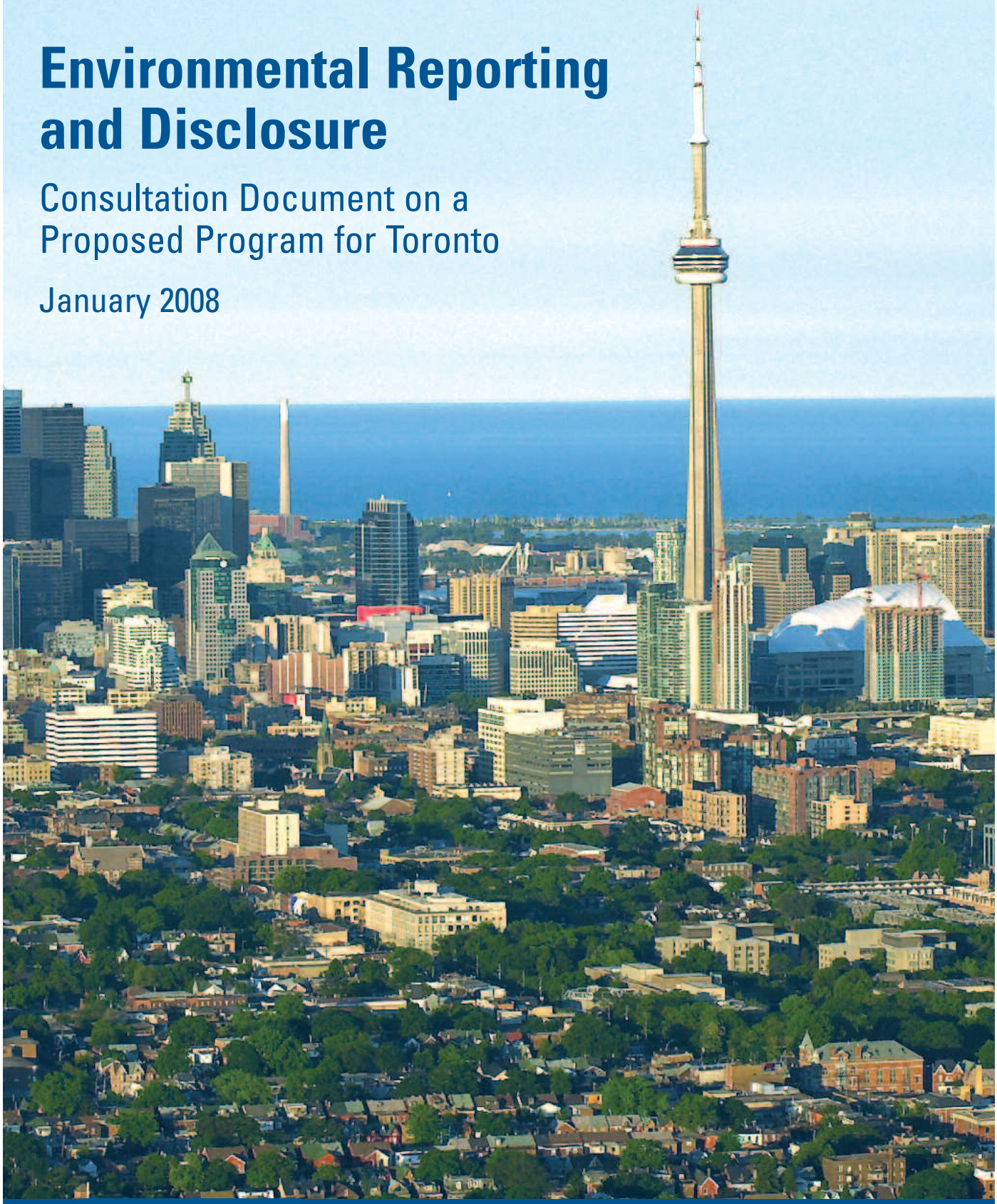
Environmental Reporting and Disclosure

Consultation Document on a Proposed Program for Toronto

January 2008



416.338.7600 toronto.ca/health

TORONTO Public Health

Seeking Comments on a Proposed City of Toronto Environmental Reporting and Disclosure Program

January 7, 2008

Toronto Public Health

A Message from Toronto's Medical Officer of Health

The City of Toronto has made a commitment to open governance and enhancing health and quality of life. Providing information about the state of the environment is an important part of that commitment.

The current systems of tracking and reporting chemicals that industries use and release into the environment are missing valuable information at the local level. To address this concern, Toronto Public Health is proposing a new program to help tackle local pollution in our city, protect health, and support businesses in reducing their use of toxic substances.

The proposed Environmental Reporting and Disclosure Program described in this document addresses the use and release of priority chemicals in Toronto. These chemicals, which include carcinogens, enter our environment from both large and small facilities and are in the air at levels that are of concern to health.

The goal of the proposed program is to lower exposure to these chemicals by encouraging local businesses to track them, publicly report them, and find ways to reduce their use and release. It would provide information about the chemicals that local industries use and enable the business community, governments, community agencies, labour and residents to more actively participate in improvements that can benefit health.

Over the past two years, Toronto Public Health has considered what approach would work best in the City of Toronto. We have researched similar programs across North America that have proven effective in reducing chemicals in the environment. We have also consulted with businesses, non-governmental and government organizations to identify their concerns and needs about environmental reporting programs.

Thank you for taking the time to read this proposal for an Environmental Reporting and Disclosure Program for the City of Toronto. I look forward to your input and appreciate your participation.

David McKeown, MDCM, MHSc, FRCPC
Medical Officer of Health
City of Toronto

FEEDBACK

Comments on this proposal must be received by 5:00pm EST on February 6, 2008.

Toronto Public Health is considering a program that would collect important information and help businesses reduce their use and release of harmful chemicals. Based on the information in the following document and your own expertise, please answer the questions below. The questions are meant only to guide you in providing comments. Feel free to add additional comments.

BUSINESSES (INCLUDING INSTITUTIONS & TRADE ASSOCIATIONS)
PLEASE CONSIDER THE FOLLOWING QUESTIONS:

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?**

RESIDENTS, COMMUNITY ORGANIZATIONS AND OTHER STAKEHOLDERS

PLEASE CONSIDER THE FOLLOWING QUESTIONS:

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?

Deadline for comments

Comments on this proposal must be received by 5:00pm EST on February 6, 2008.

Please send comments in one of the following ways:

Email: publichealth@toronto.ca
or
Mail: Environmental Reporting and Disclosure Program Consultation c/o 277 Victoria Street, 7th Floor. Toronto, Ontario M5B 1W2

The personal information that you provide to Toronto Public Health is collected under the authority of the *City of Toronto Act*, 2006, and item HL6.3 of the Minutes of Board of Health Meeting No. 6, 2007. The comments provided will be used in relation to the development of the proposed Environmental Reporting and Disclosure Program and may be used for aggregate statistical reporting. Questions about this collection can be directed to the Environmental Protection Office, 277 Victoria Street, 7th Floor, Toronto, ON M5B 1W2 or by telephone: 416-392-6788.

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INTRODUCTION

The City of Toronto is considering a new **Environmental Reporting and Disclosure Program**. The Board of Health has asked Toronto Public Health to explore what a program could look like and present it to the Board and City Council for review. The program would:

- require (through a bylaw) affected businesses to report to the City every year if they use or release any of 25 priority chemicals above specified thresholds;
- encourage businesses to become more aware of their use and release of these chemicals and find ways to prevent this pollution; and
- assist the public in obtaining access to the information that is collected.

Future reporting may require reporting of greenhouse gas releases, however it is not recommended at this stage.

Over the past two years, Toronto Public Health has examined similar programs used in North America and met with businesses, community organizations and other experts to decide what would work best for Toronto.

This document presents an idea about how an Environmental Reporting and Disclosure Program could work. It does not contain the actual text of a bylaw. It identifies elements such as the chemicals to be tracked, the types of businesses affected, what information they would be required to report and how the public could access the data. It also outlines some options for facilities to innovate, prevent pollution and improve competitiveness.

Which chemicals would be tracked by this program?

