Substances of Concern Release and Transfer Reporting in Toronto:

Analysis of Gaps

Prepared For

Toronto Public Health

Submitted by:

Marshall Macklin Monaghan Limited
Lura Consulting
Harvey Shear, Ph.D.

May 2007 **14-06829-01-EN1**

Marshall Macklin Monaghan
PROJECT MANAGERS • ENGINEERS • SURVEYORS • PLANNERS

MARSHALL MACKLIN MONAGHAN LIMITED
80 Commerce Valley Dr. E., Thornhill, ON, Canada L3T 7N4
Telephone: 905-882-1100 Facsimile: 905-882-0055
Email: mmm@mmm.ca Web: www.mmm.ca

May 30, 2007
14-06829-01-EN1

Ms. Josephine Archbold, M.Sc.
Research Consultant
Toronto Public Health
Environmental Protection Office
277 Victoria Street, 7th Floor
Toronto, Ontario M5B 1W2

Dear Ms. Archbold,

Subject: Technical Report for the Substances of Concern Release and Transfer Reporting Project

Marshall Macklin Monaghan Limited is pleased to submit our final report for the technical review of the release and transfer of substances of concern in Toronto. This report was completed in conjunction with Lura Consulting and Dr. Harvey Shear as part of the Substances of Concern – Release and Transfer Reporting Project. This report documents the methodology and findings used in the quantification of substances of concern in Toronto, Ontario.

Thank you for the opportunity to provide our services to Public Health. Should you have any questions or comments on the report, please contact me.

Yours truly,

MARSHALL MACKLIN MONAGHAN LIMITED

Carolyn Adams, P.Eng.
Project Engineer
Environmental Management

cc. Sally Leppard, Lura Consulting

J:\1442 Projects by Job Number\2006 Jobs\14-06829- Toronto Public Health\reporting\cover ltr.doc

Substances of Concern Release and Transfer Reporting in Toronto:

Analysis of Gaps

Prepared For

Toronto Public Health

Marshall Macklin Monaghan Limited
Lura Consulting
Harvey Shear, Ph.D.
14-06829-01-EN1
May 2007

KEY FINDINGS

To better understand the potential and need for greater public access to environmental information, a review of environmental information for industrial, commercial and government sectors within Toronto was conducted. Existing environmental reporting programs were reviewed to assess whether these systems adequately defined the use, storage, release and transfer of substances of concern in Toronto.

The purposes of the review were to:

- Broadly assess the completeness of existing environmental reporting systems, and discuss the coverage and gaps of these environmental reporting systems; and
- Provide an estimate of the quantities of substances of concern that are used, stored, released and transferred by sector and by substance in Toronto. This quantification was used to identify key contributors and distribution of substances of concern, and to identify gaps in the existing reporting systems.
- Guide policy development in this area.

Based on a review of various listings of substances and chemicals of concern, the National Pollutant Release Inventory (NPRI) list of substances was selected to be representative of the substances likely to be used and released in Toronto. Data reported through NPRI were extrapolated using Toronto employment data, to estimate total quantities (i.e., quantities reported through NPRI and quantities released by operations that do not report through NPRI) of substances of concern. While this method provides only a general estimate of releases of substances of concern, it can be used to enhance understanding of the gaps in environmental reporting in Toronto and guide policy development in this area.

The Census Metropolitan Area (CMA) 2005 Industry Profiles and NPRI data were used to identify 18 sectors with the potential for the use, storage, release and transfer of substances of concern. The selected sectors represent approximately 40% of the Toronto workforce, and essentially 100% of the workforce in the goods producing sectors. The 18 sectors with the potential for the release of substances of concern in Toronto were identified as follows:

- Food and Beverage Manufacturing
- Clothing Manufacturing
- Printing and Publishing
- Chemical Manufacturing
- Wood Industries
- Other Manufacturing
- Chemical Distribution
- Waste Management
- Water Treatment
- Medical and Diagnostic Laboratories
- Automotive Repair and Maintenance
- Fuelling Services
- Transportation Support
- Construction
- Laundry Services (Dry Cleaning)
- Funeral Services
- Power Generation
- Property Management/Institutional

Reported quantities for the use, releases and transfers of toxic chemicals were not available for four of the sectors: clothing manufacturing, laboratories, automotive repair and maintenance and funeral services.

NPRI data, Massachusetts Toxics Use Reduction Act (TURA) data, and emission factors from the United States Environmental Protection Agency (EPA) were used to estimate quantities of substances of concern used, released and transferred in Toronto. None of the reviewed data sources contained sufficient information on amounts of chemicals typically stored on site in preparation for their subsequent use or disposal, therefore the chemical storage component could not be estimated for this project.

The main findings of the report are summarized as follows:

- While many of Toronto's operations report to various environmental reporting mechanisms (for example Toronto Sewer Use By-law), only the NPRI is readily accessible to the public.
- 3% of Toronto's industrial, commercial and public operations report to NPRI.
- 56% of releases to air, water and land are not reported to NPRI.
- 77% of releases to air are not reported to NPRI.
- No use and storage data are reported to NPRI.
- Over 99% of releases in Toronto are to air; with waste management being the only sector in which releases are primarily to water.
- It is estimated that about 88,600 tonnes/year of substances are released in Toronto.
- It is estimated that about 75,400 tonnes/year of substances are transferred in Toronto.
- About 70% of the estimated releases are Criteria Air Contaminants, (i.e., volatile organic compounds (VOCs), nitrogen oxides, carbon monoxide and particulate matter) which contribute to poor air quality (i.e., smog).
- A limited number of substances (sulfuric acid, mercury, zinc, phosphorus, copper, aluminum, ammonia, toluene, xylene, manganese and chromium) make up about 95% of reported transfers.
- *Toronto's Ten Key Carcinogens* are reported to be released and transferred in much lower quantities than other substances, typically contributing to less than 1% of the reported quantities.
- VOCs that are not contributors to smog as identified by NPRI (e.g., dichloromethane, ethylbenzene, trichloroethylene, tetrachloroethylene, etc.) contribute less than 1% to the reported and estimated total releases.
- Small operations such as automotive repair shops, dry cleaners and funeral services do not typically report through NPRI. They contribute less than 1% to the estimated total releases in Toronto.

- There are limited data for the storage of substances of concern in Toronto as reported through the Environmental Emergencies Planning Registry.
- Reporting systems other than NPRI are not easily accessible to the public and the environmental information is not compiled for interpretation.

TABLE OF CONTENTS

SECTION ***PAGE***

LIST OF TABLES

On or Following Page

LIST OF FIGURES

Page

APPENDICES

1.0 INTRODUCTION

In October 2006, the Environmental Protection Office of Toronto Public Health (TPH) retained the consulting team of Lura Consulting, Dr. Harvey Shear of the University of Toronto and Marshall Macklin Monaghan Limited to research and consult on environmental reporting programs. The scope of work was established in our proposal dated October 2, 2006 in response to the Request for Proposal #9117-06-7306.

The objective of the project was to obtain a better understanding of existing environmental reporting systems to assess whether these systems adequately defined the use, storage, release and transfer of substances of concern in Toronto. This was achieved through stakeholder consultations, a review of several environmental reporting systems, and the quantification of the use, storage, release and transfer of substances of concern in Toronto.

This report forms part of the documentation for the project and presents the findings of a review of some existing environmental reporting systems and the estimated quantities of substances of concern in Toronto.

1.1 Purpose

TPH recognizes that providing environmental information related to the release of substances of concern to the environment can lead to enhanced health and quality of life for Torontonians [TPH, June 2006]. To better understand the potential and need for greater public access to environmental information, a review of environmental information for industrial, commercial and government sectors within Toronto was commissioned.

The purposes of the review were to:

- Broadly assess the completeness of existing environmental reporting systems, and discuss the coverage and gaps of these systems; and
- Provide an estimate of the quantities of substances of concern that are used, stored, released and transferred by sector and by substance in Toronto. This quantification was used to identify key contributors and distribution of substances of concern, and to identify gaps in the existing reporting systems.
- Guide policy development in this area.

1.2 Scope and Limitations of Work

This study was limited to stationary, non-residential sources of pollutants. Other sources of substances of concern are addressed through different environmental policies or regulations. Sources not included in this review were: mobile sources (cars, trucks, trains and airplanes), trans-boundary sources (pollution transported from the United States or other Ontario municipalities), residential sources (household heating and cooling, cleaning products and pesticides). Only existing, publicly-available data were used to estimate the quantities of substances of concern in Toronto.

Because of the potential contribution of smaller operations such as dry cleaners, funeral services and auto body shops to the overall releases of substances of concern in Toronto, these sectors were specifically included in the study. Other localized or smaller sources were not included, for example: household uses; contaminated sites; and pesticide use.

The estimated quantities presented in this report represent Toronto-wide values and do not represent quantities that can be associated with any specific industrial or commercial operation or geographic locale. Data are available for each facility through NPRI but are presented in this report as the total on-site releases (air, land and water), on-site air releases, and total off-site transfers including quantities that are sent for off-site recycling and disposal.

This method assumes that reported quantities can be used to extrapolate the release from operations (i.e., small or medium sized operations) that are not required to report to NPRI. However, releases below the threshold values are not reported to NPRI and are not captured by the method. This may be relevant for some substances of concern that are released by many operations but in small quantities.

In addition, although it is recognized that the number of employees may not be directly related to releases (i.e., a larger firm with a dedicated environmental staff may control releases more effectively) in the absence of other data (e.g., revenue, production rates), the use of employment was consistent with previous studies [ToxProbe, 2002] and was considered adequate to provide gross estimates. Moreover, employment data for Toronto was only available by ranges of employees per facility. Thus, the employment factors were developed using the averages of the ranges. The size of the impact of these limitations on the results is not known.

This report does not address occupational exposures, the toxicity of the substances considered, nor their behaviour in the environment. Estimates of chemical tonnage released and transferred by industry is not necessarily proportionate to the degree of public exposure or risk. Thus, this data represents only part of the pollution picture.

2.0 METHODOLOGY

Several interconnected tasks were completed to establish a basis for the estimation of the quantity of substances of concern used, stored, released and transferred in Toronto. The tasks included:

- Review of existing environmental reporting systems to identify the types of data available and the types of companies reporting;
- Development of a list of substances of concern that should be considered for estimation purposes; and
- Identification of the sectors and operations likely to contribute substances of concern to the Toronto environment.

This Section presents the methods used to assess each of these sources of information and documents the calculation methods used to estimate total quantities of substances of concern.

2.1 Reviewing Environmental Reporting Systems

Environmental reporting systems that had been previously documented [CELA, 2006] or that were known to the project team were reviewed to identify:

- What substances were included in the various reporting systems;
- What companies were required to report;
- What information was publicly available; and
- What level of effort was required to access the information.

The information obtained through this review is reported in Section 3.0, and was used in selecting a list of substances of concern as well as in the identification of potential sources.

2.2 Selecting a List of Substances of Concern

Canadian and American databases have developed extensive lists of substances of concern that reflect the types of substances used and released by industries in each jurisdiction. To be consistent with existing reporting systems, the term *substance* is used instead of chemical because the lists produced by NPRI and others include non-chemical substances such as particulate matter and asbestos. The Canadian list of substances was developed through the *Canadian Environmental Protection Act* (CEPA). In 2005, 323 substances were reported through the National Pollutant Release Inventory (NPRI) program (Appendix A). Appendix A is an extract from the NPRI guide [Environment Canada, 2005], which lists the substances and thresholds regulated in 2005. The US Environmental Protection Agency (EPA) manages the Toxics Release Inventory (TRI) which records releases of approximately 581 individual substances and 30 chemical categories.

Clarification of Substance of Concern, Volatile Organic Compounds and Criteria Air Contaminants

Throughout this report, reference will be made to terms such as substance of concern, volatile organic compounds (VOCs) and Criteria Air Contaminants. To provide clarity, these terms are defined below:

Substance of Concern – Chemical and physical substances that are of concern for health and/or the environment, including substances considered toxic under the *Canadian Environmental Protection Act* and Criteria Air Contaminants;

Volatile Organic Compound – A group of some 1,000 chemicals which volatilize readily in the atmosphere;

Criteria Air Contaminant – Group of seven substances that contribute to smog, acid rain and decreased visibility, identified through NPRI and used to monitor the success of emission reduction programs and to support Canadian commitments to domestic and international programs [NPRI, 2005]. They are: total particulate matter (TPM), particulate matter less than or equal to 10 microns (PM_{10}), particulate matter less than or equal to 2.5 microns ($PM_{2.5}$), sulphur oxides (SOx), nitrogen oxides (NOx), VOCs, carbon monoxide (CO) and ammonia (NH_3).

Although the US EPA TRI list of substances is more extensive than the Canadian NPRI list, some of the additional toxics may be related to substances which are not used in Canada, either because of federal bans or differences in manufacturing processes. It was beyond the scope of this study to review each item on the different lists and develop a technical justification for inclusion or exclusion. Therefore, the NPRI list of substances was adopted as a preliminary list for this review.

The NPRI list of substances was cross-referenced with priority issues identified by Toronto Board of Health [BOH, 2006] to focus on toxic chemicals that contribute to one or more of the following:

- occupational and environmental cancer;
- poor air quality in Toronto;
- damaging children's health; and,
- prevalence of Persistent Organic Pollutants (POPs) in our environment;

Although not exhaustive, the NPRI list of substances captures many of the industrial substances that are produced or used and that contribute to poor air quality and potential health impacts. With a few exceptions (notably polybrominated diphenylethers (PBDEs) and various organochlorine pesticides), the NPRI list includes the priorities identified by the Board of Health. Most of these exceptions are covered by the Stockholm Convention POPs, which are typically no longer used or produced in Canada.

In summary, the NPRI list of substances (provided in Appendix A) was considered to be comprehensive and representative of the types of chemicals used and released in Toronto and was therefore selected as the list of substances of concern to consider in this study.

