and 6,000 hospitalizations of Toronto residents each year. While VOCs can act as precursors of smog, they can also be toxic and impact directly on human health. People who chronically breathe air contaminated with VOCs may experience an increased risk of cardiovascular and respiratory problems.

Possible sources: VOCs easily evaporate into the air from their direct use, from products containing them or as by-products of industrial processes. Since there are many hundreds of VOCs it is somewhat difficult to summarize all possible sources. The most common sources however, include vehicle use, fossil fuel combustion, steel-making, petroleum refining, fuel-refilling, industrial and residential solvent use, paint application, manufacturing of synthetic materials (e.g. plastics, carpets), food processing, agricultural activities and wood processing and burning.

Conclusion

It is clear from this brief review, that based on current science and known contaminant levels in Toronto's air currently, the priority substances may adversely impact on Toronto's population in a variety of ways. Tracking information on the use and release of these chemical substances from local facilities is necessary to improve understanding of health hazards, stimulate businesses to prevent pollution, and to enable governments and the public to make better decisions to protect health.

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Appendix 2: Draft Environmental Reporting and Disclosure Bylaw

DRAFT FOR DISCUSSION PURPOSES ONLY

Authority: Community Council/Committee Item No., as adopted by City of Toronto Council
on

Enacted by Council:

CITY OF TORONTO

Bill No.

BY-LAW No. -

To adopt a new Municipal Code Chapter 423, Environmental Reporting and Disclosure.

WHEREAS the use of a toxic substance may result in its direct or unintended release to the environment; and

WHEREAS toxic substances in the workplace and the environment can have an adverse impact on the health, safety and well-being of persons, and on the economic, social and environmental well-being of the City of Toronto; and

WHEREAS the Medical Officer of Health for the City of Toronto Health Unit has determined that health and environmental risks from pollution can be reduced by enhanced reporting of toxic substances by Toronto businesses, and improved access to environmental information on toxic substances; and

WHEREAS the citizens of Toronto should know the identity and amounts of toxic chemicals that are released in to the workplace and in to the environment through chemical releases to the air, water and land in their community; and

WHEREAS the *City of Toronto Act, 2006* (the “Act”) provides that Council may pass by-laws in respect of the health, safety and well-being of persons and the economic, social and environmental well-being of the City; and

WHEREAS the Act further provides that Council may pass by-laws to establish a system of escalating fines;

The Council of the City of Toronto HEREBY ENACTS as follows:

1. Schedule A to this by-law is enacted as Chapter 243, Environmental Reporting and Disclosure, of the City of Toronto Municipal Code.

ENACTED AND PASSED this day of , A.D. 2008.

SANDRA BUSSIN,
Speaker

ULLI S. WATKISS
City Clerk

(Corporate Seal)

SCHEDULE A TO BY-LAW No. -2008

Chapter 243

ENVIRONMENTAL REPORTING AND DISCLOSURE

ARTICLE I
Interpretation

§ 243-1. Definitions.

As used in this chapter, the following terms shall have the meaning indicated:

ACCOMMODATION SERVICES — Includes hotels and motels.

ARTICLE — A manufactured item that does not release a priority substance when it undergoes processing or other use.

BY-PRODUCT — A priority substance which is incidentally manufactured, processed or otherwise used at the facility at any concentration and released on site to the environment.

CONCENTRATION THRESHOLD — The concentration of a priority substance expressed as a weight to weight ratio set out in column 3 of Schedule A.

DWELLING UNIT — Real property used or designated for use as a home or as a place in which one or more persons may sleep.

ENVIRONMENT — The air, land or water of the City of Toronto.

FACILITY — A building, equipment, structure, and other stationary items that are located on a single site or on contiguous or adjacent sites and that are owned and are operated by the same person, or by a person who controls, is controlled by, or is under common control with such person, but does not include a dwelling unit.

INSPECTOR — Any person undertaking an inspection required for the purposes of the enforcement of this chapter, and shall include a by-law enforcement officer, or officer, employee or agent of the City of Toronto or a local board of the City of Toronto, or any member of the Toronto Police Service.

MANUFACTURE — To produce, prepare or compound a priority substance and includes the coincidental production of a priority substance as a by-product.

MASS REPORTING THRESHOLD — The threshold value for each priority substance set out in column 2 of Schedule A.

MEDICAL OFFICER OF HEALTH — The Medical Officer of Health for the City of Toronto Health Unit or his or her delegate.

NATIONAL POLLUTANT RELEASE INVENTORY — The most current National Pollutant Release Inventory Canada Gazette Notice.

OTHER USE AND OTHERWISE USED — Any use, disposal or release of a priority substance at a facility that does not fall under the definitions of manufacture or process. This includes the use of the priority substance as a chemical processing aid, manufacturing aid or some other use.

PERSON — Includes a corporation, partnership or any other business association, as well as an individual.