The program would track the following 25 chemicals of greatest health concern in Toronto:

Acetaldehyde
Acrolein
Benzene
1,3-Butadiene
Cadmium
Carbon tetrachloride
Chloroform
Chromium (hexavalent)
Chromium (non-hexavalent)
1,4-Dichlorobenzene
1,2-Dichloroethane
Dichloromethane
Ethylene dibromide
Formaldehyde
Lead
Particulate matter 2.5 ($PM_{2.5}$)
Manganese
Mercury
Nickel
Nitrogen Oxides (NO_x)
Polycyclic aromatic hydrocarbons (PAHs)
Tetrachloroethylene (perchloroethylene)
Trichloroethylene
Vinyl chloride
Volatile organic compounds (VOCs)

Which businesses could be affected?

Any facility (a term that includes businesses, institutions and the City's own buildings) that uses or releases any of the listed substances may have to report. The need to report depends on the amounts and sources of chemicals 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 chemicals:

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

Why is the City of Toronto considering this program?

In an urban environment like Toronto, the public's health may be affected by a number of environmental factors, including chemicals that local industries and City operations use and release to our air, land or water. This program aims to lower our exposure to harmful chemicals in Toronto's environment by encouraging local businesses to track them and find ways to reduce their use and release.

The federal and provincial governments have programs that track and aim to reduce pollutants in our environment. Toronto is proposing to launch this new program because it will:

- focus on 25 key contaminants that are in Toronto's air at levels that may pose a health risk;
- track chemicals from small and medium-sized facilities, which are not included in other reporting programs;
- encourage local businesses to find ways to reduce chemicals and begin environmental programs; and
- give Toronto residents more information about chemical use and releases in their communities.

In 2007, Toronto Public Health examined a variety of chemical substances that may be released from institutional, commercial and industrial operations in Toronto and

identified 25 toxic substances of priority health concern.[1] They include carcinogens such as cadmium, trichloroethylene and formaldehyde. These substances occur in the Toronto environment at levels that are of concern to health. For Toronto residents, emissions to air are the most important route of exposure to these chemicals, and hence pose the greatest health risk.

Although we know these substances are in our environment at levels that are a concern to health, we are missing important information about how these chemicals get into our environment. To be able to reduce the levels found in our environment we first need to know where they are coming from.

Canada has a pollutant tracking program called the National Pollutant Release Inventory, or "NPRI." About 300 facilities in Toronto report to the NPRI. The majority of operations in Toronto that may use or emit chemical substances, however, are too small to meet current NPRI reporting requirements. Toronto Public Health estimates that more than 80 per cent of emissions to air of these 25 priority substances are not reported at all.

The proposed Environmental Reporting and Disclosure Program would fill this gap in information. It will track the use and release of the priority chemicals from all sizes of operations.

Tracking chemicals is a benefit to industry and institutions that have to report. They can identify ways to reduce or eliminate the use and releases of chemicals. The City will look at ways to help companies implement pollution prevention programs.

How could this program protect health?

Environmental reporting programs can stimulate businesses to reduce their use and releases of chemicals. This will then reduce exposure to these chemicals and benefit health.

The information collected can help the City and other governments better understand where health may be most at risk in Toronto. It can help identify the most important sources of certain pollutants and may show that some neighbourhoods are more affected than others.

The program will also make information available to the public. This information can help residents understand emissions from specific facilities in their communities and help them discuss emergency planning and opportunities to reduce emissions with businesses and governments. It can also help workers participate more fully in workplace health and safety programs.

[1] The Board of Health report and background information can be found at www.toronto.ca/health/hphe/enviro_info.htm.

How could this program help Toronto businesses?

Toronto businesses of all sizes stand to benefit from pollution prevention activities. Small and medium-sized businesses, which may not have the same knowledge and resources as larger companies, should benefit most.

Experience from across North America has shown that reporting programs can help businesses to

- improve efficiency and safe use of chemical substances
- identify pollution prevention and product substitution opportunities
- decrease security risks and the costs of waste treatment, environmental liability and compliance
- increase worker health and safety through substance use reductions or substitution, and
- communicate environmental information to shareholders, customers and the general public.

These benefits align well with the City's new "Green Economic Development Strategy" that aims to build new green ventures and support existing businesses in pursuing environmental innovation.

What feedback does the City want on this proposal?

We would like to hear from residents, businesses, institutions, community organizations and others who are interested in what we are proposing in this document, including ways to make this program as effective as possible.

At the beginning of this document, you will see a "Feedback" section with a list of questions to guide you in providing comments to the Medical Officer of Health. The questions are meant only as a guideline.

The Medical Officer of Health will use these comments to help shape a plan for the Environmental Reporting and Disclosure Program. The plan will be presented to the Board of Health in spring 2008.

THE PROPOSAL – AN ENVIRONMENTAL REPORTING AND DISCLOSURE PROGRAM FOR THE CITY OF TORONTO

The City is proposing a program that would have three main elements:

1. **A new bylaw that would require affected businesses to provide information to the City each year if they use or release a certain amount of any of the priority chemicals**. The program would focus on stationary sources, not vehicles or other mobile sources. As with many current reporting programs, Toronto aims to allow facilities to report electronically through an easy-to-use, secure website.

2. **Guidance for businesses to reduce their use of chemicals**. The City is exploring the best ways to encourage businesses to use the information that they gather to implement pollution prevention programs. In Canada and the United States, these programs can include financial and technical assistance to review a company's operations and find ways to innovate. Small and medium-sized businesses can particularly benefit from such programs.

3. **Public access to the information collected through the program.** Transparency and open governance are core values of the City of Toronto. Disclosure of information is also seen as key to the success of reporting programs such as the National Pollutant Release Inventory and the United States' Toxics Release Inventory, which make data publicly available via searchable websites and annual reports.

A NEW BYLAW

Toronto Public Health's research and earlier discussions with businesses and the community showed that mandatory reporting (rather than a voluntary program) will provide fair treatment for companies, lower costs to the City and result in the collection of detailed information. The Medical Officer of Health is therefore suggesting the City of Toronto adopt a mandatory program (a bylaw).

The proposed program has been developed to meet Toronto's needs and draws from successful reporting programs in Canada and the United States. Examples of other programs include Canada's National Pollutant Release Inventory, Massachusetts' Toxics Use Reduction Act and the Toxics Right-to-Know Bylaw in the town of Eugene, Oregon.

Under the proposed bylaw, a facility would review its processes each year to see if it used any of the 25 priority chemicals or if any of them were released to the environment. If the company used or released any of the chemicals above a certain amount (known as a "reporting threshold"), then it will have to provide this information to the City. Certain types of businesses and sources of chemicals will be exempted from the bylaw.

Priority chemicals tracked by this program

During earlier consultations Toronto Public Health heard that a local program should focus on chemicals that are of greatest concern in Toronto. While a variety of chemical substances may be released from businesses in our city, Toronto Public Health has identified 25 substances in the Toronto's environment at levels that are of concern to health. The list of priority chemicals may be subject to change.

The proposed program will track the following substances:

- Acetaldehyde
- Acrolein
- Benzene
- 1,3-Butadiene
- Cadmium
- Carbon tetrachloride
- Chloroform
- Chromium (hexavalent)
- Chromium (non-hexavalent)
- 1,4-Dichlorobenzene
- 1,2-Dichloroethane
- Dichloromethane
- Ethylene dibromide
- Formaldehyde
- Lead
- Particulate matter 2.5 ($PM_{2.5}$)
- Manganese
- Mercury
- Nickel
- Nitrogen oxides (NO_x)
- Polycyclic aromatic hydrocarbons (PAHs)
- Tetrachloroethylene (perchloroethylene)
- Trichloroethylene
- Vinyl chloride
- Volatile organic compounds (VOCs)

Some of the priority substances are directly used and others are produced as byproducts of certain processes. Appendix 2 gives more detail on these substances. See Appendix 3 for the definition of polycyclic aromatic hydrocarbons (PAHs) and Appendix 4 for the definition of volatile organic compounds (VOCs).

Facilities likely to be affected by this program

Any facility that uses or releases any of the listed substances may have to report to the City. Unless specifically exempted from the bylaw, every facility will have to look at its operations to see if it has to report. The need to report will depend on the amounts and sources of chemicals used or released.