Clarification on the Terms Use, Storage, Releases and Transfers

Throughout this report, reference will be made to the use, storage, release or transfer of substances of concern. To provide clarity, these terms are defined below:

Use – refers to the amount of substance that is used by an organization;

Storage – refers to the amount of substance that is stored on-site at a facility;

Releases – refers to the amount of substance that is released from sites into the environment through:

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

Transfers – refers to the final disposal of substances at an off-site location, treatment or recycling at an off-site location (including at municipal sewage treatment plants) and disposal into an energy-from-waste recovery system. Therefore, discharges to sanitary sewer are considered to be transfers

2.3 Selecting Representative Sectors

Industrial, commercial and governmental sectors within the City of Toronto were identified through the Toronto Census Metropolitan Area (CMA) 2005 Industry Profiles. The Industry Profiles are compiled from Statistics Canada census data and provide the North American Industry Classification System (NAICS) code and the number of employees in each sector. The Industry Profile Index [City of Toronto, 2007] lists 210 industries within the goods producing sectors and the service sectors for the Greater Toronto Area, including all of Peel and York Regions and parts of Durham and Halton Regions. The industrial sectors identified within the index were reviewed based on the comprehensive knowledge of the project team, to identify those operations which would potentially use, store, release or transfer substances of concern.

The preliminary list of sectors was compared to Toronto companies reporting to NPRI to identify possible gaps in the list. As a result, the Property Management/Institutional sector was added for consideration. Based on NPRI reports, this sector reports releases associated with building systems (i.e., chillers, boilers, standby generators, etc.).

The final list of selected sectors (Table 1) included 18 industrial, commercial and government operations that use and produce substances of concern (e.g., chemical industries, manufacturers, auto body shops, dry cleaners, commercial buildings). The complete list of sectors identified through the CMA Industry Profiles is provided in Appendix B, for reference. The list of selected sectors (Table 1) is considered to be representative of small, medium and large operations common to the City.

2.4 Estimating Use, Storage, Releases and Transfers of Substances of Concern

As documented in Section 3.0, the available information from existing databases did not provide comprehensive data on the use, storage, release and transfer of substances of concern in Toronto. For example, not all the selected sectors reported releases to NPRI, and for some sectors, only a limited number of Toronto operations reported. Therefore, a multi-level approach was developed to estimate the releases of substances not included in NPRI. In general, the approach was as follows:

- Reported data for Toronto were used where available (i.e., NPRI data for releases and transfers).
- Where data were available for only a limited number of companies (e.g., construction companies), NPRI data across Canada were reviewed to assess whether the Toronto data were representative of releases for this sector.
- For substance use, data from the *Massachusetts Toxics Use Reduction Act* (TURA) reporting system were compiled. Details of this reporting system are provided in Section 3.2.2.
- For non-reporting sectors (i.e., dry cleaners, auto body shops, gas stations), publicly available emission factors were obtained to estimate quantities.
- When emission factors were not available (i.e., funeral services) industry specific reports which documented releases were considered.

Table 1. List and Description of Selected Toronto Sectors
Toronto Public Health Access to Environmental Information Project

#	Sectors	NAICS Code	# of Operations Reporting to NPRI	Total # of Operations in Toronto	Description of Sector
1	Food and beverage manufacturing	311 - 312	28	406	The food and beverage industry includes bakeries, meat processing operations, milk and dairy operations and alcoholic and non-alcoholic beverages. 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.
2	Clothing manufacturing	315	0	631	Clothing manufacturing was considered in the review because of the historical use of metals in dyes and the use of solvents in treating textiles and cleaning finished products. Based on the lack of reporting through NPRI, it is assumed that the industry in Toronto is principally associated with manufacturing from pre-dyed and pre-treated textiles or may use less toxic processes. Therefore it was assumed that this industry would have releases associated with cleaning finished products, similar to dry cleaning operations.
3	Printing and publishing	323, 511	21	1,141	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.
4	Chemical manufacturing	324 - 326	93	542	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).
5	Wood industries	321, 337	12	457	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 (although the use of arsenic preservatives has been phased out). Wood finishing can include gluing, painting, lacquers, etc., which can emit VOCs and metals and handling processes (e.g., sanding and cutting) that would emit particulate matter.

Table 1. List and Description of Selected Toronto Sectors Toronto Public Health Access to Environmental Information Project					
6	Other manufacturing	32 - 33	114	2,172	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 chemicals can remain in the products. Chemical usage would include typical manufacturing chemicals, such as acids, bases and solvents (VOCs) for cleaning and maintenance and lubricants.
7	Chemical distribution	414, 416, 444	3	37	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, but storage capacities would be significant.
8	Waste management	562, 22132	6	89	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 inorganics for sewage treatment.
9	Water treatment	22131	4	9	This sector is limited to municipal water treatment plants (i.e., provision of drinking water) that typically use chemicals in the treatment process.
10	Medical and Diagnostic Laboratories	6215	0	268	This sector includes institutional and commercial laboratories, such as universities, colleges, government laboratories, medical and dental laboratories, commercial analytical laboratories. These operations use substances of concern in small quantities. The types of substances vary.
11	Automotive repair and maintenance	8111	0	675	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 particles can be high.

Table 1. List and Description of Selected Toronto Sectors Toronto Public Health Access to Environmental Information Project					
12	Fuelling services	447, 4121	2	249	Bulk fuelling stations report through NPRI, but gasoline stations are exempt from reporting. The transfer of petroleum products from delivery trucks to underground storage tanks and to vehicles results in the release of VOCs. Stations with car washes would also have soap, detergent and particulate releases.
13	Transportation support	48 - 49	1	417	This sector includes operations associated with air, road and rail transportation systems including TTC, taxi and limousine services, postal services and couriers and messengers. It is anticipated that releases would be associated with vehicle maintenance and repair, and private fuelling systems.
14	Construction	23	1	1,053	This sector considered the stationary sources from construction sites and includes releases from equipment and particulate matter during construction.
15	Laundry services (dry cleaning)	8123	1	320	Laundry services include commercial laundries, dry cleaners and coin washes. Because smaller operations are numerous, it was considered possible that significant overall releases could result from this sector.
16	Funeral Services	81222	0	68	Funeral services include preparation of the body for burial through embalming and cremation.
17	Power Generation	22	3	48	Although there are no electric power generating stations in Toronto, this sector includes district heating systems that release Criteria Air Contaminants.
18	Property Management / Institutional	5311, 5419, 5619, 6113, 6221	42	2,479	This sector includes services associated with large buildings, hospitals, hospital support and schools. Releases are associated with building heating and ventilation systems.
Total			331	11,061	Therefore 3% of Toronto's industrial, commercial and public operations report to NPRI.

NOTES:

1. # of Operations Reporting to NPRI was determined through a search of the NPRI 2005 database for entries with a postal code starting with "M". The search results were corrected to remove obvious errors (i.e., operation for Simcoe). [NPRI, 2007]
2. Total # of Operations in Toronto was determined through a search of the Toronto Business Directory conducted by the Toronto Economic Development Office based on NAICS codes identified above. [TBD, 2005]

The detailed methodology used in estimating quantities is presented in the following Sections with details of calculations presented in Appendix C.

2.4.1 Estimating the Use of Substances of Concern

Use of substances of concern was estimated for the selected sectors using data reported through the TURA. Data reported through TURA are compiled by the Toxics Use Reduction Institute (TURI) that was established to assist industries in the reduction of the use of toxics in their operations. The most recent TURA data were for 2004. TURA data were available for eight of the 18 sectors, as follows:

1. Food and beverage manufacturing;
2. Printing and publishing;
3. Chemical manufacturing;
4. Wood industries;
5. Other manufacturing;
6. Chemical distribution;
7. Waste management; and
8. Power generation.

To estimate the annual quantity of substances of concern used in Toronto, the TURA-reported quantities for each sector (based on a conversion of the NAICS code used by NPRI to the Standard Industrial Classification (SIC) code used by TURA) were added and in the absence of employment data for the Massachusetts operations, the number of reporting companies was recorded. To extrapolate the Massachusetts data to Toronto-based sectors, the reported quantity used was multiplied by a ratio of the number of Toronto companies reporting in that sector to the number of companies reporting through TURA. This value provided an estimated usage that corresponded to the quantity that would be reported, should existing reporting systems require it.

2.4.2 Storage of Substances of Concern

The Environmental Emergency Regulations under the CEPA requires that industrial facilities using dangerous substances have emergency plans in place to prevent accidents, and respond in the event of an accident, vandalism or terrorist attack. They require persons who own or manage specified toxic and hazardous substances at or above the specified thresholds to provide required information on the substance(s), the quantities stored and to prepare and implement environmental emergency plans. Data on the storage of a limited number of substances of concern would be available for approximately 30 companies in Toronto. Based on the limited data available, it was not considered feasible to extrapolate stored quantities for all Toronto operations. Therefore, no data for the storage were obtained for inclusion in this report.

2.4.3 Estimating Releases and Transfers of Substances of Concern

To estimate the quantities of substances of concern released or transferred within each sector, the NPRI Access database for 2005 was searched for operations with a postal code starting with "M". The extracted data was sorted by NAICS codes into the 18 selected sectors. All reported releases

and transfers for 2005 in the City of Toronto were included within these 18 sectors. The total reported releases and transfers were then summed for each sector, without statistical manipulation. No reported data were available for the following four sectors:

- Clothing manufacturing, including textiles and leather goods;
- Medical, research and commercial laboratories;
- Automotive repair; and
- Funeral services.

Where available, the reported data were used to extrapolate the quantities released Toronto-wide, based on employment as reported in the City of Toronto Economic Development Toronto Business Directory for 2005 [City of Toronto, 2005]. For example, total estimated release of a substance for a sector is equal to the total reported quantity of that substance multiplied by the approximate number of employees in the sector divided by the approximate number of employees at the reporting companies (see Appendix C).

This method assumes that reported quantities can be used to extrapolate the release from operations (i.e., small or medium sized operations) that are not required to report to NPRI. However, releases below the threshold values are not reported to NPRI and are not captured by the method. In addition, although it is recognized that the number of employees may not be directly related to releases (i.e., a larger firm with a dedicated environmental staff may control releases more effectively) in the absence of other data (e.g., revenue, production rates), employment was consistent with previous studies [ToxProbe, 2002] and was considered adequate to provide gross estimates. The size of the impact of these limitations on the results is not known.

For those sectors where reported values were limited or not available (e.g., dry cleaning, gas stations and automotive repair), estimates of releases were used based US EPA methods for calculating emission factors. These estimates were calculated using assumptions presented in Appendix C.

Reported data and emission factors were not available for clothing manufacturing, laboratories and funeral services. Clothing manufacturers were considered to release solvents during product cleaning and were therefore modelled as being similar to dry cleaning facilities. Funeral services use solvents in small quantities and release substances of concern through the cremation process. Information on air quality at a Toronto crematorium [Senes, 2000] was used for this sector. The assumptions used in the calculations for clothing and funeral services are detailed in Appendix C.

Clarification on the Terms Reported, Non-reported and Total Estimated

Throughout this report, reference will be made to the quantities that are reported, non-reported and total estimated. To provide clarity, these terms are defined below:

- **Reported** – refers to the quantity of a substance that is reported to NPRI by a company;
- **Non-reported** – refers to the quantity of a substance that is estimated, based on employment or an emission factor to be released in Toronto but is not reported to NPRI;
- **Estimated Total** – refers to the quantity of a substance estimated based on the reported quantity plus the non-reported quantity.

Although laboratories may use some common solvents in the preparation of samples, the use of specialty chemicals would be specific to the research and analyses conducted at the individual facilities. Based on the variety of possible substances of concern and the lack of details for operations within Toronto, no reliable emission factor could be developed for this sector.

3.0 EXISTING REPORTING SYSTEMS

Environmental reporting systems that are currently in place in Toronto were reviewed, to assess the potential availability of relevant environmental information. Programs in a number of other jurisdictions in North America were also assessed for comparison.

The NPRI and data compiled through the Massachusetts TURA were used to estimate quantities of substances of concern used, released and transferred in Toronto. These two systems are described in the following Sections. The other systems that were reviewed included:

- US and New York TRI systems;
- Eugene Oregon Toxics Right-to-Know Program;
- Responsible Care;
- City of Toronto Sewer Use By-law;
- Ministry of the Environment Certificates of Approval;
- Federal Environmental Emergency Plans;
- Hazardous Waste Generator Registration;
- Records of Spills and Occurences;
- Private and Retail Fuel Storage Tank Registry; and
- PCB Storage Registries (federal and provincial).

Descriptions of these other reporting systems are provided in Appendix D.

3.1 National Pollutant Release Inventory

The NPRI, legislated under the CEPA, is a Canada-wide, publicly-accessible inventory on the annual release (to air, water, land and underground) and disposal or recycling of substances. Environment Canada makes the information available in an annual public report, and maintains a inventory that can be accessed and searched through an on-line database [NPRI, 2007]. In 2005, NPRI included data on 323 substances from 8,681 facilities across Canada of which 333 facilities were in Toronto.

The NPRI list of substances (Appendix A) is based on federally identified substances that may be used or produced by Canadian industries. Companies that manufacture, process or use one of the listed substances, meet the 20,000-hour employee threshold (equivalent to 10 fulltime employees) and the substance-specific thresholds (Appendix A) must report their releases or

transfers. Typical substance thresholds are 10 tonnes, however for some highly toxic substances releases require reporting for grams or kilograms.

NPRI does not require reporting for pollutants from mobile sources, households, and facilities that release substances in quantities below the prescribed thresholds. Sector activities that may occur in Toronto, but that are specifically exempt from NPRI reporting include:

- Education or training of students;
- Research or testing;
- Maintaining or repairing transportation vehicles;
- Distribution, storage or retail sales of fuels, except for terminal operations;
- Wholesale and retail sales of NPRI substances, if the substance is not released during normal operations; and
- Practice of dentistry.

In addition to reporting company information, reporting companies must also describe the nature of the operations leading to the releases, quantities (estimated or measured) released or transferred, reasons for changes in quantities from year to year, and information on pollution prevention activities undertaken by the company.