PARTICULATE MATTER 2.5 (PM_{2.5}) — Particulate matter with a diameter less than or equal to 2.5 micrometres.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) — One or more substances listed in Schedule 1, Part 2 of the National Pollutant Release Inventory, as may be amended from time to time.

PRIORITY SUBSTANCE — A substance or group of substances identified in Schedule A, but does not include a substance that is:

- A. Present in an article;
- B. Used as a structural component of a facility;
- C. Present in a product used for routine janitorial, facility building or grounds maintenance;
- D. Present in personal items used by persons at a facility;
- E. Present in emissions from vehicles;
- F. Present in intake water or air;
- G. Present in road dust;
- H. Present in emissions from building heating systems or hot water heaters but does include emissions from process equipment;

- I. Present in materials used for the purpose of maintaining motor vehicles operated by the facility.

PRIORITY SUBSTANCE USER — A person who owns or operates a facility that releases, manufactures, processes or otherwise uses any priority substance.

PROCESS — The preparation of a priority substance, after its manufacture, for commercial distribution and includes the preparation of a substance in the same physical state or chemical form as that received by the facility, or preparation which produces a change in physical state or chemical form.

RELEASE — The emission or discharge of a priority substance, whether intentional, accidental or coincidental, from a facility into the environment.

REPORT — A report to the Medical Officer of Health submitted in a form and in a manner prescribed by the Medical Officer of Health.

STATEMENT OF CERTIFICATION — A statement made by a person reporting information pursuant to this chapter or on behalf of a person required to report, stating that the information in the report is true, accurate and complete.

TRANSFER — Sending a priority substance off site for recycling or treatment including treatment in a municipal water treatment facility.

TREATMENT — Subjecting the priority substance to physical, chemical, biological or thermal processes at a location off the facility site prior to final disposal.

VOLATILE ORGANIC COMPOUNDS (VOCs) — Volatile organic compounds as defined in item 65 in the List of Toxic Substances in Schedule 1 of the *Canadian Environmental Protection Act, 1999*, as may be amended from time to time.

ARTICLE II

Duty to Report

§ 243 -2. Duty to report.

- A. A priority substance user for each facility shall submit a report in relation to a priority substance listed in Group A of Schedule A that is released, manufactured, processed or otherwise used at that facility,
- (2) If the priority substance was manufactured, processed or otherwise used in a quantity equal to or greater than the mass reporting threshold for the substance; and

- (3) The concentration by weight of the substance was equal to or greater than the concentration threshold for the substance, unless the substance is a by-product or there is no corresponding value set out in Schedule A for the substance.
 - (3) For the purposes of Subsection A(2), by-products shall be included in the calculation of the mass reporting threshold of the priority substance, regardless of concentration.
- B. A priority substance user for each facility shall submit a report in relation to Polycyclic Aromatic Hydrocarbons (Group B of Schedule A) when,
 - (1) There is a release, disposal and/or transfer for recycling of one or more Polycyclic Aromatic Hydrocarbons from a facility if the sum total of the Polycyclic Aromatic Hydrocarbons released on site, disposed of, and/or transferred off site for recycling as a result of manufacturing, processing or other use is 10 kg or more; or
 - (2) There is a release, disposal and/or transfer for recycling of any quantity of Polycyclic Aromatic Hydrocarbons from a facility if:
 - (a) The priority substance user carried out at any time wood preservation using creosote at that facility; and
 - (b) The Polycyclic Aromatic Hydrocarbons were released on site, disposed of and/or transferred off site for recycling as a result of wood preservation using creosote.
- C. A priority substance user for each facility shall submit a report in relation to a priority substance listed in Group C of Schedule A when there is a release to air of the substance from a facility in a quantity equal to or greater than the mass reporting threshold for that substance.
- D. The reports referred to in Subsections A, B and C shall be submitted annually and shall be submitted to the Medical Officer of Health by June 30 of the year following the calendar year covered by the reporting in a form and in a manner prescribed by the Medical Officer of Health.

§ 243-3. Exemptions from reporting requirement.

The duty to report in § 2 does not apply to the following facilities:

- A. Facilities engaged solely in retail sales;
- B. Medical or dental offices;
- C. Construction and building maintenance sites;

- D. Accommodation services, but applies to laundry and dry cleaning facilities located within such facilities;
- E. Food services;
- F. Facilities for the distribution, storage or retail sale of fuels; or
- G. Facilities for the maintenance and repair of vehicles, such as automobiles, trucks, locomotives, ships or aircraft, but applies where painting or stripping of vehicles or their components, or the rebuilding or remanufacturing of vehicle components is conducted at the facility.

§ 243-4. Content of report.