Some types of facilities are more likely than others to use or release the priority chemicals. As an example, facilities in the following sectors may be required to report under the bylaw because they typically use or release one or more of the priority chemicals:

- food and beverage manufacturing
- clothing manufacturing
- printing and publishing
- chemical manufacturing
- wood industries

- other manufacturing
- chemical distribution
- waste management
- medical and diagnostic laboratories
- automotive repair and maintenance
- laundry services, including dry cleaning
- funeral services

Appendix 5 gives additional detail on the chemicals that may be used or released from these sectors.

Exemptions from reporting

Some types of facilities and uses of chemicals will not be tracked by the program. Toronto Public Health 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;
- availability of pollution prevention options or alternatives to the substance;
- minimizing reporting for "minor" uses; and
- reducing unnecessary burden from handling and accessing the data that is collected.

Toronto's proposed bylaw would have exemptions that are similar but not identical to those in the National Pollutant Release Inventory. There are two types of exemptions:

- **Sector exemptions** - homes and specific types of businesses would not have to report
- **Source exemptions** - a business would not have to report chemicals used or released from specific sources within their facility

The sector exemptions are:

- individual residences, including apartments and condominiums
- facilities where the retail sale of the substance or articles that contain the substance is the primary activity
- small medical facilities, such as doctors' and dentists' offices
- construction sites
- accommodation and food services (i.e. hotels and restaurants)

The source exemptions are:

- chemicals that exist as part of an "article" and are not released by using that article (for example, chromium in the metal alloy of a tool or mechanical part is not released while using the tool or part; a facility that manufactures the alloy, tool or part would have to estimate the chromium used and released)
- the distribution, storage or retail sale of fuels
- personal use by employees or other persons
- grounds maintenance or janitorial use
- transportation and vehicle emissions
- materials used as structural components of the facility
- intake water or intake air, such as water used for process cooling or air used as compressed air or for combustion
- road dust
- emissions from space heating

Deciding whether or not a facility reports

Figure 1 illustrates the steps a facility would follow to determine if it must report in a given year and how to report if necessary.

A facility would have to follow 3 key steps:

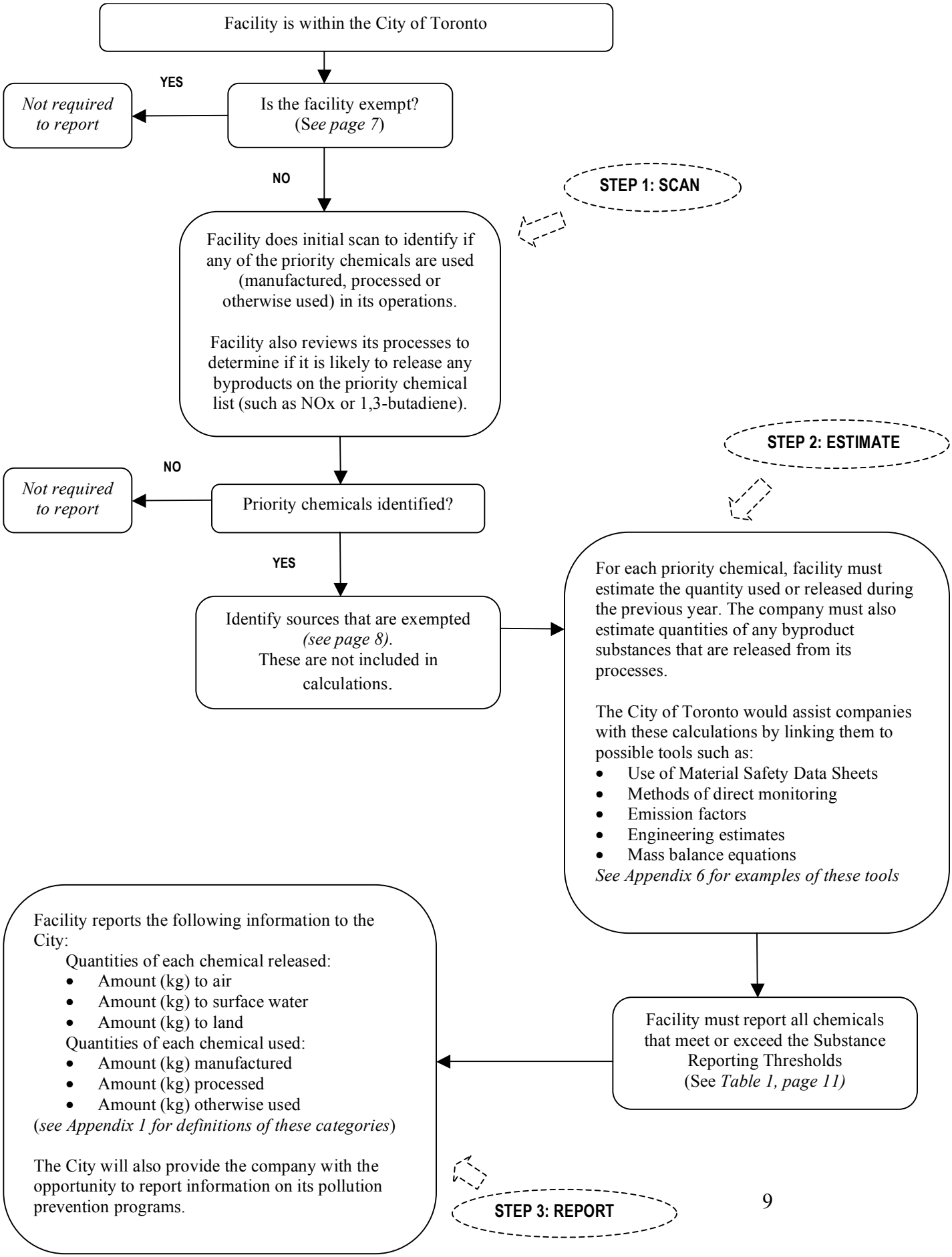
Step One: Scan for priority chemicals

If a facility is not exempt, then the operator would first review the processes and substances used on site to determine whether or not any of the 25 priority chemicals are used or released.

One way a company can find the chemicals it uses and releases is to review Material Safety Data Sheets (MSDSs). These should be available to facilities as they are required under occupational health and safety regulations. MSDSs will indicate whether the products used in a facility contain any of the 25 chemicals. A company can also consult with its suppliers or professional associations to find this information.

When a chemical is in a mixture, the information on the MSDS can be used to calculate the total amount used. The City's proposed bylaw would not require a facility to perform additional tests to scan for chemicals in mixtures.

Figure 1: How a facility would report each year under the proposed program



Some of the priority chemicals are created as byproducts of a facility's operations. The City will suggest tools to help a facility determine whether or not they release these byproducts, and how to estimate them if needed.

Step Two: Estimate what was used and released

If a facility finds that it uses or releases any of the priority chemicals, it must then calculate the amount of each chemical to see if it meets the reporting threshold. The reporting thresholds are identified in Table 1.

Tracking chemical use or identifying releases will be a new experience for many businesses. For some facilities, it may be a relatively simple matter of checking their inventories to estimate how much of a certain substance was used during the year. Other facilities may have to perform more complex estimations. In either case, the facility would be expected to provide its best estimate based on their best available information. Facilities with provincial Certificates of Approval can find information in those documents to help them with their calculations.

The City can help facilities calculate use and emissions. For example, "mass balance" equations, emission factors or engineering approaches are tools that can estimate chemical use or release based on information such as the type of equipment a facility uses or the amount of material it processes. Some examples of how these tools work are included in Appendix 7 of this report. These tools are consistent with those used for facilities reporting to the National Pollutant Release Inventory and the U.S. Toxics Release Inventory.

Reporting Thresholds

Toronto Public Health reviewed other reporting programs in North America and Europe and considered the nature of our city's businesses to determine the reporting thresholds. The proposed reporting thresholds are intended to capture the presence of a priority substance and make facilities more aware of their chemical use, while also minimizing the need to report very small amounts.

Most substances have a reporting threshold of 100 kg per year. As with other programs, substances considered to be extremely hazardous have lower thresholds.

How do the reporting thresholds work?

Except for byproducts, the reporting threshold refers to the use of the chemical, not its release. This is consistent with the National Pollutant Release Inventory and many other programs.

This means that if a facility uses a chemical ("use" is defined as "manufactured, processed or otherwise used") at a quantity above the reporting threshold, it must report,

even if its releases are less than the threshold or are zero. For byproducts such as NOx, the releases must equal or exceed the reporting threshold to require reporting.