3.2 Massachusetts Toxics Use Reduction Act (TURA)

In addition to the US TRI reporting system, facilities in Massachusetts are also required to file an annual report under the TURA program. Through this program, companies report on the use of toxics and the effectiveness of techniques implemented to reduce waste. Techniques may include input substitution, product reformulation, product unit redesign or modification, product unit modernization, improved operation and maintenance, and recycling, reuse or extended use of toxics.

Companies are required to report how the toxic material is used, and what happens to it after it is used. Approximately 500 industrial facilities within the designated industrial sectors (i.e., mining, manufacturing, transportation, wholesale and services industries) report annually. TURA reports are available to the public on-line and can be searched by community, company or chemical [TURA, 2007].

The employee and substance use thresholds are the same as the US TRI system (i.e., 10 full-time employees and typical use of 10,000 pounds (4.5 tonnes) or manufacture of 25,000 pounds (11 tonnes)). There are over 1400 chemicals that are subject to reporting, although only about 250 have been used and reported in Massachusetts. Companies are required to report how the toxic material is used, and what happens to it after it is used.

The TURA report must identify the chemicals used by the facility in three categories: manufactured, processed and otherwise used and whether the substance becomes a byproduct or it is shipped as a product or as part of a product. Byproducts are further broken down into

transfers and releases. For example, some of the toxic material may leave the facilities as a solid or liquid waste that is carted away from the site (a transfer), or as an air emission (a release). Quantities for transfers are not shown in the reports.

4.0 DISCUSSION OF FINDINGS

Based on the CMA 2005 Industry Profiles and NPRI data, 18 sectors (Table 1) were identified to have the potential for the use, storage, release and transfer of substances of concern. The selected sectors represent approximately 40% of the Toronto workforce, and essentially 100% of the workforce in the goods producing sectors.

Industries and commercial sectors in Toronto currently document and/or report environmental information through NPRI, the Toronto Sewer Use By-law, the environmental approval process (e.g., Certificates of Approval), industry-specific registration processes (i.e., underground storage tanks and PCB storage facilities) and hazardous waste disposal manifests. A limited number of companies also report through Environmental and Emergency (E2) preparedness and Responsible Care. However, most of this information is not compiled nor is it available to the public in a manner that would allow for the review of environmental hazards.

The NPRI reporting system requires reporting for substances of concern identified to be significant to Canadian industry and addresses the release and transfer of these substances. Based on the estimates presented in Section 4.3, NPRI-reported releases represent 44% of the total estimated releases of substances of concern in Toronto. However, because of the relatively high reporting thresholds (i.e., generally more than 10 tonnes annually), many of the substances released in smaller quantities are not reported. These substances (i.e., chlorinated solvents, formaldehyde, heavy metals) tend to be more toxic than the substances released in larger quantities and may be of more relevance at the local level.

In summary, none of the reporting systems that were reviewed as part of this study are comprehensive for Toronto. For example, the systems generally provide exemptions for selected sectors, few of the systems record data for use and storage of substances, and relatively high reporting thresholds mean that the substances released in smaller quantities are not reported.

4.1 Use of Substances of Concern

No local data associated with the use of substances of concern were available and therefore estimates of usage were based on Massachusetts TURA reports for eight of the 18 sectors. Estimates of use are provided in summary tables (Appendix E) for these sectors. A notation in the summary table is provided where TURA data were not available for a sector.

The quantities and types of substances that were reported to be used by the manufacturing sectors (i.e., Chemical and Other Manufacturing) generally corresponded to the NPRI-reported releases for those sectors. For example, VOCs are the substance with the greatest use and releases for both these sectors. However, the differences become more pronounced for industry-specific-sectors, such as Wood Industries and Food and Beverage Manufacturing. For these two sectors, quantities of VOCs used are calculated (based on TURA) as being lower than they are

released (as reported through NPRI) and the types of substances used (based on TURA) are significantly different than those released (based on NPRI).

The differences between the two reporting systems may be associated with one or more of the following:

- Differences in the regulatory regimes may require reporting for different substances at different reporting thresholds, and may discourage or limit the use some substances;
- Differences in manufacturing processes may result in the generation of materials that are not used in the other jurisdiction; and
- Variations in the types of industries and commercial operations within each sector.

It was beyond the scope of this study to provide an in-depth review of the variability between reported use of substances through TURA and the related releases reported through NPRI within each sector. Based on the available data and the variability between the use and releases of substances of concern, the use quantities reported through TURA were not extrapolated to estimate the overall Toronto usage of substances of concern.

4.2 Releases and Transfers of Substances of Concern

4.2.1 Quantities Reported Through NPRI

NPRI reports include quantities for on-site releases, on-site disposal and off-site transfers of toxic substances, as defined in Section 2.4.1. One sector (Chemical Manufacturing) reported on-site disposal of toxic substances. This reported quantity was associated with a single facility, and was not considered representative of the overall sector.

Quantities of releases and transfers that are reported to NPRI were available for 14 of the 18 sectors as presented in summary tables in Appendix E. The sectors which did not report releases or transfers were:

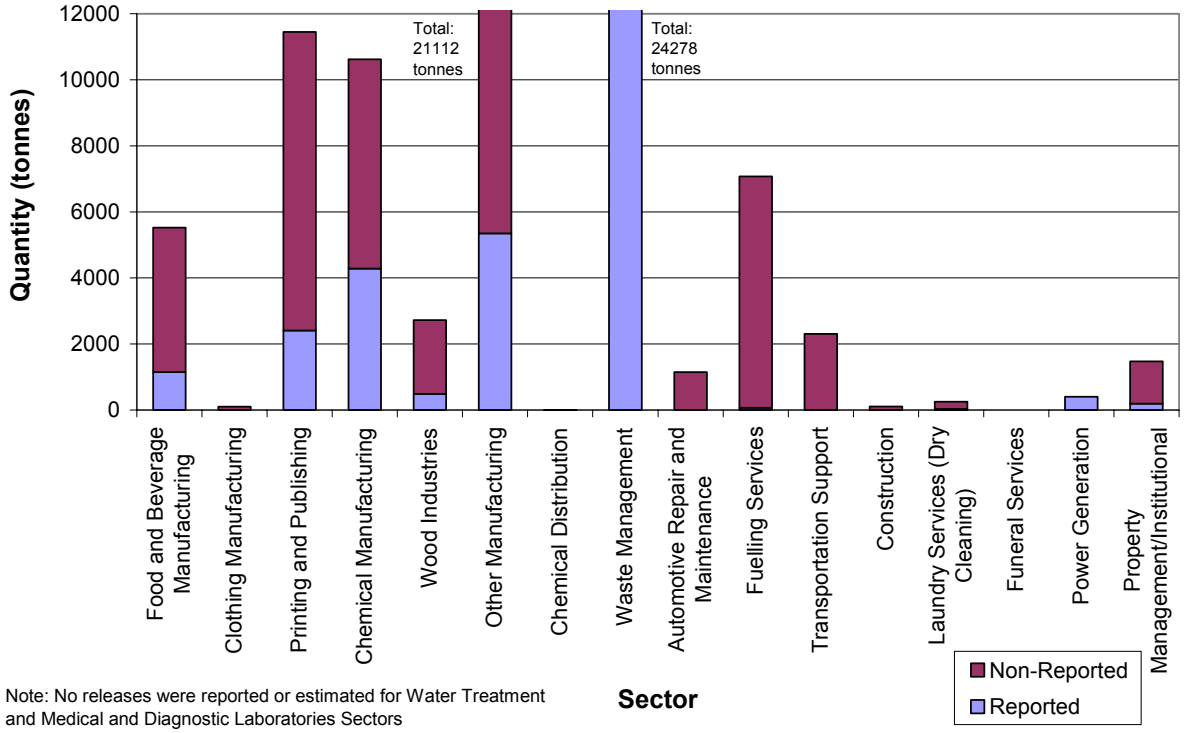
1. Clothing manufacturing;
2. Medical and diagnostic laboratories;
3. Automotive repair; and
4. Funeral services.

A summary of the reported quantities released for each sector is presented in Table 2(a). For most of the sectors, the most significant releases are from four substances:

- VOCs;
- Nitrogen oxides;
- Carbon monoxide; and
- Particulate matter (total, PM<10 and PM<2.5).

The one exception to this is the Waste Management sector, which has the greatest quantity of reported releases (Figure 1) with nitrate ion and ammonia (Table 2(a)) contributing over 96% of the reported releases for this sector. Based on the sewage treatment process, the releases of nitrate ion and ammonia would represent discharges to surface water from the treatment of organic compounds in sewage.

Figure 1. Estimated Total Releases of Substances of Concern by Sector



Note: No releases were reported or estimated for Water Treatment and Medical and Diagnostic Laboratories Sectors

NPRI also records releases to air separately (Figure 2) from the total reported releases to air, land and water. Table 3(a) provides reported quantities for releases to air only for each of the 18 sectors. Comparison to Table 2(a) confirms that only 2% of the releases from the waste management sector are related to air. For most of the other sectors, air releases account for 99% to 100% of the reported releases. This is reasonable because operations in Toronto discharge waste to sanitary sewers, and discharges to sewers are reported as off-site transfers, not on-site releases.

Considering releases to air only, the most significant reported releases (88% of the total) were from the following sectors:

- Other Manufacturing (35.8%);
- Chemical Manufacturing (28.7%);
- Printing and Publishing (16.1%); and

Table 2. Quantities of Substances Released by Sector
Substances of Concern Release and Transfer Reporting in Toronto

2(a). NPRI Reported Releases

#	Sector	Nitrate Ion	Volatile Organic Compounds (VOCs)	Ammonia	Nitrogen Oxides	Carbon Monoxide	Particulates <10 (PM10)	Total Particulates (PM total)	Particulates <2.5 (PM2.5)	Sulphur Dioxide	Phosphorus	HCFC-142b	Dichloromethane	n-Butyl alcohol	Aluminum (fume or dust)	Zinc (and its compounds)	Nonylphenol and its ethoxylates	Methyl methacrylate	Sodium nitrite	Ethylbenzene	Phenol (and its salts)	iButyl Alcohol	HCFC-22	Diethanolamine (and its salts)	Acetonitrile	N-Methyl-2-pyrrolidone	Copper (and its compounds)	Hydrochloric acid	Lead (and its compounds)	Ethylene glycol	Nitric acid	2,6-Di-t-butyl-4-methylphenol
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing		646.38	45.94	220.93	101.55	47.10	65.85	16.67	0.68	0.001																				0.09	
2	Clothing Manufacturing																															
3	Printing and Publishing		2386.96		3.33	2.80	0.72		1.13	0.02				4.537				0.36		3.55	1.20	0.20							0.11	2.06		
4	Chemical Manufacturing		2958.51	0.33	319.86	380.09	87.03	81.28	61.55	8.72	0.01	201.04	67.04	7.98		1.97	17.72	15.97	16.36	2.93			12.18	11.94	10.30	7.83	0.04	1.99	0.16	1.82	0.02	2.1
5	Wood Industries		390.99		39.86		21.50		21.39		0.06											12.82										
6	Other Manufacturing		2201.39	63.09	896.64	234.08	514.60	567.21	433.48	307.89	0.02			39.33	50.75	4.07		0.36		9.40	12.64						0.97	3.69	0.12		2.96	
7	Chemical Distribution					0.10							0.04	0.003				0.03	0.02	0.04		0.002						0.003		0.04		
8	Waste Management	16835.00	96.55	6607.10	253.50	130.90	18.15		13.44		286.94					25.17											6.20		4.42			
9	Water Treatment																															
10	Medical and Diagnostic Laboratories																															
11	Automotive Repair and Maintenance																															
12	Fuelling Services		68.10																	0.28												
13	Transportation Support		6.36																													
14	Construction						0.54																									
15	Laundry Services (Dry Cleaning)		31.18																													
16	Funeral Services																															
17	Power Generation				250.80	129.10	11.80		11.80																							
18	Property Management/Institutional		1.10		100.63	7.03	47.69	0.80	36.25	0.69																						
	Total Compound	**16835.00**	**8787.51**	**6716.46**	**2085.56**	**985.65**	**749.12**	**715.14**	**595.70**	**318.00**	**287.03**	**201.04**	**67.08**	**51.85**	**50.75**	**31.21**	**17.72**	**16.72**	**16.37**	**16.20**	**13.84**	**13.02**	**12.18**	**11.94**	**10.30**	**7.83**	**7.21**	**5.69**	**4.81**	**3.93**	**3.07**	**2.06**
	% of Total Compound	43.55%	22.73%	17.38%	5.40%	2.55%	1.94%	1.85%	1.54%	0.82%	0.74%	0.52%	0.17%	0.13%	0.13%	0.08%	0.05%	0.04%	0.04%	0.04%	0.04%	0.03%	0.03%	0.03%	0.03%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%	0.01%