In addition to information prescribed by the Medical Officer of Health, a report required under this chapter shall be true, accurate and complete, and shall include:

- A. The name and location of the facility;
- B. Contact information regarding the person at the facility responsible for the report;
- C. A statement of certification in a form prescribed by the Medical Officer of Health;
- D. The quantity of each priority substance manufactured, processed or otherwise used;
- E. The quantity of each priority substance released to the environment; and
- F. The methods used to calculate the quantity of each priority substance.

§ 243-5. Record-keeping.

The information upon which reports referred to in this chapter are based shall be retained for a minimum of five years from the date the report is submitted and, upon request, shall be provided to the Medical Officer of Health for audit purposes.

ARTICLE III Inspections

§ 243-6. Inspections

- A. Subject to compliance with section 377 of the *City of Toronto Act, 2006*, an inspector may enter in or upon the property of a facility at any reasonable time for the purposes of inspecting the facility and determining whether this chapter is being complied with, and may for that purpose:

- (1) Require the production for inspection of documents of things relevant to the inspection;
- (2) Inspect and remove documents and things relevant to the inspection for the purpose of making copies or extracts;
- (3) Require information from any person concerning a matter related to the inspection; and
- (4) Alone or in conjunction with a person possessing special or expert knowledge, make examinations or take tests, samples or photographs necessary for the purposes of the inspection.

ARTICLE IV **Access to Information**

§ 243-7. Access to information.

- A. All information submitted to and collected by the City in a report will, except as otherwise provided in this section, be available for disclosure to the public in accordance with the *Municipal Freedom of Information and Protection of Privacy Act* (MFIPPA).
- B. Where information submitted to the City or to the Medical Officer of Health in any form, as required under this chapter, is confidential or proprietary or may otherwise be exempt from disclosure under MFIPPA, the person submitting the information shall identify that information upon its submission to the City or to the Medical Officer of Health and shall provide sufficient details as to the reason for its purported exemption from disclosure.
- C. Public access to information reported pursuant to this chapter, unless such access is restricted by MFIPPA, shall be provided on the basis that the City of Toronto makes no representation or warranty as to the accuracy or completeness of the information so provided.

ARTICLE V **Penalty**

§ 243-8. Offence.

Every person who contravenes the provisions of this chapter and every director or officer of a corporation who knowingly concurs in a contravention of the provisions of this chapter by the corporation, is guilty of an offence and is liable to a fine of not more than:

- A. \$5,000 for a first offence;
- B. \$25,000 for a second offence; or
- C. \$100,000 for a third or subsequent offence.

§ 243-9. Implementation.

This by-law comes into force on January 1, 2010.

SCHEDULE A TO CHAPTER 243
Priority Substances, Mass Reporting Thresholds and Concentration Thresholds

Chemical Name	CAS No. ^{b.}	Mass Reporting Threshold kg/yr	Concentration Threshold % w/w
<i>GROUP A</i>			
Acetaldehyde	75-07-0	100	1.0
Acrolein	107-02-8	100	1.0
Benzene	71-43-2	100	1.0
1,3-Butadiene	106-99-0	100	1.0
Cadmium ^a	7440-43-9	1.0	0.1
Carbon tetrachloride	56-23-5	100	1.0
Chloroform (Trichloromethane)	67-66-3	100	1.0
Chromium, Hexavalent ^a	7440-47-3	10	0.1
Chromium, Non-hexavalent ^a	-	100	1.0
1,2-Dibromo ethane (Ethylene dibromide)	106-93-4	100	1.0
1,4-Dichlorobenzene	106-46-7	100	1.0
1,2-Dichloroethane (Ethylene dichloride)	107-06-2	100	1.0
Dichloromethane (Methylene chloride)	75-09-2	100	1.0
Formaldehyde	50-00-0	100	1.0
Lead ^a	7439-92-1	10	0.1
Manganese ^a	7439-96-5	10	1.0
Mercury ^a	7439-97-6	1.0	0.0
Nickel ^a	7440-02-0	100	1.0
Tetrachloroethylene (Perchloroethylene)	127-18-4	100	1.0
Trichloroethylene	079-01-6	100	1.0
Vinyl chloride	75-01-4	100	1.0
<i>GROUP B</i>			
Polycyclic Aromatic Hydrocarbons (PAHs)	-	10 ^d	n/a ^e
<i>GROUP C</i>			
Nitrogen Oxides ^c (NO _x)	11104-93-1	200	n/a
Particulate Matter 2.5 (PM _{2.5})	-	30	n/a
Volatile Organic Compounds (VOCs) total	-	100	n/a

a. and its compounds, expressed as the metal

b. Chemical Abstracts Service Registry Number

c. NO + NO₂, expressed as NO₂

d. PAHs released as a result of wood preservation using creosote must be reported even if below the mass reporting threshold

e. n/a = not applicable

Appendix 3: Feedback from January 2008 Stakeholder Consultations

Introduction

Over the past three years, Toronto Public Health (TPH) has consulted extensively with businesses, residents, community organizations, agencies representing workers, governments and City staff on the development of an Environmental Reporting, Disclosure and Innovation Program. Consultation has included interviews, focus groups and meetings.