See "What information would be reported?" on the next page for an example of how this works and what would be reported.

Table 1: Reporting Thresholds for Priority Chemicals

Chemical Name	CAS No.	Reporting threshold (kg/yr)
Acetaldehyde	75-07-0	100
Acrolein	107-02-8	100
Benzene	71-43-2	100
1,3-Butadiene	106-99-0	100
Cadmium[1]	-	10
Carbon tetrachloride	56-23-5	100
Chloroform (trichloromethane)	67-66-3	100
Chromium, Non-hexavalent[1]	-	100
Chromium, Hexavalent[1]	-	10
1,4-Dichlorobenzene	106-46-7	100
1,2-Dichloroethane (Ethylene dichloride)	107-06-2	100
Dichloromethane (Methylene chloride)	75-09-2	100
1,2-dibromoethane (Ethylene dibromide)	106-93-4	100
Formaldehyde	50-00-0	100
Lead[1]	-	10
Manganese[1]	-	10
Mercury[1]	-	10
Nickel[1]	-	100
NOx[2]	-	200
PAHs[3]	-	10
$PM_{2.5}$[4]	-	30
Tetrachloroethylene	127-18-4	100
Trichloroethylene	079-01-6	100
Vinyl chloride	75-01-4	100
VOCs (total)[3]	-	100

CAS = Chemical Abstract Service, a common system of identifying chemicals

[1] and its compounds (Different compounds have different CAS numbers.)

[2] expressed as NO_2.

[3] as defined by the National Pollutant Release Inventory

[4] means any particulate matter with a diameter less than or equal to 2.5 micrometers

Step 3: Report chemicals used or released.

Toronto Public Health aims to make it as easy as possible for facilities to report, particularly those that already submit data under programs such as the NPRI and Ontario Regulation 147/01. For example, Toronto Public Health is exploring the use of software such as Environment Canada's One Window for National Environmental Reporting (OWNERS) website. OWNERS assists facilities to estimate emissions and allows them to report their data through a secure website. The software guides users on what information to provide and, for those who need it, can automatically do many of the required calculations. Toronto's website and written materials could also provide the companies with information on how to reduce the use or substitute the chemicals with safer alternatives.

What information will be reported?

Toronto Public Health is proposing a program that would collect the following information:

- **Quantities of each chemical released to the environment:**
    - Releases to air (fugitive and direct emissions)
    - Releases to surface water (spills and discharges)
    - Releases to land (spills and on-site disposal)

- **Quantities of each chemical used:**
    - Amount manufactured
    - Amount processed
    - Amount otherwise used

See Appendix 1 for a description of these terms. Note that, unlike the National Pollutant Release Inventory, "releases" does not include off-site disposal or recycling (also known as "transfers"). Figure 2 shows a sample of what a facility will report.

Capturing release information is consistent with environmental reporting programs such as the National Pollutant Release Inventory. Releases of the priority chemicals to Toronto's environment, particularly air, can impact health.

Toronto Public Health also wants facilities to report their chemical use because this information is key to reducing chemicals and protecting health. When chemicals are used in a facility, there can be a potential hazard to the health of the community and workers. Usage information provides key data to the facility for pollution prevention and enables the City to evaluate data. This data is collected by successful reporting programs in Massachusetts and Oregon.

In Toronto's program, businesses will also be able to provide additional information that explains programs they have to reduce pollution. For example, a company could mention recent or future changes to its process that would reduce or eliminate a particular chemical.

Figure 2: Sample information a facility will report to the City of Toronto

FACILITY INFORMATION
Facility Name: _____
Facility Address: _____
Contact Person: _____
Telephone: _____ Email: _____

Reporting Year: _____

SUMMARY INFORMATION
Total (kg) of all priority substances used: _____
Total amount manufactured: _____
Total amount processed: _____
Total amount otherwise used: _____
Total (kg) of all priority substances released: _____
Total releases to air: _____
Total releases to surface water: _____
Total releases to land: _____

SUBSTANCE INFORMATION: *(complete for each substance)*

Substance: _____ CAS #: _____

Usage Information			
Manufactured	**Processed**	**Otherwise used**	**Total Used (Kg)**

Release Information				
Releases to Air				
Stack/Point	Fugitive	Spills	Other	**Total (Kg)**
Releases to Surface Water				
Discharges	Spills	Leaks	Other	**Total (Kg)**
Releases to Land				
On-site disposal	Spills	Leaks	Other	**Total (Kg)**

Company statement on programs to reduce pollution: _____
_____
_____
_____

Enforcement

The City will enforce the requirement to report under this program. Businesses would be subject to information audits by City staff, and would be required to keep records for a period of 7 years for audit purposes.

Reporting greenhouse gases

Toronto's Board of Health has asked the Medical Officer of Health to consider whether this reporting program could also collect information on greenhouse gas emissions. The primary greenhouse gases are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Released into our environment from vehicles and electricity and natural gas combustion (from space heating), greenhouse gases contribute to climate change.

Toronto Public Health does not recommend that the bylaw require facilities to report greenhouse gas emissions at this time. The City can currently estimate greenhouse gas emissions in Toronto. Although more specific data could be useful, collecting and managing this information would greatly increase the cost and complexity of the program.

The bylaw will include a way to expand or reduce the list of substances to report. If in the future it becomes more feasible to include greenhouse gases, the City could then propose that it be added to the program. Such data could help the City evaluate its success in meeting its greenhouse gas reduction targets and promote awareness among Toronto businesses.

Disclosing information to the public

Public access to the information that businesses provide is a key part of the proposed Environmental Reporting and Disclosure Program.

Current reporting programs, including the National Pollutant Release Inventory and the United States' Toxics Release Inventory, make data available to the public via searchable websites and annual reports. The public has access to total figures but not the raw data used to estimate emissions. This public disclosure has been considered vital to the success of these programs in reducing the use and release of chemicals.

Toronto Public Health is proposing two ways to make the information available:

- **A searchable website.** As with programs in Canada and the United States, Toronto's program aims to enable the public to search for information by facility, chemical name and location. A website could also link users to third-party information on the chemicals and post statements provided by businesses on pollution prevention activities.

- **An annual summary report.** The City would publish an annual report that could include totals and trends and provide context. The report would be available online and in print.

Disclosure of information reported to the City under the proposed program would be made in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*.

ENCOURAGING POLLUTION PREVENTION

By tracking chemicals, a facility can identify ways to prevent pollution. For example, it could replace a hazardous chemical with a safer substitute so that there are no longer any uses or emissions of the chemical. A company could also modify its processes to recycle or more efficiently use the chemical to reduce use or emissions.

Toronto Public Health recognizes that facilities may need assistance to make best use of the information that is gathered through this program to reduce their use and release of chemicals. Toronto's program aims to provide guidance to businesses, and we are reviewing other programs to see what could work best. Some programs direct facilities to information from governments and business associations on pollution prevention programs for specific chemicals and business sectors. In other communities, governments support universities to provide personalized technical assistance for facilities. The Massachusetts Toxics Use Reduction Institute and the Eco-Efficiency Centre at Dalhousie University in Nova Scotia are examples of this approach.

Toronto Public Health expects that small and medium-sized businesses will be the main users of the pollution prevention assistance. Many will have new environmental reporting requirements and may have limited experience in pollution prevention.

Program Timeline

This program is under development and your comments will help the Medical Officer of Health present a draft plan to the Board of Health in spring 2008. City Council would be asked to support the plan that the Board of Health recommends.

If the program and bylaw are supported by City Council, the program would be phased in to give facilities time to learn about the bylaw and begin collecting the necessary data.

More Information

If you would like to learn more about previous work used in the development of the proposed Environmental Reporting and Disclosure Program, see Appendix 7 or visit our www.toronto.ca/health/hphe/toxic_chemicals/toxicchemicals.htm.

APPENDIX 1 – Glossary of Terms

Note: The definitions in this Appendix are meant to help readers understand the proposed Environmental Reporting and Disclosure Program. Definitions are not intended to represent what may or may not appear in the final text of any bylaw.

Article means a manufactured item that does not release a priority substance when it undergoes processing or other use.

By-product means a substance which is incidentally manufactured, processed or otherwise used at the facility at any concentration, and released on site to the environment or disposed of.