2(b). Estimated Non-reported Releases

#	Sector	Nitrate Ion	Volatile Organic Compounds (VOCs)	Ammonia	Nitrogen Oxides	Carbon Monoxide	Particulates <10 (PM10)	Total Particulates (PM total)	Particulates <2.5 (PM2.5)	Sulphur Dioxide	Phosphorus	HCFC-142b	Dichloromethane	n-Butyl alcohol	Aluminum (fume or dust)	Zinc (and its compounds)	Nonylphenol and its ethoxylates	Methyl methacrylate	Sodium nitrite	Ethylbenzene	Phenol (and its salts)	iButyl Alcohol	HCFC-22	Diethanolamine (and its salts)	Acetonitrile	N-Methyl-2-pyrrolidone	Copper (and its compounds)	Hydrochloric acid	Lead (and its compounds)	Ethylene glycol	Nitric acid	2,6-Di-t-butyl-4-methylphenol
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing		2471.99	175.70	844.92	388.35	180.12	251.85	63.74	2.61	0.00																				0.34	
2	Clothing Manufacturing		100.00																													
3	Printing and Publishing		8962.44		12.49	10.51	2.69		4.22	0.08				17.04				1.34		13.33	4.51	0.74							0.41	7.73		
4	Chemical Manufacturing		4376.78	0.49	473.20	562.30	128.75	120.24	91.06	12.89	0.01	297.42	99.18	11.81		2.91	26.21	23.62	24.20	4.34			18.02	17.66	15.24	11.58	0.06	2.95	0.23	2.70	0.03	3.04
5	Wood Industries		1796.30		183.14		98.78		98.26		0.28											58.89										
6	Other Manufacturing		6489.35	185.98	2643.16	690.03	1516.97	1672.06	1277.82	907.62	0.06			115.94	149.60	12.00		1.06		27.71	37.25						2.86	10.89	0.35		8.73	
7	Chemical Distribution					0.27							0.11	0.01				0.08	0.04	0.10		0.01						0.01		0.11		
8	Waste Management																															
9	Water Treatment																															
10	Medical and Diagnostic Laboratories																															
11	Automotive Repair and Maintenance		1150.00																													
12	Fuelling Services		7000.00																													
13	Transportation Support		2300.00																													
14	Construction						107.66																									
15	Laundry Services (Dry Cleaning)																															
16	Funeral Services						0.05									0.004													0.0002			
17	Power Generation																															
18	Property Management/Institutional		7.21		662.11	46.27	313.81	5.24	238.50	4.57																						
	Total Compound	**0.00**	**34654.07**	**362.16**	**4819.03**	**1697.73**	**2348.82**	**2049.39**	**1773.60**	**927.76**	**0.36**	**297.42**	**99.29**	**144.79**	**149.60**	**14.91**	**26.21**	**26.11**	**24.24**	**45.49**	**41.76**	**59.63**	**18.02**	**17.66**	**15.24**	**11.58**	**2.92**	**13.85**	**1.00**	**10.54**	**9.10**	**3.04**
	% of Total Compound	0.00%	69.42%	0.73%	9.65%	3.40%	4.71%	4.11%	3.55%	1.86%	0.0007%	0.60%	0.20%	0.29%	0.30%	0.03%	0.05%	0.05%	0.05%	0.09%	0.08%	0.12%	0.04%	0.04%	0.03%	0.02%	0.006%	0.03%	0.00%	0.02%	0.02%	0.01%

2(c). Estimated Total Releases

#	Sector	Nitrate Ion	Volatile Organic Compounds (VOCs)	Ammonia	Nitrogen Oxides	Carbon Monoxide	Particulates <10 (PM10)	Total Particulates (PM total)	Particulates <2.5 (PM2.5)	Sulphur Dioxide	Phosphorus	HCFC-142b	Dichloromethane	n-Butyl alcohol	Aluminum (fume or dust)	Zinc (and its compounds)	Nonylphenol and its ethoxylates	Methyl methacrylate	Sodium nitrite	Ethylbenzene	Phenol (and its salts)	iButyl Alcohol	HCFC-22	Diethanolamine (and its salts)	Acetonitrile	N-Methyl-2-pyrrolidone	Copper (and its compounds)	Hydrochloric acid	Lead (and its compounds)	Ethylene glycol	Nitric acid	2,6-Di-t-butyl-4-methylphenol
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing		3118.37	221.64	1065.85	489.89	227.22	317.70	80.41	3.30	0.005																				0.42	
2	Clothing Manufacturing		100.00																													
3	Printing and Publishing		11349.40		15.81	13.31	3.40		5.35	0.10				21.57				1.70		16.88	5.71	0.93							0.52	9.79		
4	Chemical Manufacturing		7335.29	0.82	793.06	942.39	215.77	201.51	152.61	21.61	0.02	498.46	166.22	19.79		4.88	43.93	39.59	40.56	7.27			30.21	29.59	25.54	19.41	0.10	4.94	0.39	4.52	0.05	5.10
5	Wood Industries		2187.29		223.00		120.28		119.64		0.35											71.71										
6	Other Manufacturing		8690.74	249.07	3539.81	924.10	2031.57	2239.27	1711.30	1215.51	0.09			155.27	200.35	16.07		1.41		37.11	49.89	0.00					3.83	14.59	0.47		11.70	
7	Chemical Distribution					0.38							0.15	0.01				0.12	0.06	0.14		0.01						0.01		0.15		
8	Waste Management	16835.00	96.55	6607.10	253.50	130.90	18.15		13.44		286.94					25.17											6.20		4.42			
9	Water Treatment																															
10	Medical and Diagnostic Laboratories																															
11	Automotive Repair and Maintenance		1150.00																													
12	Fuelling Services		7068.10																	0.28												
13	Transportation Support		2306.36																													
14	Construction						108.20																									
15	Laundry Services (Dry Cleaning)		31.18																													
16	Funeral Services						0.05									0.0036													0.00015			
17	Power Generation				250.80	129.10	11.80		11.80																							
18	Property Management/Institutional		8.31		762.74	53.30	361.50	6.04	274.75	5.26																						
	Total Compound	**16835.00**	**43441.58**	**7078.63**	**6904.58**	**2683.37**	**3097.94**	**2764.52**	**2369.30**	**1245.77**	**287.40**	**498.46**	**166.37**	**196.65**	**200.35**	**46.12**	**43.93**	**42.83**	**40.61**	**61.69**	**55.59**	**72.65**	**30.21**	**29.59**	**25.54**	**19.41**	**10.13**	**19.54**	**5.81**	**14.47**	**12.17**	**5.10**
	% of Total Compound	19.01%	49.05%	7.99%	7.80%	3.03%	3.50%	3.12%	2.67%	1.41%	0.32%	0.56%	0.19%	0.22%	0.23%	0.05%	0.05%	0.05%	0.05%	0.07%	0.06%	0.08%	0.03%	0.03%	0.03%	0.02%	0.01%	0.02%	0.01%	0.02%	0.01%	0.01%

Note 1. It is assumed that NPRI captures all emissions for the Waste Management and Power Generation Sectors. Therefore, no estimate is provided for non-reported releases for these sectors.

Table 2. Quantities of Substances Released by Sector
Substances of Concern Release and Transfer Reporting in Toronto

2(a). NPRI Reported Releases

#	Bis(2-ethylhexyl) adipate	HCFC-141b	Cyanides (ionic)	Sulphuric acid	Chromium (and its compounds)	Naphthalene	Trichloroethylene	2-Mercaptobenzothiazole	Ethylene oxide	Nickel (and its compounds)	Cumene	Tetrachloroethylene	Triethylamine	Manganese (and its compounds)	sec-Butyl alcohol	Cadmium (and its compounds)	Arsenic (and its compounds)	Butyl acrylate	Octylphenol and its ethoxylates	Nitrilotriacetic acid (and its salts)	Hexavalent chromium compounds	Aluminum oxide (fibrous forms)	p,p'-Isopropylidenediphenol	Methylenebis (phenylisocyanate)	Acrylonitrile	Hydrogen cyanide	Silver (and its compounds)	Toluenediisocyanate (mixed isomers)	Mercury (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1																0.0001													
2																													
3						0.46					0.03																		
4	1.35	1.52	0.7	0.17		0.63	0.32	0.82			0.34	0.30	0.34					0.20	0.19	0.18	0.008		0.12	0.12	0.11			0.06	
5														0.001		0.004													
6	0.44			1.14	1.15	0.003	0.40		0.63	0.39				0.29	0.25	0.004	0.001				0.15	0.14				0.07	0.06		
7			0.7				0.21					0.06																	
8																0.24	0.23												0.05
9																													
10																													
11																													
12																													
13																													
14																													
15																													
16																													
17																													
18																													
	1.79	**1.52**	**1.40**	**1.31**	**1.15**	**1.10**	**0.93**	**0.82**	**0.63**	**0.39**	**0.37**	**0.36**	**0.34**	**0.29**	**0.25**	**0.25**	**0.23**	**0.20**	**0.19**	**0.18**	**0.16**	**0.14**	**0.12**	**0.12**	**0.11**	**0.07**	**0.06**	**0.06**	**0.05**
	0.005%	0.004%	0.004%	0.003%	0.003%	0.003%	0.002%	0.002%	0.002%	0.001%	0.001%	0.001%	0.001%	0.001%	0.001%	0.001%	0.001%	0.001%	0.0005%	0.0005%	0.0004%	0.0004%	0.0003%	0.0003%	0.0003%	0.0002%	0.0002%	0.0002%	0.0001%

2(b). Estimated Non-reported Releases

#	Bis(2-ethylhexyl) adipate	HCFC-141b	Cyanides (ionic)	Sulphuric acid	Chromium (and its compounds)	Naphthalene	Trichloroethylene	2-Mercaptobenzothiazole	Ethylene oxide	Nickel (and its compounds)	Cumene	Tetrachloroethylene	Triethylamine	Manganese (and its compounds)	sec-Butyl alcohol	Cadmium (and its compounds)	Arsenic (and its compounds)	Butyl acrylate	Octylphenol and its ethoxylates	Nitrilotriacetic acid (and its salts)	Hexavalent chromium compounds	Aluminum oxide (fibrous forms)	p,p'-Isopropylidenediphenol	Methylenebis (phenylisocyanate)	Acrylonitrile	Hydrogen cyanide	Silver (and its compounds)	Toluenediisocyanate (mixed isomers)	Mercury (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1																0.0002													
2																													
3						1.74					0.12																		
4	1.99	2.25	1.04	0.25		0.93	0.47	1.21			0.50	0.45	0.51					0.29	0.29	0.27	0.01		0.18	0.17	0.17			0.09	
5														0.005		0.02													
6	1.30			3.37	3.39	0.01	1.18		1.86	1.16				0.84	0.74	0.01	0.003				0.44	0.42				0.21	0.19		
7			1.84				0.55					0.16																	
8																													
9																													
10																													
11																													
12																													
13																													
14																													
15												224.00																	
16																													0.001
17																													
18																													
	3.29	**2.25**	**2.88**	**3.62**	**3.39**	**2.68**	**2.20**	**1.21**	**1.86**	**1.16**	**0.63**	**224.60**	**0.51**	**0.85**	**0.74**	**0.03**	**0.00**	**0.29**	**0.29**	**0.27**	**0.45**	**0.42**	**0.18**	**0.17**	**0.17**	**0.21**	**0.19**	**0.09**	**0.001**
	0.01%	0.004%	0.006%	0.01%	0.01%	0.005%	0.004%	0.002%	0.004%	0.002%	0.001%	0.45%	0.001%	0.002%	0.001%	0.0001%	0.00001%	0.001%	0.001%	0.001%	0.001%	0.001%	0.0004%	0.0003%	0.0003%	0.0004%	0.0004%	0.0002%	0.00000%

2(c). Estimated Total Releases

#	Bis(2-ethylhexyl) adipate	HCFC-141b	Cyanides (ionic)	Sulphuric acid	Chromium (and its compounds)	Naphthalene	Trichloroethylene	2-Mercaptobenzothiazole	Ethylene oxide	Nickel (and its compounds)	Cumene	Tetrachloroethylene	Triethylamine	Manganese (and its compounds)	sec-Butyl alcohol	Cadmium (and its compounds)	Arsenic (and its compounds)	Butyl acrylate	Octylphenol and its ethoxylates	Nitrilotriacetic acid (and its salts)	Hexavalent chromium compounds	Aluminum oxide (fibrous forms)	p,p'-Isopropylidenediphenol	Methylenebis (phenylisocyanate)	Acrylonitrile	Hydrogen cyanide	Silver (and its compounds)	Toluenediisocyanate (mixed isomers)	Mercury (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1																0.0003													
2																													
3						2.20					0.16																		
4	3.34	3.76	1.74	0.42		1.56	0.79	2.03			0.85	0.75	0.85					0.49	0.48	0.45	0.02		0.30	0.29	0.28			0.16	
5														0.01		0.02													
6	1.74			4.51	4.54	0.01	1.58		2.49	1.56				1.13	0.99	0.02	0.004				0.59	0.57				0.28	0.25		
7			2.54				0.76					0.21																	
8																0.24	0.23												0.05
9																													
10																													
11																													
12																													
13																													
14																													
15												224.00																	
16																													0.0006
17																													
18																													
	5.07	**3.76**	**4.28**	**4.93**	**4.54**	**3.77**	**3.13**	**2.03**	**2.49**	**1.56**	**1.00**	**224.96**	**0.85**	**1.13**	**0.99**	**0.28**	**0.24**	**0.49**	**0.48**	**0.45**	**0.61**	**0.57**	**0.30**	**0.29**	**0.28**	**0.28**	**0.25**	**0.16**	**0.05**
	0.006%	0.004%	0.005%	0.006%	0.005%	0.004%	0.004%	0.002%	0.003%	0.002%	0.001%	0.25%	0.001%	0.001%	0.001%	0.0003%	0.0003%	0.001%	0.001%	0.0005%	0.0007%	0.0006%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	0.0002%	0.0001%

Table 2. Quantities of Substances Released by Sector
Substances of Concern Release and Transfer Reporting in Toronto

2(a). NPRI Reported Releases

#	Ethyl acrylate	Selenium (and its compounds)	Cobalt (and its compounds)	Chlorine	Phthalic anhydride	Hydrogen fluoride	Acrylic acid (and its salts)	Polymeric diphenylmethane diisocyanate	C.I. Basic Green 4	Antimony (and its compounds)	Decabromodiphenyl oxide	1,1-Methylenebis (4-isocyanatocyclohexane)	Butyl benzyl phthalate	Isophorone diisocyanate	Methyl acrylate	Dioxins and furans	Hexachlorobenzene	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1																		1145.19	2.96%
2																		0.00	0.00%
3			0.01															2407.47	6.23%
4	0.03				0.007	0.001	0.005	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001			4284.24	11.08%
5																		486.62	1.26%
6		0.03	0.001	0.008		0.005										2.15E-07		5347.87	13.83%
7																		1.25	0.00%
8																4.00E-09	2.00E-09	24277.90	62.81%
9																		0.00	0.00%
10																		0.00	0.00%
11																		0.00	0.00%
12																		68.38	0.18%
13																		6.36	0.02%
14																		0.54	0.00%
15																		31.18	0.08%
16																		0.00	0.00%
17																		403.50	1.04%
18																		194.19	0.50%
	0.03	**0.03**	**0.01**	**0.008**	**0.007**	**0.006**	**0.005**	**0.002**	**0.002**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**2.19E-07**	**2.00E-09**	**38654.68**	**100.00%**
	0.0001%	0.0001%	0.00003%	0.00002%	0.00002%	0.00002%	0.00001%	0.00001%	0.00000%	0.000003%	0.000003%	0.000003%	0.000003%	0.000003%	########	########	0.00000000001%	100.00%	