In January 2008, the Medical Officer of Health (MOH) released a draft framework for an Environmental Reporting, Disclosure and Innovation Program to stakeholders for a 30-day comment period. The framework reflected previous feedback from the Board of Health and stakeholders.

Over 500 stakeholders provided written comments on the proposed reporting program. This report presents key findings from the consultation and describes how TPH has integrated these views into the current proposal being recommended to the Board of Health.

How TPH Consulted Stakeholders

The January 2008 consultation was part of a process that engaged stakeholders since 2005. Figure 1 illustrates the main activities TPH undertook to identify and consult those who may be affected by this program.

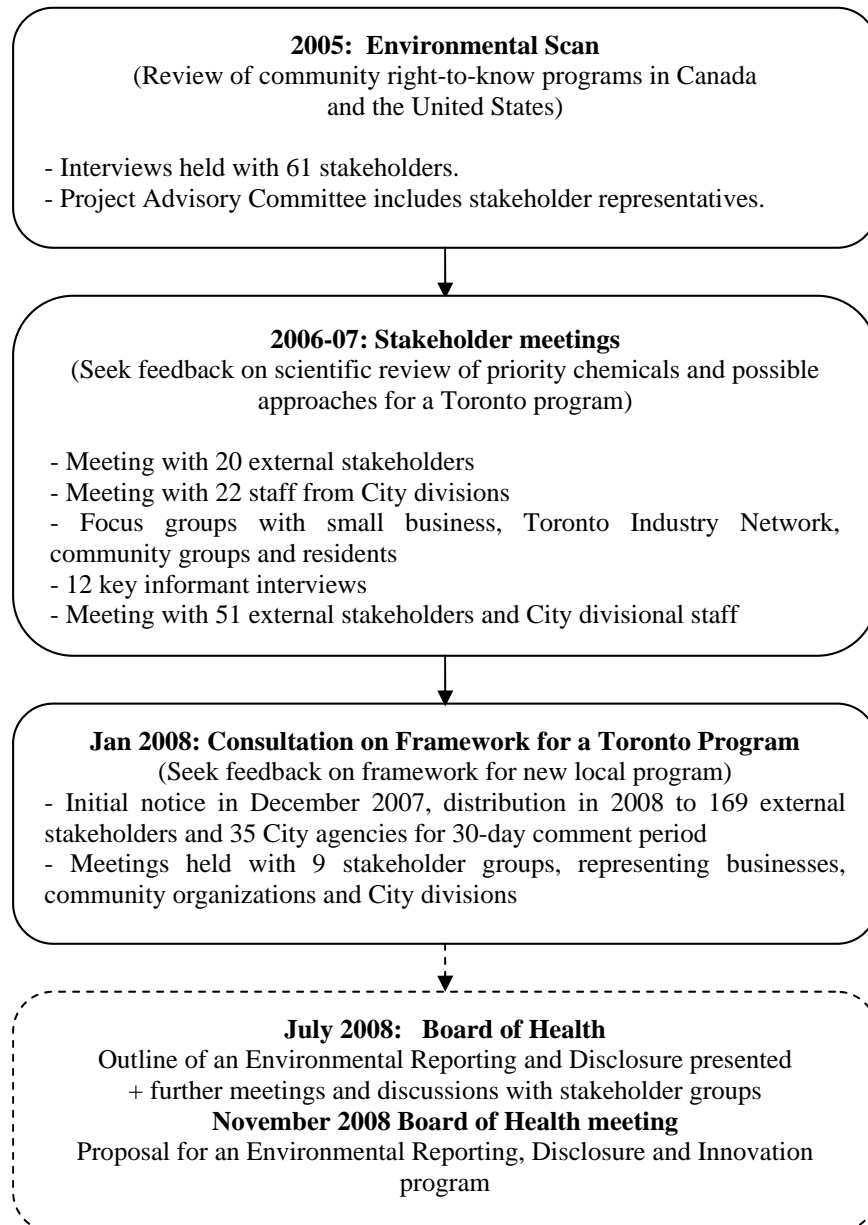
To identify stakeholders for its January 2008 consultation, TPH reviewed lists from previous consultations, requested lists and advice from Economic Development and other City divisions and contacted associations representing all of the business sectors and community interests that were anticipated to be affected by the program. In December 2007, TPH informed these stakeholders via email, phone and a website posting, that it would release a proposal for public comment, and invited them to identify additional parties to whom TPH should send the document. Based on this early work, on January 7, 2008, TPH posted the consultation document⁸ and background information on its webpage and emailed it to 35 city agencies and 169 known stakeholders. Stakeholders were offered 30 days to submit comments on the proposal. TPH also accepted comments after this time.