Priority substance means any of the 25 substances or group of substances identified by Toronto Public Health as being covered by the proposed Environmental Reporting and Disclosure Program

Use of a priority substance means to "manufacture, process or otherwise use" the substance. These terms are defined as they are in the National Pollutant Release Inventory:

> **Manufacture** means to produce, prepare or compound a substance. It also includes the coincidental production of a substance as a "by-product" of the manufacture, processing or other use of other substances.
> *Example:* The production of carbon tetrachloride by a chemical plant is an example of manufacturing. The production of acetaldehyde during wastewater treatment is an example of coincidental production.
>
> **Process** includes: 1) the preparation of a priority substance, after its manufacture, for distribution in commerce; 2) the preparation of a substance with or without changes in physical state or chemical form; 3) the processing of a mixture or formulation that contains a priority substance as one component; and 4) the processing of "articles" (See definition of article above).
> *Examples:* The use of acrolein (a priority substance) to manufacture acrylic acid (not an ERD substance) is an example of processing. The use of toluene and xylene (VOCs) to blend paint solvent mixtures is an example of processing without changes in chemical form
>
> **Otherwise Used** means any use, disposal or release of a substance at a facility that does not fall under the definitions of "manufacture" or "process." This includes the use of the substance as a chemical processing aid, manufacturing aid or some other use.
> *Example:* The use of trichloroethylene in the maintenance of manufacturing and process equipment is considered an "other use."

Release means the emission or discharge of a substance from the facility site to air, surface waters or land. Unlike the National Pollutant Release Inventory, "releases" does not include off-site disposal or recycling (known as "transfers."

> **Release to Air** means emissions from stacks, storage/handling, fugitive emissions and spills.
>
> **Release to Surface Water** means direct discharges, spills and leaks.
>
> **Release to Land** means spills, leaks and on-site disposal.

APPENDIX 2 – Priority Chemicals

While a variety of chemical substances may be released from businesses in our city, Toronto Public Health has identified 25 substances in the Toronto's environment at levels that are of concern to health.

Table A2 identifies the 25 priority chemicals and their most common sources. This is not intended to be a complete list of sources. Where applicable, the Chemical Abstract Service (CAS) number of the substance is included in the table because it is a common way to identify these chemicals.

A2. The 25 priority chemicals and selected sources[1]

Chemical Name	Selected Sources
Acetaldehyde CAS # 75-07-0	- used as an intermediate in the synthesis of other chemicals. - a byproduct of incomplete wood combustion, pulp and paper production, stationary internal combustion engines and turbines and wastewater processing.
Acrolein CAS #107-02-8	- used as an intermediate in the manufacture of acrylic acid. - formed from the breakdown of certain pollutants in outdoor air.
Benzene CAS # 71-43-2	- a constituent in motor fuels; - 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. - used as a chemical intermediate, manufacture of detergents, explosives, pharmaceuticals, and dyestuffs.
1,3-Butadiene CAS #106-99-0	- used production of synthetic plastics and rubber. - by-product of manufacturing, processing, wastewater and combustion.
Cadmium	- released into air from zinc, lead, or copper smelting - used to manufacture pigments and batteries and in the metal-plating and plastics industries.
Carbon tetrachloride CAS #56-23-5	- Used industrially as a refrigerant and solvent.
Chloroform **(also known as Trichloromethane)** CAS #67-66-3	- most of the chloroform is used to manufacture HCFC-22 (a refrigerant for air conditioners). It may be released into the air from a large number of sources related to its manufacture and use, as well as its formation in the chlorination of drinking water, wastewater, and swimming pools.
Chromium	-chromium is a metal used mainly for making steel and other alloys and can be released during welding and cutting stainless steel. -chromium compounds exist in the environment primarily in three forms: divalent, trivalent and hexavalent. -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; in chrome plating.
1,4-Dichlorobenzene	- used as an intermediate in chemical production, and as a fumigant

CAS #106-46-7	and a space deodorant.
1,2-Dichloroethane (also known as Ethylene dichloride) CAS #107-06-2	- primarily used in the production of vinyl chloride and other chemicals. - used as solvent in closed systems for various extraction and cleaning purposes.
Dichloromethane (also known as Methylene chloride) CAS #75-09-2	- used as a solvent in paint strippers and removers; as a process solvent in the manufacture of drugs, pharmaceuticals, and film coatings; as a metal cleaning and finishing solvent in electronics manufacturing; aerosol propellant, and as an agent in urethane foam blowing. - sources also include landfills and wastewater processing.
1,2-Dibromo ethane (also known as Ethylene dibromide) CAS #106-93-4	- used as an intermediate for dyes, resins, waxes, and gums.
Formaldehyde CAS #50-00-0	- used mainly to produce resins used in particleboard products and as an intermediate in the synthesis of other chemicals. - also released from stationary internal combustion engines and turbines, pulp and paper plants, and other manufacturing facilities.
Lead	- used in the manufacture of batteries. - releases during combustion of solid waste, coal, and oils, emissions from iron and steel production and lead smelters.
Manganese	- used in the production of steel and alloys, batteries, matches, fireworks and as a chemical intermediate - also released into the air by combustion of coal and oil and by power plants.
Mercury	- used in the production of thermometers, barometers, batteries, dental amalgams, fluorescent lights, lubrication oils and in industrial processes
Nickel	- used for electroplating and the production of batteries, industrial plumbing, machinery parts, resistance wiring and chemical catalysts - also released from utility oil and coal combustion, nickel metal refining, and lead smelting
Nitrogen oxides (NO_x)	- released as a by-product of combustion and from some chemical processes
Particulate matter 2.5 ($PM_{2.5}$)	- small particles less than 2.5 microns in size - released as a by-product of combustion and industrial processes
Polycyclic aromatic hydrocarbons (PAHs)	- for this program, the definition and list of chemicals that are considered PAHs are the same as in the National Pollutant Release Inventory - a group of compounds released as a by-product of combustion and certain industrial processes Component of asphalt, coal tar and other bituminous products
Tetrachloroethylene (also known as perchloroethylene) CAS #127-18-4	- widely used for dry-cleaning fabrics and textile processing and also used as a chemical intermediate and in metal degreasing operations.
Trichloroethylene CAS #079-01-6	- used in industrial degreasing of metal parts, as a chemical intermediate, as an industrial solvent and the production of

	consumer products such as paint strippers, adhesives and rug-cleaning fluids.
Vinyl chloride CAS #75-01-4	- used to make polyvinyl chloride (PVC) plastic and vinyl products.
Volatile organic compounds (VOCs)	- a group of organic chemicals that easily evaporate into the air from their direct use, from products containing them or as byproducts of industrial processes. - for this program, the definition and list of chemicals that are considered VOCs are the same as under Ontario Regulation 127/01 under the Ontario *Environmental Protection Act*

[1] http://www.epa.gov/ttnatw01/hlthef/hapindex.html

APPENDIX 3 – Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are primarily produced as byproducts of combustion and will exist as a mixture of compounds. They can also be part of products such as coal tar.

A facility would not have to quantify individual compounds. A facility could consult their Material Safety Data Sheets or use an emission factor to estimate the total amount of PAHs used or released from its processes, and report the total if it exceeds the reporting threshold of 10 kg/yr.

Toronto's program will use the same group of PAHs that are reported under the National Pollutant Release Inventory (see Table A3).

A3. Polycyclic aromatic hydrocarbons (PAHs) for Toronto's proposed program.

CAS Number	Substance Name	CAS Number	Substance Name
56-55-3	Benzo(a)anthracene	224-42-0	Dibenz(a,j)acridine
218-01-9	Benzo(a)phenanthrene	53-70-3	Dibenzo(a,h)anthracene
50-32-8	Benzo(a)pyrene	189-55-9	Dibenzo(a,i)pyrene
205-99-2	Benzo(b)fluoranthene	194-59-2	7H-Dibenzo(c,g)carbazole
192-97-2	Benzo(e)pyrene	206-44-0	Fluoranthene
191-24-2	Benzo(g,h,i)perylene	193-39-5	Indeno(1,2,3-c,d)pyrene
205-82-3	Benzo(j)fluoranthene	198-55-0	Perylene
207-08-9	Benzo(k)fluoranthene	85-01-8	Phenanthrene
83-32-9	Acenaphthene	129-00-0	Pyrene
208-96-8	Acenaphthylene	86-73-7	Fluorene

[Reference: http://www.ec.gc.ca/pdb/npri/2006Guidance/Guide2006/app5_e.cfm]

APPENDIX 4 – Volatile Organic Compounds

Volatile organic compounds (VOCs) is a group of chemicals used or incidentally manufactured during various processes. Only VOCs that participate in atmospheric photochemical reactions and which are identified in Ontario Regulation 127/01 under the Ontario *Environmental Protection Act* will be reported (see Table A4 below).