2(b). Estimated Non-reported Releases

#	Ethyl acrylate	Selenium (and its compounds)	Cobalt (and its compounds)	Chlorine	Phthalic anhydride	Hydrogen fluoride	Acrylic acid (and its salts)	C.I. Basic Green 4	Polymeric diphenylmethane diisocyanate	Antimony (and its compounds)	Decabromodiphenyl oxide	1,1-Methylenebis (4-isocyanatocyclohexane)	Butyl benzyl phthalate	Isophorone diisocyanate	Methyl acrylate	Dioxins and furans	Hexachlorobenzene	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1																		4379.62	8.77%
2																		100.00	0.20%
3		0.00	0.05															9039.43	18.11%
4	0.05				0.01	0.001	0.01	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001			6338.05	12.70%
5																		2235.67	4.48%
6		0.09	0.00	0.02		0.01										6.34E-07		15764.70	31.58%
7																		3.30	0.01%
8																		0.00	0.00%
9																		0.00	0.00%
10																		0.00	0.00%
11																		1150.00	2.30%
12																		7000.00	14.02%
13																		2300.00	4.61%
14																		107.66	0.22%
15																		224.00	0.45%
16																2.60E-09		0.05	0.00%
17																		0.00	0.00%
18																		1277.71	2.56%
	0.05	**0.09**	**0.05**	**0.02**	**0.01**	**0.016**	**0.007**	**0.003**	**0.002**	**0.001**	**0.001**	**0.001**	**0.001**	**0.00**	**0.001**	**6.36E-07**	**0.00E+00**	**49920.20**	**100.00%**
	0.00010%	0.00018%	0.00010%	0.00005%	0.00002%	0.00003%	0.00001%	0.000006%	0.00000%	0.00000%	0.00000%	0.000003%	0.000003%	0.000003%	0.00000%	########	0.0000000000%	100.0%	

2(c). Estimated Total Releases

#	Ethyl acrylate	Selenium (and its compounds)	Cobalt (and its compounds)	Chlorine	Phthalic anhydride	Hydrogen fluoride	Acrylic acid (and its salts)	C.I. Basic Green 4	Polymeric diphenylmethane diisocyanate	Antimony (and its compounds)	Decabromodiphenyl oxide	1,1-Methylenebis (4-isocyanatocyclohexane)	Butyl benzyl phthalate	Isophorone diisocyanate	Methyl acrylate	Dioxins and furans	Hexachlorobenzene	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1																		5524.81	6.24%
2																		100.00	0.11%
3			0.06															11446.90	12.92%
4	0.08				0.02	0.002	0.01	0.005	0.004	0.002	0.002	0.002	0.002	0.002	0.002			10622.30	11.99%
5																		2722.29	3.07%
6		0.12	0.004	0.03		0.02										8.49E-07		21112.56	23.84%
7																		4.55	0.01%
8																4.00E-09	2.00E-09	24277.90	27.41%
9																		0.00	0.00%
10																		0.00	0.00%
11																		1150.00	1.30%
12																		7068.38	7.98%
13																		2306.36	2.60%
14																		108.20	0.12%
15																		255.18	0.29%
16																2.60E-09		0.05	0.0001%
17																		403.50	0.46%
18																		1471.90	1.66%
	0.08	**0.12**	**0.06**	**0.03**	**0.02**	**0.02**	**0.01**	**0.005**	**0.004**	**0.002**	**0.002**	**0.002**	**0.002**	**0.002**	**0.002**	**8.55E-07**	**2.00E-09**	**88574.88**	**100.00%**
	0.0001%	0.0001%	0.0001%	0.00004%	0.00002%	0.00003%	0.00001%	0.000006%	0.000004%	0.000003%	0.000003%	0.000003%	0.000003%	0.000003%	########	########	0.00000000001%	100.00%	

Table 3. Quantities of Substances Released to Air by Sector
Substances of Concern Release and Transfer Reporting in Toronto

3(a). NPRI Reported Releases Air Only

#	Sector	Volatile Organic Compounds (VOCs)	Nitrogen Oxides	Carbon Monoxide	Particulates <10 (PM10)	Total Particulates (PM total)	Particulates <2.5 (PM2.5)	Sulphur Dioxide	HCFC-142b	Ammonia	Dichloromethane	n-Butyl alcohol	Aluminum (fume or dust)	Lead (and its compounds)	Nonylphenol and its ethoxylates	Methyl methacrylate	Sodium nitrite	Ethylbenzene	Phenol (and its salts)	iButyl Alcohol	Mercury (and its compounds)	HCFC-22	Diethanolamine (and its salts)
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing	646.38	220.93	101.55	47.10	65.85	16.67	0.68		45.94													
2	Clothing Manufacturing																						
3	Printing and Publishing	2386.96	3.33	2.80	0.72		1.13	0.02				4.537		0.11		0.36		3.55	1.20	0.20			
4	Chemical Manufacturing	2958.51	319.86	380.09	87.03	81.28	61.55	8.72	201.04	0.33	66.94	7.94		0.16	17.63	15.97	16.36	2.92				12.18	11.93
5	Wood Industries	390.99	39.86		21.50		21.39													12.82			
6	Other Manufacturing	2201.39	896.64	234.08	514.60	567.21	433.48	307.89		62.35		39.33	50.70	0.12		0.36		9.40	12.64				
7	Chemical Distribution			0.10							0.04	0.003				0.03	0.02	0.04		0.002			
8	Waste Management	96.55	253.50	130.90	18.15		13.44							35.00							13.00		
9	Water Treatment																						
10	Medical and Diagnostic Laboratories																						
11	Automotive Repair and Maintenance																						
12	Fuelling Services	68.10																0.28					
13	Transportation Support	5.60																					
14	Construction				0.54																		
15	Laundry Services (Dry Cleaning)	31.18																					
16	Funeral Services																						
17	Power Generation		250.80	129.10	11.80		11.80																
18	Property Management/Institutional	1.10	100.63	7.03	47.69	0.80	36.25	0.69															
	Total Compound	**8786.74**	**2085.56**	**985.65**	**749.12**	**715.14**	**595.70**	**318.00**	**201.04**	**108.62**	**66.98**	**51.81**	**50.70**	**35.39**	**17.63**	**16.72**	**16.37**	**16.19**	**13.84**	**13.02**	**13.00**	**12.18**	**11.93**
	% of Total Compound	58.82%	13.96%	6.60%	5.02%	4.79%	3.99%	2.13%	1.35%	0.73%	0.45%	0.35%	0.34%	0.24%	0.12%	0.11%	0.11%	0.11%	0.09%	0.09%	0.09%	0.08%	0.08%

3(b). Estimated Non-reported Air Releases

#	Sector	Volatile Organic Compounds (VOCs)	Nitrogen Oxides	Carbon Monoxide	Particulates <10 (PM10)	Total Particulates (PM total)	Particulates <2.5 (PM2.5)	Sulphur Dioxide	HCFC-142b	Ammonia	Dichloromethane	n-Butyl alcohol	Aluminum (fume or dust)	Lead (and its compounds)	Nonylphenol and its ethoxylates	Methyl methacrylate	Sodium nitrite	Ethylbenzene	Phenol (and its salts)	iButyl Alcohol	Mercury (and its compounds)	HCFC-22	Diethanolamine (and its salts)
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing	2471.99	844.92	388.35	180.12	251.85	63.74	2.61		175.70													
2	Clothing Manufacturing	100.00																					
3	Printing and Publishing	8962.44	12.49	10.51	2.69		4.22	0.08				17.04		0.41		1.34		13.33	4.51	0.74			
4	Chemical Manufacturing	4376.78	473.20	562.30	128.75	120.24	91.06	12.89	297.42	0.49	99.03	11.74		0.23	26.08	23.62	24.20	4.32				18.02	17.65
5	Wood Industries	1796.30	183.14		98.78		98.26													58.89			
6	Other Manufacturing	6489.35	2643.16	690.03	1516.97	1672.06	1277.82	907.62		183.80		115.94	149.45	0.35		1.06		27.71	37.25				
7	Chemical Distribution			0.27							0.11	0.01				0.08	0.04	0.10		0.01			
8	Waste Management	0.00	0.00	0.00	0.00		0.00							0.00							0.00		
9	Water Treatment																						
10	Medical and Diagnostic Laboratories																						
11	Automotive Repair and Maintenance	1150.00																					
12	Fuelling Services	7000.00																					
13	Transportation Support	2300.00																					
14	Construction				107.66																		
15	Laundry Services (Dry Cleaning)																						
16	Funeral Services				0.05									0.00015							0.00056		
17	Power Generation																						
18	Property Management/Institutional	7.21	662.11	46.27	313.81	5.24	238.50	4.57															
	Total Compound	**34654.07**	**4819.03**	**1697.73**	**2348.82**	**2049.39**	**1773.60**	**927.76**	**297.42**	**359.98**	**99.14**	**144.73**	**149.45**	**1.00**	**26.08**	**26.11**	**24.24**	**45.47**	**41.76**	**59.63**	**0.00**	**18.02**	**17.65**
	% of Total Compound	69.44%	9.66%	3.40%	4.71%	4.11%	3.55%	1.86%	0.60%	0.72%	0.20%	0.29%	0.30%	0.002%	0.0523%	0.05%	0.05%	0.09%	0.08%	0.12%	0.00%	0.04%	0.04%

3(c). Estimated Total Air Releases

#	Sector	Volatile Organic Compounds (VOCs)	Nitrogen Oxides	Carbon Monoxide	Particulates <10 (PM10)	Total Particulates (PM total)	Particulates <2.5 (PM2.5)	Sulphur Dioxide	HCFC-142b	Ammonia	Dichloromethane	n-Butyl alcohol	Aluminum (fume or dust)	Lead (and its compounds)	Nonylphenol and its ethoxylates	Methyl methacrylate	Sodium nitrite	Ethylbenzene	Phenol (and its salts)	iButyl Alcohol	Mercury (and its compounds)	HCFC-22	Diethanolamine (and its salts)
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing	3118.37	1065.85	489.89	227.22	317.70	80.41	3.30		221.64													
2	Clothing Manufacturing	100.00																					
3	Printing and Publishing	11349.40	15.81	13.31	3.40		5.35	0.10				21.57		0.52		1.70		16.88	5.71	0.93			
4	Chemical Manufacturing	7335.29	793.06	942.39	215.77	201.51	152.61	21.61	498.46	0.82	165.97	19.68		0.39	43.71	39.59	40.56	7.25				30.21	29.59
5	Wood Industries	2187.29	223.00		120.28		119.64													71.71			
6	Other Manufacturing	8690.74	3539.81	924.10	2031.57	2239.27	1711.30	1215.51		246.15		155.27	200.15	0.47		1.41		37.11	49.89				
7	Chemical Distribution			0.38							0.15	0.01				0.12	0.06	0.14		0.01			
8	Waste Management	96.55	253.50	130.90	18.15		13.44							35.00							13.00		
9	Water Treatment																						
10	Medical and Diagnostic Laboratories																						
11	Automotive Repair and Maintenance	1150.00																					
12	Fuelling Services	7068.10																0.28					
13	Transportation Support	2305.60																					
14	Construction				108.20																		
15	Laundry Services (Dry Cleaning)	31.18																					
16	Funeral Services				0.05									0.00015							0.00056		
17	Power Generation		250.80	129.10	11.80		11.80																
18	Property Management/Institutional	8.31	762.74	53.30	361.50	6.04	274.75	5.26															
	Total Compound	**43440.82**	**6904.58**	**2683.37**	**3097.94**	**2764.52**	**2369.30**	**1245.77**	**498.46**	**468.60**	**166.12**	**196.53**	**200.15**	**36.38**	**43.71**	**42.82**	**40.61**	**61.66**	**55.59**	**72.65**	**13.00**	**30.21**	**29.59**
	% of Total Compound	67.00%	10.65%	4.14%	4.78%	4.26%	3.65%	1.92%	0.77%	0.72%	0.2562%	0.30%	0.31%	0.056%	0.07%	0.07%	0.06%	0.10%	0.09%	0.11%	0.02%	0.05%	0.05%

Table 3. Quantities of Substances Released to Air by Sector
Substances of Concern Release and Transfer Reporting in Toronto