During the consultation period, the document was further circulated with the assistance of many stakeholders, including the Toronto Association of Business Improvement Areas (TABIA) and several health, environmental and worker organizations. TPH also held individual meetings with 9 key stakeholder groups, including TABIA, the Toronto

⁸ Consultation document and background information are available at www.toronto.ca/health/hphe/enviro_info.htm

Industry Network, E.I. DuPont Canada, the Korean Drycleaners Association and the Toronto Cancer Prevention Coalition.

Figure 1: Overview of stakeholder consultation



In the consultation document, the following questions were asked:

To business and government sectors:

1. *In what ways might the proposed program impact your business?*
2. *Do you think your business would be required to report to the City the use or release of any of the 25 chemical substances described in this document? If yes, please estimate how many chemicals you may report.*

3. *What assistance would be helpful to your business to report on the chemical substances proposed in the Environmental Reporting and Disclosure Program?*
4. *Does your business currently report the use or release of these chemicals or any other substances through an existing environmental reporting program? If yes, please indicate which program(s):*
 - a. *National Pollutant Release Inventory (NPRI)*
 - b. *Ontario Regulation 127/01 (under the Ontario Environmental Protection Act)*
 - c. *City of Toronto Sewer Use Bylaw*
 - d. *Other (please describe)*
5. *Would 'pollution prevention' information be helpful to your business operations? If yes, what type of assistance would be most helpful?*
6. *How could the City make the information, collected under this program, accessible, understandable and relevant for users?*
7. *Any additional comments?*

To residents, community organizations and other stakeholders:

1. *In what ways might the proposed program impact you or your community/organization?*
2. *How would you make use of the information collected through the Environmental Reporting and Disclosure Program?*
3. *How could the City make the information accessible, understandable and relevant for users?*
4. *Any additional comments?*

TPH received feedback by e-mail and mail.

Summary of Stakeholder Feedback

TPH received 541 written submissions on the proposal:

- 461 from residents
- 33 from community organizations
- 6 from agencies representing workers (e.g. unions, occupational health clinics)
- 31 from businesses or business associations
- 10 from City agencies, boards, commissions, corporations or divisions (ABCCDs)

A list of stakeholders (except residents) that submitted feedback is included at the end of this report.

Areas of Stakeholder Agreement

There was general support from all stakeholders for:

1. the program's intent to stimulate pollution prevention among local facilities, citing the potential social, health and economic benefits of environmental innovations;
2. the value of environmental information for protecting health, educating the community, encouraging pollution prevention and helping businesses and the community;
3. an approach that supported and engaged all users, from residents to businesses.

Areas of Stakeholder Disagreement

Stakeholder views differed on whether the proposal outlined by TPH was the best way to accomplish the program's goal.

- Residents, agencies representing workers, and health and environmental organizations supported the approach being proposed, identifying many health, environmental and economic benefits of the program.
- Most businesses and many City ABCCDs opposed a new bylaw and favoured a voluntary approach. Many sought additional details before offering more specific feedback. Notwithstanding their opposition to a regulatory approach, many businesses made helpful suggestions for improving the proposed approach.

Resident Feedback

461 Toronto residents submitted written comments on the proposed program. All but one expressed strong support for the program.

Main points:

- Program has many benefits:
 - protects the environment
 - helps build a local environmental protection strategy
 - protects the health of the community
 - helps residents make informed choice about where to live and work
 - helps develop research questions
- City should consider the most cost-effective implementation strategy
- Data should be:
 - Easily accessible via variety of electronic and non-electronic formats
 - Available as raw data, interpreted summaries and in map-based displays
 - Searchable by location, chemical and company
 - Available (at least in summary form) in major languages spoken in Toronto

Selected comments:

"The program would provide the relevant information needed in order to confidently approach and negotiate with businesses in my community in an effort to decrease their toxic harm."

"I am hugely in favor of the proposed new Environmental Reporting and Disclosure bylaw. As a concerned citizen, parent of two young children, and a long time asthma patient, I believe this bylaw will be a big step toward ensuring the health and safety of the public put in danger by the chemical substances in our environment."

"I would choose among services, such as dry cleaners, on the basis of their ability to reduce or eliminate harmful emissions."

“The bottom line for me is that you ‘get what you measure,’ and this proposal would be an initial step towards gathering the data required to make informed decisions in the future.”

Community Organization Feedback

Thirty-three community organizations, including health agencies, ratepayers and neighbourhood associations and environmental groups, submitted written comments. All expressed strong support for the proposed program.

Main points:

- Echoed benefits raised by residents
- Chemical regulation is increasing globally to reflect scientific learning and public concern over avoidable health risks – Toronto’s program is part of this change, and will make the City a global leader
- More types of workplaces and chemicals should be tracked by the program, or at least TPH should identify how more chemicals or facilities could be added in the future
- Urged easily accessible data for variety of users

Selected comments:

“The information...will enable physicians in Toronto to become much better informed about contaminants in their areas...”