It would not be necessary for a facility to report amounts of the individual VOCs listed in Table A4. In the proposed program, a facility could use an emission factor or consult its Material Safety Data Sheets to estimate the total amount of VOCs used or released. It would report if the total amount of VOCs exceeds the reporting threshold of 100 kg/yr.

Several VOCs in Table A4, such as benzene and formaldehyde, are also identified individually on the list of 25 priority chemicals. When reporting, a facility will first have to quantify the priority chemicals and report if they exceed thresholds. For priority chemicals that are VOCs, their use and release must also be included in calculations of "total VOCs" and be reported if this threshold is exceeded. This is a common practice with other reporting programs.

A4. List of substances that are included in "Total VOCs"

CAS Number	Individual Substances	CAS Number	Individual Substances
75-07-0	Acetaldehyde	123-72-8	Butyraldehyde
75-05-8	Acetonitrile	75-15-0	Carbon disulphide
98-86-2	Acetophenone	56-23-5	Carbon tetrachloride
74-86-2	Acetylene	75-72-9	CFC-13
107-02-8	Acrolein	108-90-7	Chlorobenzene
79-06-1	Acrylamide	75-00-3	Chloroethane
79-10-7	Acrylic acid [2]	67-66-3	Chloroform
107-13-1	Acrylonitrile	74-87-3	Chloromethane
124-04-9	Adipic Acid	1319-77-3	Cresol [2,3]
107-18-6	Allyl alcohol	98-82-8	Cumene
62-53-3	Aniline [2]	110-82-7	Cyclohexane
120-12-7	Anthracene	108-93-0	Cyclohexanol
71-43-2	Benzene	84-74-2	Dibutyl phthalate
100-44-7	Benzyl chloride	95-50-1	*o*-Dichlorobenzene
92-52-4	Biphenyl	106-46-7	*p*-Dichlorobenzene
74-83-9	Bromomethane	107-06-2	1,2-Dichloroethane
106-99-0	1,3-Butadiene	78-87-5	1,2-Dichloropropane
111-76-2	2-Butoxyethanol	77-73-6	Dicyclopentadiene
141-32-2	Butyl acrylate	124-40-3	Dimethylamine
78-83-1	*i*-Butyl alcohol	115-10-6	Dimethylether
123-86-4	*n*-Butyl acetate	68-12-2	N,N-Dimethylformamide
71-36-3	*n*-Butyl alcohol	1300-71-6	Dimethyl phenol
78-92-2	*sec*-Butyl alcohol	131-11-3	Dimethyl phthalate
75-65-0	*tert*-Butyl alcohol	123-91-1	1,4-Dioxane
85-68-7	Butyl benzyl phthalate	122-39-4	Diphenylamine
106-88-7	1,2-Butylene oxide	106-89-8	Epichlorohydrin

110-80-5	2-Ethoxyethanol	98-95-3	Nitrobenzene
111-15-9	2-Ethoxyethyl acetate	*	Nonylphenol and its ethoxylates[4]
141-78-6	Ethyl acetate	*	Octylphenol and its ethoxylates[5]
140-88-5	Ethyl acrylate	*	PAHs
64-17-5	Ethyl alcohol	123-63-7	Paraldehyde
100-41-4	Ethylbenzene	76-01-7	Pentachloroethane
74-85-1	Ethylene	79-21-0	Peracetic acid [2]
107-21-1	Ethylene glycol	555-10-2	Beta-Phellandrene
75-21-8	Ethylene oxide	108-95-2	Phenol [2]
50-00-0	Formaldehyde	103-71-9	Phenyl isocyanate
64-18-6	Formic acid	90-43-7	*o*-Phenylphenol [2]
98-00-0	Furfural alcohol	85-44-9	Phthalic anhydride
67-72-1	Hexachloroethane	80-56-8	Alpha-Pinene
110-54-3	*n*-Hexane	127-91-3	Beta-Pinene
78-84-2	Isobutyraldehyde	123-38-6	Propionaldehyde
78-79-5	Isoprene	74-98-6	Propane
67-63-0	Isopropyl alcohol	115-07-1	Propylene
5989-27-5	D-Limonene	75-56-9	Propylene oxide
108-31-6	Maleic anhydride	110-86-1	Pyridine [2]
67-56-1	Methanol	100-42-5	Styrene
109-86-4	2-Methoxyethanol	79-34-5	1,1,2,2-Tetrachloroethane
110-49-6	2-Methoxyethyl acetate	127-18-4	Tetrachloroethylene
96-33-3	Methyl acrylate	109-99-99	Tetrahydrofuran
1634-04-4	Methyl *tert*-butyl ether	108-88-3	Toluene
7379-12-6	2-Methyl-3-hexanone	91-08-7	Toluene-2,6-diisocyanate
101-14-4	*p,p'*-Methylene*bis*(2-chloroaniline)	79-00-5	1,1,2-Trichloroethane
101-68-8	Methylene*bis*(phenylisocyanate)	79-01-6	Trichloroethylene
101-77-9	*p,p'*-Methylenedianiline	121-44-8	Triethylamine
78-93-3	Methyl ethyl ketone	95-63-6	1,2,4-Trimethylbenzene
108-10-1	Methyl isobutyl ketone	420-56-4	Trimethylfluorosilane
80-62-6	Methyl methacrylate	108-05-4	Vinyl acetate
872-50-4	N-Methyl-2-pyrrolidone	75-01-4	Vinyl chloride
123-35-3	Myrcene	75-35-4	Vinylidene chloride
91-20-3	Naphthalene		
CAS Number	**Isomer Groups**	**CAS Number**	**Isomer Groups**
*	Anthraquinone [7]	*	Hexane [8]
*	Butane [7]	25264-93-1	Hexene [7]
25167-67-3	Butene [7]	27133-93-3	Methylindan [7]
*	Cycloheptane [7]	*	Nonane[7]
*	Cyclohexene [7]	*	Octane [7]
*	Cyclooctane [7]	*	Pentane [7]
*	Decane [7]	*	Pentene[7]
*	Dihydronapthalene [7]	68956-56-9	Terpene [7]
*	Dodecane [7]	25551-13-7	Trimethlybenzene [9]
*	Heptane [7]	1330-30-7	Xylene [6]

CAS Number	Other Groups and Mixtures	CAS Number	Other Groups and Mixtures
8001-58-9	Creosote	64475-85-0	Mineral spirits
112-34-5	Diethylene glycol buthyl ether	8030-30-6	Naphtha
112-15-2	Diethylene glycol ethyl ether acetate	5131-66-8	Propylene glycol butyl ether
112-07-2	Ethylene glycol butyl ether acetate	108-65-6	Propylene glycol methyl ether acetate
112-25-4	Ethylene glycol hexyl ether	64742-89-8	Solvent naphtha light aliphatic
64741-65-7	Heavy alkylate naphtha	64742-88-7	Solvent naphtha medium aliphatic
64742-94-5	Heavy aromatic solvent naphtha	8052-41-3	Stoddard solvent
64742-48-9	Hydrotreated heavy naphtha	8032-32-4	VM & P naphtha
64742-48-4	Hydrotreated light distillate	8042-47-5	White mineral oil
64742-95-6	Light aromatic solvent naphtha		

NOTE:

* No single CAS number applies to this listing.

1 CAS Registry Number denotes the Chemical Abstracts Service Registry Number, as appropriate.

2 "and its salts" – The CAS number corresponds to the weak acid or base. However, the substance includes the salts of these weak acids and bases. When calculating the weight of these substances and their salts, use the molecular weight of the acid or base, not the total weight of the salt.