3(a). NPRI Reported Releases Air Only

#	Acetonitrile	N-Methyl-2-pyrrolidone	Cadmium (and its compounds)	Hydrochloric acid	Zinc (and its compounds)	Ethylene glycol	Nitric acid	2,6-Di-t-butyl-4-methylphenol	HCFC-141b	Bis(2-ethylhexyl) adipate	Chromium (and its compounds)	Naphthalene	Sulphuric acid	Trichloroethylene	Copper (and its compounds)	Ethylene oxide	Cumene	Triethylamine	Tetrachloroethylene	sec-Butyl alcohol	Nickel (and its compounds)	Manganese (and its compounds)	Butyl acrylate	Hexavalent chromium compounds	Aluminum oxide (fibrous forms)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1							0.09																		
2																									
3						2.06						0.46					0.03								
4	10.30	7.83		1.88	1.65	1.82	0.02	2.1	1.52	1.34		0.63	0.14	0.23	0.04		0.34	0.34	0.25				0.20	0.008	
5			0.004																			0.001			
6			0.003	3.44	2.96		2.94				1.15	0.00097	0.91	0.4	0.76	0.63				0.25	0.24	0.24		0.15	0.14
7				0.003		0.04								0.21					0.06						
8			7.50		0.13																				
9																									
10																									
11																									
12																									
13																									
14																									
15																									
16																									
17																									
18																									
	10.30	**7.83**	**7.51**	**5.32**	**4.74**	**3.92**	**3.05**	**2.06**	**1.52**	**1.34**	**1.15**	**1.09**	**1.05**	**0.83**	**0.80**	**0.63**	**0.37**	**0.34**	**0.30**	**0.25**	**0.24**	**0.24**	**0.20**	**0.16**	**0.14**
	0.07%	0.05%	0.05%	0.04%	0.03%	0.03%	0.02%	0.014%	0.01%	0.009%	0.008%	0.007%	0.007%	0.006%	0.005%	0.004%	0.003%	0.002%	0.002%	0.002%	0.002%	0.002%	0.001%	0.001%	0.001%

3(b). Estimated Non-reported Air Releases

#	Acetonitrile	N-Methyl-2-pyrrolidone	Cadmium (and its compounds)	Hydrochloric acid	Zinc (and its compounds)	Ethylene glycol	Nitric acid	2,6-Di-t-butyl-4-methylphenol	HCFC-141b	Bis(2-ethylhexyl) adipate	Chromium (and its compounds)	Naphthalene	Sulphuric acid	Trichloroethylene	Copper (and its compounds)	Ethylene oxide	Cumene	Triethylamine	Tetrachloroethylene	sec-Butyl alcohol	Nickel (and its compounds)	Manganese (and its compounds)	Butyl acrylate	Hexavalent chromium compounds	Aluminum oxide (fibrous forms)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1							0.34																		
2																									
3						7.73						1.74					0.12								
4	15.24	11.58		2.78	2.44	2.69	0.03	3.04	2.25	1.98		0.93	0.20	0.33	0.06		0.50	0.51	0.36				0.29	0.01	
5			0.02																			0.005			
6			0.01	10.13	8.73		8.68				3.38	0.003	2.68	1.18	2.23	1.86				0.74	0.72	0.70		0.44	0.42
7				0.01		0.11													0.16						
8			0.00		0.00																				
9																									
10																									
11																									
12																									
13																									
14																									
15																			224.00						
16					0.0036																				
17																									
18																									
	15.24	**11.58**	**0.03**	**12.92**	**11.18**	**10.54**	**9.04**	**3.04**	**2.25**	**1.98**	**3.38**	**2.67**	**2.89**	**1.51**	**2.30**	**1.86**	**0.63**	**0.51**	**224.52**	**0.74**	**0.72**	**0.70**	**0.29**	**0.45**	**0.42**
	0.03%	0.02%	0.00%	0.03%	0.02%	0.021%	0.02%	0.01%	0.00%	0.00%	0.01%	0.01%	0.006%	0.003%	0.005%	0.00%	0.001%	0.001%	0.45%	0.001%	0.001%	0.001%	0.001%	0.001%	0.0008%

3(c). Estimated Total Air Releases

#	Acetonitrile	N-Methyl-2-pyrrolidone	Cadmium (and its compounds)	Hydrochloric acid	Zinc (and its compounds)	Ethylene glycol	Nitric acid	2,6-Di-t-butyl-4-methylphenol	HCFC-141b	Bis(2-ethylhexyl) adipate	Chromium (and its compounds)	Naphthalene	Sulphuric acid	Trichloroethylene	Copper (and its compounds)	Ethylene oxide	Cumene	Triethylamine	Tetrachloroethylene	sec-Butyl alcohol	Nickel (and its compounds)	Manganese (and its compounds)	Butyl acrylate	Hexavalent chromium compounds	Aluminum oxide (fibrous forms)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1							0.42																		
2																									
3						9.79						2.20					0.16								
4	25.54	19.41		4.66	4.10	4.51	0.05	5.10	3.76	3.32		1.56	0.34	0.56	0.10		0.85	0.85	0.61				0.49	0.02	
5			0.02																			0.01			
6			0.01	13.57	11.69		11.62				4.53	0.004	3.59	1.58	2.99	2.49				0.99	0.96	0.93		0.59	0.56
7				0.01		0.15								0.21					0.21						
8			7.50		0.13																				
9																									
10																									
11																									
12																									
13																									
14																									
15																			224.00						
16					0.0036																				
17																									
18																									
	25.54	**19.41**	**7.53**	**18.24**	**15.92**	**14.46**	**12.10**	**5.10**	**3.76**	**3.32**	**4.53**	**3.76**	**3.93**	**2.35**	**3.10**	**2.49**	**1.00**	**0.85**	**224.82**	**0.99**	**0.96**	**0.94**	**0.49**	**0.61**	**0.56**
	0.04%	0.03%	0.012%	0.03%	0.02%	0.022%	0.02%	0.01%	0.01%	0.01%	0.01%	0.01%	0.006%	0.004%	0.005%	0.00%	0.002%	0.001%	0.35%	0.002%	0.001%	0.001%	0.001%	0.001%	0.0009%

Table 3. Quantities of Substances Released to Air by Sector
Substances of Concern Release and Transfer Reporting in Toronto

3(a). NPRI Reported Releases Air Only

#	p,p'-Isopropylidenediphenol	Methylenebis (phenylisocyanate)	Acrylonitrile	Toluenediisocyanate (mixed isomers)	Phosphorus	Ethyl acrylate	Selenium (and its compounds)	Cobalt (and its compounds)	Phthalic anhydride	Chlorine	Silver (and its compounds)	Acrylic acid (and its salts)	Cyanides (ionic)	Hydrogen fluoride	Antimony (and its compounds)	Decabromodiphenyl oxide	Dioxins and furans	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1					0.001													1145.19	7.67%
2																		0.00	0.00%
3								0.01										2407.47	16.12%
4	0.12	0.12	0.11	0.06	0.01	0.03			0.007			0.004		0.001	0.001	0.001		4281.47	28.66%
5																		486.56	3.26%
6					0.01		0.022	0.008		0.005	0.00							5344.45	35.78%
7													0.001					0.55	0.00%
8					0.04													568.21	3.80%
9																		0.00	0.00%
10																		0.00	0.00%
11																		0.00	0.00%
12																		68.38	0.46%
13																		5.60	0.04%
14																		0.54	0.00%
15																		31.18	0.21%
16																		0.00	0.00%
17																		403.50	2.70%
18																		194.19	1.30%
	0.12	**0.12**	**0.11**	**0.06**	**0.06**	**0.03**	**0.02**	**0.02**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**14937.28**	**100.00%**
	0.0008%	0.0008%	0.0008%	0.0004%	0.0004%	0.00%	0.0001%	0.0001%	0.00005%	0.00003%	0.00003%	0.00003%	0.00001%	0.00001%	0.00001%	0.00001%	0.00000%	100.00%	

3(b). Estimated Non-reported Air Releases

#	p,p'-Isopropylidenediphenol	Methylenebis (phenylisocyanate)	Acrylonitrile	Toluenediisocyanate (mixed isomers)	Phosphorus	Ethyl acrylate	Selenium (and its compounds)	Cobalt (and its compounds)	Phthalic anhydride	Chlorine	Silver (and its compounds)	Acrylic acid (and its salts)	Cyanides (ionic)	Hydrogen fluoride	Antimony (and its compounds)	Decabromodiphenyl oxide	Dioxins and furans	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1					0.004													4379.62	8.78%
2																		100.00	0.20%
3								0.05										9039.43	18.11%
4	0.18	0.17	0.17	0.09	0.01	0.05			0.01			0.01		0.001	0.001	0.001		6333.95	12.69%
5																		2235.39	4.48%
6					0.04		0.06	0.02		0.01	0.01							15754.63	31.57%
7													0.003					0.90	0.00%
8					0.00													0.00	0.00%
9																		0.00	0.00%
10																		0.00	0.00%
11																		1150.00	2.30%
12																		7000.00	14.03%
13																		2300.00	4.61%
14																		107.66	0.22%
15																		224.00	0.45%
16																	2.60E-09	0.05	0.00%
17																		0.00	0.00%
18																		1277.71	2.56%
	0.18	**0.17**	**0.17**	**0.09**	**0.05**	**0.05**	**0.06**	**0.07**	**0.01**	**0.01**	**0.01**	**0.01**	**0.003**	**0.001**	**0.001**	**0.001**	**2.60E-09**	**49903.35**	**100.00%**
	0.00035%	0.000%	0.000%	0.000%	0.000%	0.000%	0.0001%	0.0001%	0.0000%	0.0000%	0.0000%	0.00001%	0.00001%	0.000003%	0.000003%	0.000003%	0.000000000%	100.00%	

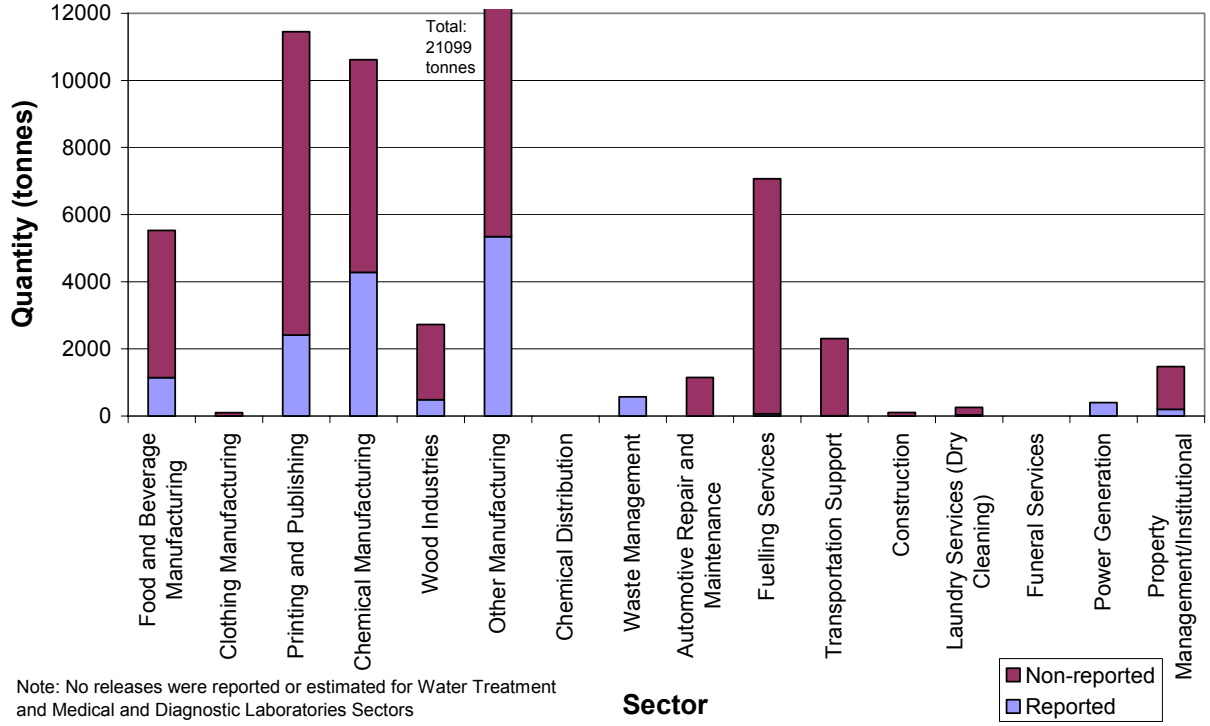
3(c). Estimated Total Air Releases

#	p,p'-Isopropylidenediphenol	Methylenebis (phenylisocyanate)	Acrylonitrile	Toluenediisocyanate (mixed isomers)	Phosphorus	Ethyl acrylate	Selenium (and its compounds)	Cobalt (and its compounds)	Phthalic anhydride	Chlorine	Silver (and its compounds)	Acrylic acid (and its salts)	Cyanides (ionic)	Hydrogen fluoride	Antimony (and its compounds)	Decabromodiphenyl oxide	Dioxins and furans	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1					0.005													5524.81	8.52%
2																		100.00	0.15%
3								0.06										11446.90	17.65%
4	0.30	0.29	0.28	0.16	0.02	0.08			0.02			0.01		0.002	0.002	0.002		10615.42	16.37%
5																		2721.95	4.20%
6					0.05		0.09	0.03		0.02	0.02							21099.08	32.54%
7													0.004					1.46	0.00%
8					0.04													568.21	0.88%
9																		0.00	0.00%
10																		0.00	0.00%
11																		1150.00	1.77%
12																		7068.38	10.90%
13																		2305.60	3.56%
14																		108.20	0.17%
15																		255.18	0.39%
16																	2.60E-09	0.05	0.00%
17																		403.50	0.62%
18																		1471.90	2.27%
	0.30	**0.29**	**0.28**	**0.16**	**0.11**	**0.08**	**0.09**	**0.09**	**0.02**	**0.02**	**0.02**	**0.01**	**0.004**	**0.002**	**0.002**	**0.002**	**2.60E-09**	**64840.63**	**100.00%**
	0.00046%	0.000%	0.000%	0.000%	0.000%	0.000%	0.0001%	0.0001%	0.0000%	0.0000%	0.0000%	0.00002%	0.00001%	0.000004%	0.000004%	0.000004%	0.000000000%	100.00%	

- Food and Beverage Manufacturing (7.7%).

Wood industries, waste management and power generation sectors each contributes approximately 3% to the reported air releases.