“As a group committed to working to prevent cancer we support this by-law as a significant step to reducing the risk of cancer by reducing environmental exposure to potential carcinogens.”

“When governments support community, consumers and business groups by helping them to identify where and what the hazardous chemicals are, knowledge bases are broadened and solutions can be created.”

“It is essential that this information be presented to the public in a meaningful way. Lists of chemical names and concentrations are a good first step, but the public needs to know what the different chemical levels means and what type of health risk or danger they pose.”

“...to better understand sources of pollutants within Toronto is it also necessary to know sources located outside of the City’s borders. Toronto’s by-law would be a stimulus to improve data availability beyond its borders.”

“... concerned residents and business owners committed to their communities are the best guarantee of safe and healthy neighbourhoods.”

Worker Feedback

Six worker agencies, including unions, occupational health clinics and legal agencies, commented on the proposal. All supported the proposal.

Main points:

- Program is necessary because it will provide more information to workers and the community than what is currently provided by the Workplace Hazardous Materials Information System (WHMIS) program. Compared to WHMIS, this program would allow workers, particularly those in workplaces with poor health and safety programs, to more easily investigate what substances are being used and what their individual exposures might be.
- New immigrants to Toronto often work in workplaces with poor access to information about the substances that they may be working with. This program would allow these workers to seek information without fear of reprisals from employers.
- Program would be an important step in an essential municipal strategy to engage our local manufacturing sector in innovations and modernization, to ensure employment.

Selected comments:

“This program would honor a community and worker’s right to know about potential hazardous exposures and health and environmental risks we face, so that we can make informed decisions regarding where we work and live.”

“By educating our workers and communities about toxic chemical exposure and their environmental and health effects, community members and workers have an incentive to work together to reduce risk and prevent exposure.”

“Put simply, this program will provide the tools required for businesses, workers and community members to work together to green Toronto’s businesses.”

“Cost savings to companies could be realized through safer conditions for workers and lower compensation claims due to occupational diseases.”

“...this information could be extremely useful in the diagnosis and treatment of occupational disease within the community.”

“While community right to know will not end the crisis in manufacturing in our city, it is a good first step towards creating an environment in which manufacturing has a future here.”

“Many of our clients work in unorganized workplaces where health and safety procedures are not followed...many are not even aware of their rights to a healthy and safe working environment. For those who try to enforce their rights, they often face reprisal from their employers.”

Businesses and Business Association Feedback

TPH circulated the document to 101 business stakeholders, representing all sectors that may be affected by this program. Where possible individual facilities were contacted, in other cases TPH engaged their businesses associations. Thirty-one businesses or sector

associations offered their comments on the proposal. Most supported the intent of the program but opposed a regulatory approach. Many sought additional clarification before offering more specific comments, and offered suggestions for alternative approaches.

Main points:

- Concerns with program:
 - adds to existing burden of reporting to federal, provincial and City programs
 - duplicates information currently being collected by other governments
 - certain sectors (e.g. autobody and automotive coatings manufacturers) are facing changes to federal or provincial laws that will burden facilities and stimulate pollution prevention better than a bylaw
 - usage information could compromise corporate confidentiality and could be used for criminal activity
 - certain substances or sectors should be exempted while others should be added
 - little public interest in information currently collected, so no reason to collect more
 - public will be unable to understand or respond appropriately to information that is made available to them
 - small and medium-sized businesses will be hardest hit economically
- If the City decides to proceed with the program, the City should:
 - provide contextual information to minimize public overreaction
 - establish clear health priority for the programs
 - ensure adequate educational programs and enforcement resources to support participation and compliance of smaller operations
 - consolidate services to business – single web portal, coordinated City team for businesses to access, no duplication of requirements
 - clarify how data will be used
 - clarify costs to City and to businesses
 - pilot the program in certain sectors before proceeding with the full list of substances and sectors

Selected comments:

“A blanket by-law compelling all but exempted businesses that use chemicals to report usage and emissions will be costly to administer, be very disruptive and difficult to enforce.”

“...(company name) recommends that TPH abandon the traditional by-law approach and work with other City divisions to develop an incentive package that will encourage businesses to reduce their environmental footprint.”

“...(company name) fully supports this proposed reporting structure. With the cooperative efforts of all involved, the program can assist all in creating a safe environment. We look forward to having the opportunity to work alongside the City of Toronto in this very important endeavour.”

“We believe the current regulatory controls in place for the chemical industry by Federal and Provincial regulators adequately protect the health of the citizens of the City of Toronto.”

“...without addressing the management of toxics, additional information on emissions made available to the community may only serve to further frustrate the public who are likely equally interested in what businesses are doing to curb emissions.”

“Should an environmental issue (be) taken care of, the party to be affected should be taken care of too.”