3 "all isomers" including, but not limited to, the individual isomers of cresol: *m*-cresol (CAS No. 108-39-4), *o*-cresol (CAS No. 95-48-7) and *p*-cresol (CAS No. 106-44-5)

4 Includes nonylphenol, its ethoxylates and derivatives with CAS numbers: 104-40-5; 25154-52-3; 84852-15-3; 1323-65-5; 26523-78-4; 28987-17-9; 68081-86-7; 68515-89-9; 68515-93-5; 68081-86-1; 104-35-8; 20427-84-3; 26027-38-3; 27177-05-5; 27177-08-8; 28679-13-2; 27986-36-3; 37251-69-7; 7311-27-5; 9016-45-9; 27176-93-8; 37340-60-6; 51811-79-1; 51938-25-1; 68412-53-3; 9051-57-4; 37205-87-1; 68412-54-4; 127087-87-01.

5 Includes octylphenol and its ethoxylates with CAS numbers: 140-66-9; 1806-26-4; 27193-28-8; 68987-90-6; 9002-93-1; 9036-19-5.

6 "all isomers" including, but not limited to, the individual isomers of xylene: *m*-xylene (CAS No. 108-38-3), *o*-xylene (CAS No. 95-47-6) and *p*-xylene (CAS No. 106-42-3).

7 "all isomers."

8 "all isomers", excluding *n*-hexane (CAS No. 110-54-3).

9 "all isomers", excluding 1,2,4-trimethylbenzene (CAS No. 95-63-6).

APPENDIX 5 – Possible Usage or Release of Priority Chemicals

A5. Examples of sectors that may have to report and the priority chemicals they may use or release

Sectors	Possible Usage or Release of Priority Chemicals
Food and beverage manufacturing	May use or release NOx, $PM_{2.5}$, benzene, VOCs. Typical chemical usage is associated with fuel (e.g., natural gas or oil) for process heating in ovens and drying systems; cleaning solvents for washing equipment between batches and maintenance chemicals (solvents). The operations also emit particulate matter.
Clothing manufacturing	May use or release formaldehyde, tetrachloroethylene, $PM_{2.5}$ or benzene. This industry would likely have releases associated with cleaning finished products.
Printing and publishing	May use or release formaldehyde, tetrachloroethylene, lead, chromium, VOCs, benzene, NOx or $PM_{2.5}$. Printing and publishing operations include the preparation of paper products with coatings and the application of inks. These processes would emit VOCs from the coatings and inks, metals from the inks and particulate matter from the drying processes. Larger operations would have emission controls to reduce emissions.
Chemical manufacturing	May use or release 1,3-butadiene, formaldehyde, 1,4-dichloromethane, carbon tetrachloride, dichloromethane, tetrachloroethylene, ethylene dibromide, trichloroethylene, vinyl chloride, NOx, 1,2-dichloroethane, $PM_{2.5}$, lead, PAHs, VOCs or benzene. This sector includes manufacturers of chemicals such as pharmaceuticals, plastics and rubber. In Toronto, the most significant are pharmaceuticals manufacturers. Each industry would use specialty chemicals for the products manufactured, but would also use substances typical of any manufacturing industry. These would include cleaning agents such as acids, bases and solvents (VOCs).
Wood industries	May use or release cadmium, NOx, $PM_{2.5}$, manganese, VOCs, formaldehyde or tetrachloroethylene. Wood product manufacturing includes the treatment and finishing of wood products, including furniture (wood and non-wood) and building materials. Treatment can include the impregnation of the wood products with preservatives that can contain solvents and metals. Wood finishing can include gluing, painting, lacquers, etc., which can emit VOCs and PM during handling processes (e.g., sanding and cutting)
Other manufacturing	May use or release formaldehyde, 1,4-dichloromethane, cadmium, tetrachloroethylene, trichloroethylene, vinyl chloride, NOx, $PM_{2.5}$, manganese, lead or benzene. This sector includes the manufacturers that use chemicals in the production, but in which the products themselves are not chemical-based. In some cases, such as for foam products, significant amount of chemicals can remain in the products. Chemical usage would include typical manufacturing chemicals, such as acids, bases, lubricants and solvents (VOCs) for cleaning and maintenance.

Chemical distribution	May use or 22release dichloromethane, tetrachloroethylene or trichloroethylene. This sector includes warehouses that store chemical products either in bulk or in retail containers. Chemicals may include industrial solvents such as VOCs and chlorinated solvents, acids and bases, pesticides, and inorganic solutions (e.g., ammonia). Depending on the method of storage and transfer, emissions may be limited.
Waste management	May use or release cadmium, PAHs, chloroform, $PM_{2.5}$, NOx, mercury, lead or PAHs This sector includes waste management operations such as private transfer stations for solid and liquid waste, sewage treatment plants operated by the municipality and waste transportation companies. Releases vary greatly between the different operations, with particulate matter most prevalent for solid waste management, VOCs for liquid waste management and nutrients and inorganic chemicals for sewage treatment.
Medical and Diagnostic Laboratories	May use or release acrolein, tetrachloroethylene, trichloroethylene or lead. This sector includes institutional and commercial laboratories, such as universities, colleges, government laboratories, medical and hospital dental laboratories, commercial analytical laboratories. These operations use substances of concern in small quantities. The types of substances vary.
Automotive repair and maintenance	May use or release acetaldehyde, lead, cadmium, mercury, chromium or benzene. This sector includes service centres, auto glass repair, and auto body shops. Service centres provide maintenance and repair services on vehicles, such as transmission, mufflers, brakes, oil changes, engine repair. Releases associated with car repairs are typically low because automotive fluids tend to be non-volatile. Auto body shops provide services such as the repair and painting of vehicles and parts. The painting process can involve the application of several layers of coatings, including base coats, primers and final paint. Each application results in the release of VOCs that provide the medium for the coating. Particulate matter from sanding and painting would also be released. Depending on the type of coatings, the metal content of particulate matter can be high.
Laundry services (dry cleaning)	May use or release tetrachloroethylene (perchloroethylene), carbon tetrachloride or lead. Laundry services include commercial laundries, dry cleaners and coin washes.
Funeral Services	May use or release mercury, lead, NOx, $PM_{2.5}$ or PAHs.
Power Generation	May release NOx, $PM_{2.5}$, PAHs and benzene. This sector includes district heating systems that release Criteria Air Contaminants.

APPENDIX 6 – Examples of Data Estimation Tools

The proposed Environmental Reporting and Disclosure Program would require facilities to estimate use and releases of priority chemicals. The program will help facilities make these calculations with tools already in use by Environment Canada and the United States Environmental Protection Agency.

The following are examples of three types of tools that a facility could use to determine its chemical use or releases.

Example 1: Emission Factors to estimate releases

Emission factors are tables and software programs that allow a facility to enter basic information to estimate chemical use or emissions. These tools have been developed over many years by industry and governments and are accepted standards for environmental audits and reporting to programs such as the National Pollutant Release Inventory and the U.S. Toxics Release Inventory.

For example, a dry cleaning facility wishes to estimate the amount of tetrachloroethylene (also known as perchloroethylene) that is released from its facility.

> Step 1: It finds the appropriate emission factor:
> Through the City's website, the facility is directed to an emission factor found in a U.S. EPA publication entitled "Toxic Air Pollutant Emission Factors - A Compilation for Selected Air Toxic Compounds and Sources." There are two emission factors provided in the mentioned document; one for typical systems and another for well-controlled systems. This drycleaner uses well-controlled "3rd generation" machines so it chooses the emission factor as 3.0 kg perchloroethylene/tonne clothes cleaned.
>
> Step 2: It uses the emission factor to calculate its emissions:
> The dry cleaner averages 0.5 tonnes of garments per hour and operates for 1,500 hours per year, so it estimates emissions as follows:
> Perchloroethylene released = clothes cleaned x emission factor
> = 0.5 tonne/hour x 1,500 hour/year x 3.0 kg Perchloroethylene/tonne
> **= 2,250 kg Perchloroethylene/yr**

Example 2: Mass balance to estimate releases

Mass balance is an accounting of the quantity of a substance going in and out of an entire facility, process or piece of equipment. Releases can then be calculated as the difference between input and output. Accumulation or depletion of the substance in the equipment are accounted for in the calculation.