Figure 2. Estimated Total Releases of Substances of Concern (Air Only) by Sector



Note: No releases were reported or estimated for Water Treatment and Medical and Diagnostic Laboratories Sectors

NPRI reporting methods categorize VOCs that undergo photochemical degradation causing ground-level smog as a single toxic substance (total VOCs) under the Criteria Air Contaminants, reported at a threshold of 10 tonnes. This total VOC quantity includes releases or transfers of 60 VOCs that are also reported individually, at a threshold of 1 tonne. To avoid double-counting VOCs, the quantities for the 60 individual VOCs were not included in the quantities presented in Tables 2 and 3 or the summary tables in Appendix E. The VOCs that are individually reported to NPRI are included in Table 4. Where individual VOCs are in Table 2, Table 3 and Appendix E (e.g., trichloroethylene, ethylbenzene, dichloromethane, etc.), these are not included with the Criteria Air Contaminants and are not included in the total VOC quantities.

In order to evaluate the composition of total VOCs released in Toronto, the quantities of individual VOCs were extracted from the NPRI database as presented in Table 4. The individual VOCs included in the Total VOCs that are released in the greatest quantities are:

- Toluene (27.9%);
- Isopropyl alcohol (17.4%);

Table 4. Summary of Reported Releases for Individual VOC Compounds
Substances of Concern Release and Transfer Reporting in Toronto

4. NPRI Reported Releases

#	Sector	Toluene	Isopropyl alcohol	Methyl ethyl ketone	Methanol	Xylene (all isomers)	2-Butoxyethanol	Styrene	Methyl isobutyl ketone	n-Hexane	Formaldehyde	1,2,4-Trimethylbenzene	Vinyl acetate	Propylene	Dimethyl phthalate	Benzene	Dibutyl phthalate	Total Releases	% of Total
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1	Food and Beverage Manufacturing	0.19	18.67	0.33		0.57												19.76	0.88%
2	Clothing Manufacturing																	0.00	0.00%
3	Printing and Publishing	355.90	101.61	199.64	0.19	18.27	14.12	4.36	90.24	5.24	0.61	3.86			0.09			794.12	35.44%
4	Chemical Manufacturing	156.27	229.97	83.99	220.77	27.93	4.06	87.03	1.09	4.10	0.03	1.86	0.92	2.39			0.001	820.42	36.62%
5	Wood Industries	66.70		25.20	16.48	19.18				32.84								160.40	7.16%
6	Other Manufacturing	17.13	39.76	32.07	53.74	105.13	43.26	6.93	3.31	0.82	23.17	0.88			0.09	0.01		326.29	14.56%
7	Chemical Distribution	0.12	0.12	0.26	0.93	0.19	0.01	0.03	0.03	0.18		0.001						1.87	0.08%
8	Waste Management	28.30				27.99	53.11											109.40	4.88%
9	Water Treatment																	0.00	0.00%
10	Medical and Diagnostic Laboratories																	0.00	0.00%
11	Automotive Repair and Maintenance																	0.00	0.00%
12	Fuelling Services	0.76				0.29				0.68		0.16				0.09		1.97	0.09%
13	Transportation Support				0.76								5.60					6.36	0.28%
14	Construction																	0.00	0.00%
15	Laundry Services (Dry Cleaning)																	0.00	0.00%
16	Funeral Services																	0.00	0.00%
17	Power Generation																	0.00	0.00%
18	Property Management/Institutional																	0.00	0.00%
	Total Compound	**625.38**	**390.13**	**341.48**	**292.88**	**199.56**	**114.56**	**98.34**	**94.67**	**43.86**	**23.81**	**6.76**	**6.52**	**2.39**	**0.19**	**0.10**	**0.001**	**2240.60**	100.00%
	% of Total Compound	27.91%	17.41%	15.24%	13.07%	8.91%	5.11%	4.39%	4.23%	1.96%	1.06%	0.30%	0.29%	0.11%	0.01%	0.004%	0.00004%	100.00%	

- Methyl ethyl ketone (15.2%);
- Methanol (13.1%);
- Xylene(8.9%);
- 2-Butoxyethanol (5.1%);
- Styrene (4.4%);
- Methyl isobutyl ketone (4.2%);
- N-Hexane (2%); and
- Formaldehyde (1.1%).

These contribute to 99.3% of the reported VOC releases. The key carcinogens that are part of the VOC aggregate (1,3-butadiene, benzene, formaldehyde) contribute a very small proportion of the VOC releases. For example, formaldehyde represents 1.1%, benzene represents 0.01% and 1,3-butadiene is not reported to be released in Toronto. The other VOC "key carcinogens" that are not reported in total VOCs (Table 3(a)) are trichloroethylene (0.006%) and tetrachloroethylene (0.002%). As noted earlier, while the estimated quantities are small, this does not account for their relative toxicity.

Reported data for the off-site transfer of substances of concern are included in the summary tables presented in Appendix E and in Table 5. The total estimated transfers for Toronto were 75,400 tonnes (Table 5(c)) from 65 substances, compared to 88,600 tonnes (Table 2(c)) from 76 substances for on-site releases. As with the on-site releases, the majority of transfers are associated with a limited number of substances of concern, principally from: sulfuric acid (34.4%), mercury (13.6%), zinc (11.1%), phosphorus (7.5%), copper (6.4%), aluminum (5.3%), ammonia (5.1%), toluene (3.5%), xylene (3.3%), manganese (2.8%) and chromium (1.2%). Together, these substances represent 94% of the reported transfers.

4.2.2 Estimated Quantities Not Reported Through NPRI

The reported quantities as shown in Table 2(a) were extrapolated based on employment (as discussed in Section 2.4.1) to estimate the non-reported releases of substances of concern in Toronto. Where reported data were not available, alternate estimation methods (see Section 2.4.1 and Appendix C) were used. The estimated quantities of non-reported releases (i.e., those releases estimated to be associated with operations that do not report to NPRI) are presented by substance and sector in Table 2(b). The total estimated releases (i.e., the sum of (a) and (b)) are quantified in Table 2(c).

In estimating non-reported releases, it was noted that the NPRI reported quantities for the Waste Management sector were representative of sewage treatment plants and that NPRI captured the existing plants within this sector. Non-reporting operations in the Waste Management sector included solid and liquid waste management firms, such as private and municipal transfer stations and waste transport systems. The releases from these types of operations would be very different in nature and quantity from releases associated with a sewage treatment plant. In the

absence of information to characterize releases from waste management operations other than sewage treatment plants, it was assumed that the NPRI quantities represented the entire sector and that there were no non-reported releases or transfers for this sector.

Similarly, the NPRI-reported quantities for the Power Generation sector reflected releases from district heating systems only, as other types of power generation (i.e., coal or gas-fired generating stations) are not present in Toronto. Employment in this sector included in the database included head offices of many of the utility companies; operations that would not be associated with releases similar to the district heating systems. Therefore, for this sector as well, it was assumed that the NPRI quantities represented the entire sector and that no non-reported releases or transfers existed for this sector.

4.3 Contribution of Estimated Total Releases by Sectors

Figure 1 presents estimated total releases (reported and non-reported) for each sector. The five sectors (as described in Table 1) with the greatest estimated total releases (Table 2(c)), in descending order are:

- Waste Management (27.4%);
- Other Manufacturing (23.8%);
- Printing and Publishing (12.9%);
- Chemical manufacturing (12.0%); and
- Fuelling Services (8.0%).

These five sectors represent 84% of the estimated total releases for Toronto. Based on the number of operations reported in these sectors (Table 1), the five sectors represent approximately 38% of the operations in Toronto.

The sectors with the most significant quantities of non-reported releases (Table 2(b)) are:

- Other Manufacturing (31.6%);
- Printing and Publishing (18.1%)
- Fuelling Services (14.0%);
- Chemical Manufacturing (12.7%); and
- Food and Beverage Manufacturing (8.8%).

These five sectors represent 85% of the non-reported releases.

The least significant sectors (e.g., funeral services, chemical distribution, clothing manufacturing, construction and laundry services) represent less than 1% of the estimated total emissions from approximately 19% of Toronto operations (Table 1). These sectors include many of those for which publicly available data were not available, and therefore the estimates are based on emission factors or limited data.

Table 5. Quantities of Off-Site Transfers by Sector
Substances of Concern Release and Transfer Reporting in Toronto

5(a). NPRI Reported Off-site Transfers

#	Sector	Sulphuric acid	Mercury (and its compounds)	Zinc (and its compounds)	Phosphorus	Copper (and its compounds)	Aluminum (fume or dust)	Ammonia	Toluene	Xylene (all isomers)	Manganese (and its compounds)	Chromium (and its compounds)	Methanol	Nickel (and its compounds)	Lead (and its compounds)	Nitrate Ion	Methyl ethyl ketone	Methylenebis (phenylisocyanate)	Ethylbenzene	Bis(2-ethylhexyl) adipate	Hydrochloric acid	Isopropyl alcohol	Nitric acid
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing				0.31									61.12		60.54							17.00
2	Clothing Manufacturing																						
3	Printing and Publishing								793.56	13.71			0.92		0.03		42.10					4.93	
4	Chemical Manufacturing	9552.00	0.03	343.08	0.09			26.86	89.46	683.34	0.01		218.92	5.07	39.77		32.99	59.89	94.39	103.31		31.61	
5	Wood Industries				22.38	7.21			22.38	0.19	24.17	18.74	0.17				18.74						
6	Other Manufacturing	454.27		2800.34	43.18	1770.46	1546.23	54.32	22.03	135.243	727.54	339.45	23.212	150.19	108.63	72.81	38.04		2.90		82.51	24.07	40.66
7	Chemical Distribution								0.01	0.004													
8	Waste Management		3950.00	87.81	2108.60	92.30		1401.60	83.36	130.237	65.36				12.17	2.30		57.74	11.82				
9	Water Treatment																						
10	Medical and Diagnostic Laboratories																						
11	Automotive Repair and Maintenance																						
12	Fuelling Services																						
13	Transportation Support												1.80										
14	Construction																						
15	Laundry Services (Dry Cleaning)																						
16	Funeral Services																						
17	Power Generation																						
18	Property Management/Institutional		0.52																				
	Total Compound	**10006.27**	**3950.55**	**3231.23**	**2174.56**	**1869.97**	**1546.23**	**1482.78**	**1010.80**	**962.73**	**817.08**	**358.20**	**245.01**	**216.38**	**160.60**	**135.65**	**131.88**	**117.63**	**109.10**	**103.31**	**82.51**	**60.61**	**57.66**
	% of Total Compound	34.39%	13.58%	11.11%	7.47%	6.43%	5.31%	5.10%	3.47%	3.31%	2.81%	1.23%	0.84%	0.74%	0.55%	0.47%	0.45%	0.40%	0.38%	0.36%	0.28%	0.21%	0.20%

5(b). Estimated Off-site Transfers

#	Sector	Sulphuric acid	Mercury (and its compounds)	Zinc (and its compounds)	Phosphorus	Copper (and its compounds)	Aluminum (fume or dust)	Ammonia	Toluene	Xylene (all isomers)	Manganese (and its compounds)	Chromium (and its compounds)	Methanol	Nickel (and its compounds)	Lead (and its compounds)	Nitrate Ion	Methyl ethyl ketone	Methylenebis (phenylisocyanate)	Ethylbenzene	Bis(2-ethylhexyl) adipate	Hydrochloric acid	Isopropyl alcohol	Nitric acid
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing				1.19									233.75		231.51							65.01
2	Clothing Manufacturing																						
3	Printing and Publishing								2979.60	51.48			3.44		0.12		158.09					18.52	
4	Chemical Manufacturing	14131.10	0.05	507.55	0.14			39.73	132.34	1010.93	0.02		323.86	7.50	58.83		48.80	88.59	139.63	152.84		46.76	
5	Wood Industries				102.80	33.13			102.80	0.89	111.04	86.12	0.77				86.12						
6	Other Manufacturing	1339.12		8254.99	127.29	5219.05	4558.06	160.14	64.94	398.68	2144.67	1000.66	68.43	442.75	320.24	214.63	112.14		8.54		243.22	70.96	119.84
7	Chemical Distribution								0.04	0.01													
8	Waste Management																						
9	Water Treatment																						
10	Medical and Diagnostic Laboratories																						
11	Automotive Repair and Maintenance																						
12	Fuelling Services																						
13	Transportation Support																						
14	Construction																						
15	Laundry Services (Dry Cleaning)																						
16	Funeral Services																						
17	Power Generation																						
18	Property Management/Institutional		3.42																				
	Total Compound	**15470.22**	**3.47**	**8762.53**	**231.41**	**5252.18**	**4558.06**	**199.87**	**3279.72**	**1461.98**	**2255.73**	**1086.77**	**396.50**	**683.99**	**379.19**	**446.14**	**405.14**	**88.59**	**148.18**	**152.84**	**243.22**	**136.24**	**184.86**
	% of Total Compound	33.38%	0.01%	18.91%	0.50%	11.33%	9.83%	0.43%	7.08%	3.15%	4.8672%	2.34%	0.86%	1.48%	0.82%	0.96%	0.87%	0.19%	0.32%	0.33%	0.52%	0.29%	0.40%