“Although the objectives of these programs are noble and important, governments are imposing significantly greater administrative burden on manufacturers at a time when we are struggling for our very survival.”

“As the regulatory requirements increase, simplicity is paramount to their ability to stay in business and earn a profit.”

City ABCCD Feedback

Ten ABCDDs submitted written comments. Overall, they support the program’s intent to stimulate pollution prevention and environmental best practices by Toronto businesses and those that regularly examine environmental contaminants would welcome the additional data that the program would generate. However, some divisions strongly oppose a new bylaw and recommend new voluntary incentives program to stimulate environmental innovation.

Main points:

- environmental information would be useful to relate to the monitoring data currently collected by some ABCCDs, and help to inform outreach programs and other initiatives to reduce environmental contamination
- some ABCCDS are concerned about adding to existing burden of reporting for their facilities
- City should provide ABCCDs with financial and technical resources to enable compliance, and facilitate more intradivisional collaboration to assess combined facilities and operations
- Will unfairly burden Toronto businesses and encourage some to leave the City for the GTA.

Selected comments:

“(ABCCD) supports the idea of openness and transparency. (ABCCD) would be happy to have information on its chemical usage and emissions made publicly available.”

“The information collected could assist with risk management and improve Health and Safety by minimizing exposure.”

“We would hope that there is a systematic method of reporting, corporate database created/developed for maintaining and accessing the collected information and user-friendly reporting tool for submitting the data.”

“Our Division, as might others, may require assistance in carrying out assessments, estimation and/or monitoring of released chemicals.”

“In lieu of a proposed by-law... recommends that the City encourage a phased approach to deliver a much more comprehensive program...”

“...the proposed Environmental Reporting and Disclosure Program (should) be replaced with an Environmental Incentive Program for Industry.”

Responding to Stakeholder Concerns

The proposal circulated in January 2008 reflected feedback from earlier consultation with businesses and community agencies. For example, TPH proposed linkages to the federal government's OWNERS reporting system after hearing the need for simple electronic reporting, particularly from facilities already reporting to the National Pollutant Release Inventory. TPH also proposed an accessible web-based disclosure system to enable maximum involvement with the community.

Table 1 describes how the MOH's current recommendations and draft bylaw reflect the feedback from stakeholders from this recent 2008 round of consultations:

Table 1: Incorporating Stakeholder Feedback into the Proposed Program

Key Stakeholder Views and Recommendations	How Feedback is Addressed in the Proposed Program
Ensure effective public disclosure <ul style="list-style-type: none">Information must be accessible, easy to understand and relevant for users.	<p>Like the NPRI, Toronto will have a searchable website that will enable users to search data by chemical, facility and neighbourhood and see results in map-based and table format.</p> <p>Data will be linked to authoritative third-party information related to chemicals, health and environmental impacts.</p> <p>TPH will compile and interpret data in annual electronic and hard-copy report. Summaries will be translated into top Toronto languages.</p>

<ul style="list-style-type: none"> • Provide context to data so residents are not unnecessarily alarmed or business operations misinterpreted. • Disclosure must protect business competitiveness and public security. 	<p>TPH will promote program to public so they can understand how it works and become meaningfully engaged.</p> <p>Businesses will have the option to provide contextual information about their pollution prevention programs.</p> <hr/> <p>The proposed bylaw contains confidentiality provisions, subject to the requirements of the <i>Municipal Freedom of Information and Protection of Privacy Act</i>.</p>
<p>Avoid duplication with existing regulations</p> <ul style="list-style-type: none"> • Proposed program duplicates current chemical reporting requirements of other governments. • Chemicals are already well-regulated by all levels of government • Consider voluntary approach instead of a bylaw 	<p>TPH has conducted additional reviews of existing regulations and confirmed that the proposed program does not duplicate the reporting requirements of other policies. Where policies are most comparable (e.g. the NPRI), TPH has avoided duplication through integrated electronic reporting.</p> <hr/> <p>The program complements existing chemical regulations.</p> <p>The program will focus on local businesses, particularly small and medium-sized facilities, which are less active in pollution prevention activities.</p> <hr/> <p>Bylaw is necessary to ensure level playing field for facilities, and that program would collect sufficient data.</p> <p>TPH will consider, in consultation with stakeholders, incentives or recognition programs to encourage voluntary pollution prevention activities by facilities</p>
<p>Minimize impact on facilities</p> <ul style="list-style-type: none"> • Adds to administrative costs of business, particularly for small and medium-sized facilities. 	<p>TPH will minimize reporting burden, particularly in the first years, through training workshops, bylaw guidance documents, sector-specific reporting guides, electronic calculators to</p>

**List of Stakeholders that Submitted Written Comments
(not including 461 residents)**

BUSINESS & BUSINESS ASSOCIATIONS:

1. Baking Association of Canada
2. BASF Canada
3. Canadian Manufacturers and Exporters
4. Canadian Plastics Industry Association
5. Careful Hand Laundry
6. Chemtura Ltd.
7. Dominion Colour Corporation
8. E.I. DuPont Canada
9. Enwave Energy Corporation
10. Halogenated Solvents Industry Alliance Inc.
11. Hamilton District Autobody Repair Association
12. Korean Drycleaners Association
13. Maple Leaf Foods
14. Nestle Canada Confectionary – Sterling Road
15. Ontario & Toronto Automobile Dealers Association
16. Ontario Association of Cemetery and Funeral Professionals
17. Ontario Energy Association
18. Ontario Environment Industry Association
19. Ontario Fabricare Association
20. Ontario Funeral Service Association
21. ORTECH Environmental
22. Pinchin Environmental
23. Portlands Energy Centre
24. Sanofi Pasteur
25. Teknion Corporation
26. Toronto and District Funeral Directors Inc.
27. Toronto Industry Network
28. Unidentified business
29. Unidentified business
30. Vacuum Metallizing Limited
31. Vinyl Council of Canada

LABOUR UNIONS & AGENCIES REPRESENTING WORKERS

1. Occupational Health Clinics for Ontario Workers Inc.
2. Toronto and York Region Labour Council
3. Toronto Workers' Health and Safety Legal Clinic
4. Unidentified legal clinic
5. UNITE HERE Local 75
6. United Steelworkers

NON-GOVERNMENTAL ORGANIZATIONS

1. Canadian Association of Physicians for the Environment

2. Canadian Cancer Society
3. Canadian Environmental Law Association
4. Canadian Institute for Environmental Law and Policy
5. David Suzuki Foundation
6. Don Watershed Regeneration Council
7. East Toronto Climate Action Group
8. EcoSchool Committee, Northern Secondary School
9. Environmental Health Clinic, Women's College Hospital
10. Etobicoke-Mimico Watersheds Coalition
11. Great Lakes United
12. Green Enterprise Toronto
13. Harbord Village Residents' Association
14. Humber Watershed Alliance
15. Indoor Air Quality Work Group
16. International Institute of Concern for Public Health
17. Joint Watershed Working Committee
18. Labour Environmental Alliance Society
19. Mount Dennis Community Association
20. North Leaside Residents' Association
21. Ontario Bar Association
22. Pollution Watch
23. South Riverdale Community Health Centre
24. St. Lawrence Neighbourhood Association
25. St. Stephen's Community House
26. The Canadian Partnership Against Cancer
27. The Environmental Hypersensitivity Association of Ontario
28. The Safe Sewage Committee / The Ashbridges Bay Treatment Plant
Neighbourhood Liaison Committee
29. The Taylor Massey Project
30. Toronto Cancer Prevention Coalition
31. Toronto Energy Coalition
32. Toronto Environmental Alliance
33. York Quay Neighbourhood Association

CITY OF TORONTO ABCCDs

1. Economic Development, Culture and Tourism
2. Ted Reeve Arena
3. Toronto and Region Conservation
4. Toronto District School Board
5. Toronto Fleets
6. Toronto Hydro Corporation
7. Toronto Police Service
8. Toronto Transit Commission
9. Toronto Water
10. Transportation Services

Appendix 4: Evaluation Framework for Environmental Reporting, Disclosure and Innovation Program

GOAL:

To improve and protect health through reduced exposure to toxic substances, particularly in the air.

BY-LAW:

Affected businesses must provide information to the City each year if they use or release a certain amount of any of the priority substances.

POPULATIONS OF INTEREST:

The by-law is intended to protect the health of all inhabitants of Toronto. Activities related to implementation of the by-law are directed at businesses in Toronto that use or release the priority substances. Public access to data is intended to inform the community at large, health, environmental, labour and government organizations as well as the business community.

COMPONENTS:

Data Collection/Reporting and Enforcement

Use and Access to the Data

ACTIVITIES:

- Ensure facilities aware of the bylaw
- Ensure facilities assess, collect and report the data
- Encourage facilities to consider pollution prevention activities
- Survey facilities
- Conduct enforcement/audits

- Analyse and identify trends
- Make reports available for the public and key stakeholders
- Educate facilities about pollution prevention options

SHORTER-TERM RESULTS:

- Facilities motivated to comply with by-law
- Facilities aware of pollution prevention (P2) resources/less toxic alternatives
- Facilities pursuing P2 plans

- Informed public participation in environmental health policy and improved collaboration with local industries
- Industry monitors toxics use and improved collaboration with public on reduction plans
- Improved government initiatives related to healthy public policies

Change in use of the priority substances:

- Reduction in use & release of priority substances
- Increased use of less toxic alternatives

Change in overall environmental performance (e.g. energy and water efficiency, greenhouse gas reduction)

LONGER-TERM IMPACT:

Reduced adverse health and environmental impacts from decreased exposure to priority pollutants.