For example, a manufacturing facility knows how much trichloroethylene it purchases in a year (its "input") but wants to estimate how much it is releasing to air during its processes. The facility also knows that there are only three "outputs" for the chemical:

- the product the company sells contains 25% trichloroethylene
- the waste from the facility contains 15% trichloroethylene
- the air emissions of trichloroethylene, which are unknown

Step 1: It calculates inputs and outputs:
Input = Amount purchased (800 kg)
Output = Product (2400 kg x 25% by weight) + Waste (1000 kg x 15% by weight) + Air releases (unknown)

Step 2: It compares inputs to outputs to determine the unknown air releases:
Air releases = Input – (product + waste)
Air releases (unknown) = 800 kg – (600 kg + 150 kg)
50 kg = Air releases

Example 3: Direct Monitoring to estimate releases

Some facilities may have the resources or requirements to measure actual quantities of chemicals emitted from their operations.

For example, an auto repair facility repaints parts and vehicles in a spray booth. The painting process releases large amounts volatile organic compounds (VOCs) from both the paints and the spraying process, and the VOCs are emitted from a stack on the booth.

By measuring what comes from its stack, this facility knows the amount of VOCs that come out per cubic metre of air. It can calculate the total VOCs released during a year as follows:

Step 1: It identifies its operating conditions:
Average measured VOC concentration from stack: 0.002 kg VOC/m^3
Stack flow rate (how much air the stack vents): 30 000 m^3/hour
Spray booth annual operation: 2 000 hours

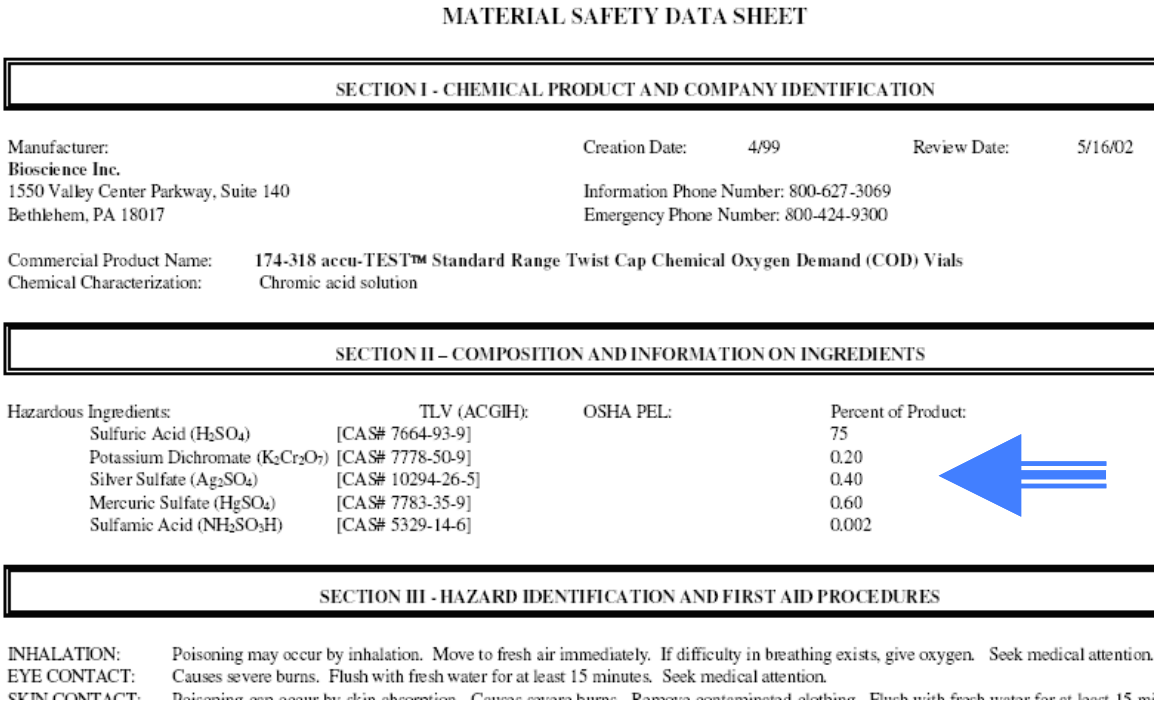
Step 2: It estimates annual emissions:
30 000 m^3/hour x 0.002 kg VOC/m^3 = 60 kg VOC/hour
60 kg VOC/hour x 2 000 hours/year = **120 000 kg/year VOCs**

Example 4: Using Material Safety Data Sheets (MSDSs) to estimate the use of chemicals in a mixture.

Suppose a company is using commercial kits to analyze chemical oxygen demand (COD) in water. These kits contain several chemicals at different concentrations. In order to identify which of these chemicals need to be reported and to calculate the amount you

have used, you can use the MSDS sheet provided by the seller of the kits. You know from your inventory that you have used 200 kg of this mixture in the reporting year.

Step 1: Identify the chemicals present in the kit and their concentrations in the MSDS. The following figure shows where to find this information.



MATERIAL SAFETY DATA SHEET

SECTION I - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Manufacturer:
Bioscience Inc.
1550 Valley Center Parkway, Suite 140
Bethlehem, PA 18017

Creation Date: 4/99 Review Date: 5/16/02

Information Phone Number: 800-627-3069
Emergency Phone Number: 800-424-9300

Commercial Product Name: **174-318 accu-TEST™ Standard Range Twist Cap Chemical Oxygen Demand (COD) Vials**
Chemical Characterization: Chromic acid solution

SECTION II – COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients:	TLV (ACGIH):	OSHA PEL:	Percent of Product:
Sulfuric Acid (H_2SO_4)	[CAS# 7664-93-9]		75
Potassium Dichromate ($K_2Cr_2O_7$)	[CAS# 7778-50-9]		0.20
Silver Sulfate (Ag_2SO_4)	[CAS# 10294-26-5]		0.40
Mercuric Sulfate ($HgSO_4$)	[CAS# 7783-35-9]		0.60
Sulfamic Acid (NH_2SO_3H)	[CAS# 5329-14-6]		0.002

SECTION III - HAZARD IDENTIFICATION AND FIRST AID PROCEDURES

INHALATION: Poisoning may occur by inhalation. Move to fresh air immediately. If difficulty in breathing exists, give oxygen. Seek medical attention.
EYE CONTACT: Causes severe burns. Flush with fresh water for at least 15 minutes. Seek medical attention.

From the MSDS you can identify that there are two chemicals in the list of priority substances: potassium dichromate (hexavalent chromium and its compounds) and mercuric sulfate (mercury and its compounds). They are present in the mixture at concentrations of 0.20 % and 0.60 % respectively.

Step 2: Calculate the annual use for these chemicals from the amount of mixture used (200 kg) and the concentrations from the MSDS:

chemical used = mixture used x concentration in the mixture. =
potassium dichromate used = 200 kg x 0.002 = **0.40 kg**
mercuric sulphate used = 200 kg x 0.006 = **1.2 kg**

Step 3: The company would identify any other sources of chromium and mercury compounds. If the total amounts of chromium or mercury meet the reporting thresholds, then the company reports these uses.

APPENDIX 7 – Background Reports

The following information can be found at www.toronto.ca/health/hphe/enviro_info.htm.

Board of Health reports

Strategy to Enhance Access to Environmental Information in Toronto
(Staff Report, July 2007) - This report describes why the Medical Officer of Health is recommending an environmental reporting program for the City of Toronto.

Process to Identify Priority Substances of Health Concern for Enhanced Environmental Reporting – Technical Summary
(Medical Officer of Health report, July 2007)– This report gives details about how the chemicals of highest health concern were identified.

More background information

The four reports below provide some background information that was used to prepare the July 2007 report to the Board of Health:

> *Environmental Reporting in Toronto: Gaps and Opportunities*. Lura Consulting (May 2007)
>
> *Substances of Concern Release and Transfer Reporting in Toronto: Analysis of Gaps.* Marshall Macklin Monaghan, Lura Consulting, Dr. Harvey Shear (May 2007)
>
> *Access to Environmental Information Pilot Project Report* (April 2007) – This report describes a pollution prevention pilot project at a City of Toronto facility.
>
> *Environmental Information Available on the City of Toronto Website* (June 2007)

Additional information can be found under the heading "Access to Environmental Information in the City of Toronto" at www.toronto.ca/health/hphe/toxic_chemicals/toxicchemicals.htm.