5(c). Estimated Total Off-site Transfers

#	Sector	Sulphuric acid	Mercury (and its compounds)	Zinc (and its compounds)	Phosphorus	Copper (and its compounds)	Aluminum (fume or dust)	Ammonia	Toluene	Xylene (all isomers)	Manganese (and its compounds)	Chromium (and its compounds)	Methanol	Nickel (and its compounds)	Lead (and its compounds)	Nitrate Ion	Methyl ethyl ketone	Methylenebis (phenylisocyanate)	Ethylbenzene	Bis(2-ethylhexyl) adipate	Hydrochloric acid	Isopropyl alcohol	Nitric acid
		tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1	Food and Beverage Manufacturing				1.50									294.87		292.04							82.01
2	Clothing Manufacturing																						
3	Printing and Publishing								3773.16	65.19			4.36		0.15		200.19					23.46	
4	Chemical Manufacturing	23683.10	0.08	850.63	0.23			66.58	221.80	1694.27	0.03		542.78	12.56	98.60		81.79	148.48	234.02	256.15		78.37	
5	Wood Industries				125.17	40.34			125.17	1.09	135.21	104.86	0.93				104.86						
6	Other Manufacturing	1793.39		11055.33	170.47	6989.51	6104.30	214.46	86.98	533.92	2872.21	1340.11	91.64	592.94	428.87	287.44	150.18		11.44		325.73	95.03	160.5
7	Chemical Distribution								0.05	0.01													
8	Waste Management		3950.00	87.81	2108.60	92.30		1401.60	83.36	130.24	65.36				12.17	2.30		57.74	11.82				
9	Water Treatment																						
10	Medical and Diagnostic Laboratories																						
11	Automotive Repair and Maintenance																						
12	Fuelling Services																						
13	Transportation Support												1.80										
14	Construction																						
15	Laundry Services (Dry Cleaning)																						
16	Funeral Services																						
17	Power Generation																						
18	Property Management/Institutional		3.94																				
	Total Compound	**25476.49**	**3954.02**	**11993.76**	**2405.97**	**7122.15**	**6104.30**	**1682.65**	**4290.52**	**2424.71**	**3072.81**	**1444.97**	**641.51**	**900.38**	**539.79**	**581.79**	**537.02**	**206.22**	**257.28**	**256.15**	**325.73**	**196.86**	**242.51**
	% of Total Compound	33.77%	5.24%	15.90%	3.19%	9.44%	8.09%	2.23%	5.69%	3.21%	4.0732%	1.92%	0.85%	1.19%	0.72%	0.77%	0.71%	0.27%	0.34%	0.34%	0.43%	0.26%	0.32%

Table 5. Quantities of Off-Site Transfers by Sector
Substances of Concern Release and Transfer Reporting in Toronto

5(a). NPRI Reported Off-site Transfers

#	Methyl isobutyl ketone	Asbestos (friable form)	Silver (and its compounds)	Butyl benzyl phthalate	1,2,4-Trimethylbenzene	n-Butyl alcohol	Antimony (and its compounds)	2-Butoxyethanol	Decabromodiphenyl oxide	Ethylene glycol	Nonylphenol and its ethoxylates	Tetrachloroethylene	Vinyl acetate	Hexavalent chromium compounds	Cadmium (and its compounds)	Formaldehyde	N-Methyl-2-pyrrolidone	Trichloroethylene	Dichloromethane	Acrylic acid (and its salts)	Chloroform
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1																					
2																					
3	22.13													0.04							
4	7.86	46.40		20.23	15.35	8.03	4.31	3.16	5.80	7.43	6.13	4.44	2.79	0.07		1.25	3.17	1.92	2.80	2.20	1.2
5																					
6	4.98		32.72		2.22	5.93	7.02	7.316	4.16			0.83		3.03	0.20	1.967		1.2			
7																					
8	12.972													0.60	3.46						
9																					
10																					
11																					
12																					
13													1.28								
14																					
15																					
16																					
17																					
18																					
	47.94	**46.40**	**32.72**	**20.23**	**17.57**	**13.96**	**11.32**	**10.48**	**9.96**	**7.43**	**6.13**	**5.27**	**4.07**	**3.74**	**3.65**	**3.22**	**3.17**	**3.12**	**2.80**	**2.20**	**1.20**
	0.16%	0.16%	0.11%	0.07%	0.06%	0.05%	0.04%	0.04%	0.03%	0.03%	0.02%	0.02%	0.01%	0.01%	0.01%	0.011%	0.01%	0.01%	0.01%	0.01%	0.004%

5(b). Estimated Off-site Transfers

#	Methyl isobutyl ketone	Asbestos (friable form)	Silver (and its compounds)	Butyl benzyl phthalate	1,2,4-Trimethylbenzene	n-Butyl alcohol	Antimony (and its compounds)	2-Butoxyethanol	Decabromodiphenyl oxide	Ethylene glycol	Nonylphenol and its ethoxylates	Tetrachloroethylene	Vinyl acetate	Hexavalent chromium compounds	Cadmium (and its compounds)	Formaldehyde	N-Methyl-2-pyrrolidone	Trichloroethylene	Dichloromethane	Acrylic acid (and its salts)	Chloroform
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1																					
2																					
3	83.10													0.13							
4	11.63	68.64		29.93	22.71	11.88	6.37	4.68	8.57	10.99	9.07	6.57	4.12	0.11		1.85	4.69	2.84	4.14	3.25	1.78
5																					
6	14.67		96.44		6.54	17.47	20.68	21.57	12.26			2.45		8.92	0.58	5.80		3.54			
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					
18																					
	109.40	**68.64**	**96.44**	**29.93**	**29.26**	**29.35**	**27.05**	**26.24**	**20.84**	**10.99**	**9.07**	**9.01**	**4.12**	**9.16**	**0.58**	**7.65**	**4.69**	**6.38**	**4.14**	**3.25**	**1.78**
	0.24%	0.15%	0.21%	0.065%	0.06%	0.06%	0.06%	0.06%	0.04%	0.02%	0.020%	0.019%	0.01%	0.02%	0.001%	0.016%	0.010%	0.014%	0.009%	0.007%	0.00%

5(c). Estimated Total Off-site Transfers

#	Methyl isobutyl ketone	Asbestos (friable form)	Silver (and its compounds)	Butyl benzyl phthalate	1,2,4-Trimethylbenzene	n-Butyl alcohol	Antimony (and its compounds)	2-Butoxyethanol	Decabromodiphenyl oxide	Ethylene glycol	Nonylphenol and its ethoxylates	Tetrachloroethylene	Vinyl acetate	Hexavalent chromium compounds	Cadmium (and its compounds)	Formaldehyde	N-Methyl-2-pyrrolidone	Trichloroethylene	Dichloromethane	Acrylic acid (and its salts)	Chloroform
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
1																					
2																					
3	105.23													0.17							
4	19.48	115.04		50.16	38.07	19.91	10.68	7.84	14.37	18.42	15.21	11.01	6.91	0.18		3.10	7.86	4.76	6.94	5.45	2.98
5																					
6	19.65		129.16		8.76	23.40	27.70	28.88	16.42			3.28		11.95	0.77	7.77		4.74			
7																					
8	12.97													0.60	3.46						
9																					
10																					
11																					
12																					
13													1.28								
14																					
15																					
16																					
17																					
18																					
	157.33	**115.04**	**129.16**	**50.16**	**46.83**	**43.31**	**38.37**	**36.72**	**30.79**	**18.42**	**15.21**	**14.28**	**8.19**	**12.90**	**4.23**	**10.86**	**7.86**	**9.50**	**6.94**	**5.45**	**2.98**
	0.21%	0.15%	0.17%	0.066%	0.06%	0.06%	0.05%	0.05%	0.04%	0.02%	0.020%	0.019%	0.01%	0.02%	0.006%	0.014%	0.010%	0.013%	0.009%	0.007%	0.00%

Table 5. Quantities of Off-Site Transfers by Sector
Substances of Concern Release and Transfer Reporting in Toronto

5(a). NPRI Reported Off-site Transfers

#	iButyl Alcohol	Naphthalene	Methyl methacrylate	Phenol (and its salts)	Octylphenol and its ethoxylates	Arsenic (and its compounds)	p,p'-Isopropylidenediphenol	Cumene	Benzoyl peroxide	Diphenylamine	Butyl acrylate	Hydrogen fluoride	Styrene	Ethyl acrylate	Acetonitrile	Sodium nitrite	Isophorone diisocyanate	Chlorine	Benzene	Methyl acrylate	Dibutyl phthalate	Acrylamide	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1																							138.97	0.48%
2																							0.00	0.00%
3	0.04																						877.46	3.02%
4		0.69	0.67	0.60	0.54	0.16	0.49	0.37	0.36	0.15	0.08	0.05	0.04	0.02	0.02	0.02				0.004	0.002	0.001	11429.61	39.29%
5	0.87																						114.85	0.39%
6	0.13																0.01	0.007	0.006				8507.81	29.24%
7																							0.02	0.0001%
8						0.35																	8020.67	27.57%
9																							0.00	0.00%
10																							0.00	0.00%
11																							0.00	0.00%
12																							0.00	0.00%
13																							3.08	0.01%
14																							0.00	0.00%
15																							0.00	0.00%
16																							0.00	0.00%
17																							0.00	0.00%
18																							0.52	0.002%
	1.04	**0.69**	**0.67**	**0.60**	**0.54**	**0.51**	**0.49**	**0.37**	**0.36**	**0.15**	**0.08**	**0.05**	**0.04**	**0.02**	**0.02**	**0.02**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**29092.97**	
	0.004%	0.002%	0.002%	0.002%	0.002%	0.002%	0.002%	0.001%	0.001%	0.001%	0.0003%	0.0002%	0.0001%	0.0001%	0.0001%	0.0001%	0.0000%	0.00002%	0.000021%	0.00001%	0.00001%	0.000003%		

5(b). Estimated Off-site Transfers

#	iButyl Alcohol	Naphthalene	Methyl methacrylate	Phenol (and its salts)	Octylphenol and its ethoxylates	Arsenic (and its compounds)	p,p'-Isopropylidenediphenol	Cumene	Benzoyl peroxide	Diphenylamine	Butyl acrylate	Hydrogen fluoride	Styrene	Ethyl acrylate	Acetonitrile	Sodium nitrite	Isophorone diisocyanate	Chlorine	Benzene	Methyl acrylate	Dibutyl phthalate	Acrylamide	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1																							531.46	1.15%
2																							0.00	0.00%
3	0.15																						3294.63	7.11%
4		1.03	1.00	0.89	0.79	0.24	0.72	0.54	0.53	0.22	0.12	0.08	0.06	0.04	0.03	0.03				0.006	0.003	0.001	16908.81	36.48%
5	3.99																						527.64	1.14%
6	0.38																0.03	0.02	0.02				25079.72	54.11%
7																							0.05	0.00%
8																							0.00	0.00%
9																							0.00	0.00%
10																							0.00	0.00%
11																							0.00	0.00%
12																							0.00	0.00%
13																							0.00	0.00%
14																							0.00	0.00%
15																							0.00	0.00%
16																							0.00	0.00%
17																							0.00	0.00%
18																							3.42	0.01%
	4.52	**1.03**	**1.00**	**0.89**	**0.79**	**0.24**	**0.72**	**0.54**	**0.53**	**0.22**	**0.12**	**0.08**	**0.06**	**0.04**	**0.03**	**0.03**	**0.029**	**0.021**	**0.018**	**0.006**	**0.003**	**0.001**	**46345.73**	**100.00%**
	0.010%	0.002%	0.002%	0.0019%	0.00171%	0.001%	0.002%	0.001%	0.001%	0.000%	0.0003%	0.0002%	0.0001%	0.0001%	0.0001%	0.00007%	0.00006%	0.000045%	0.000038%	0.000013%	0.00001%	0.000003%	100.00%	

5(c). Estimated Total Off-site Transfers

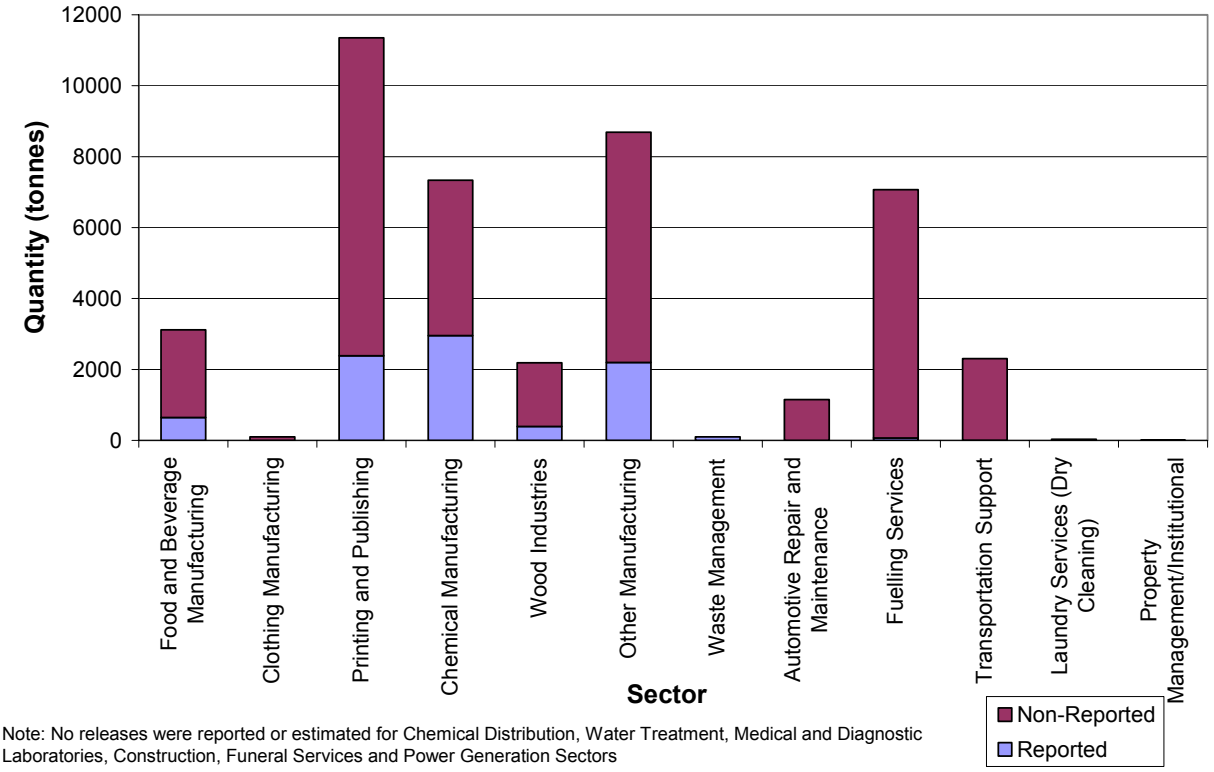
#	iButyl Alcohol	Naphthalene	Methyl methacrylate	Phenol (and its salts)	Octylphenol and its ethoxylates	Arsenic (and its compounds)	p,p'-Isopropylidenediphenol	Cumene	Benzoyl peroxide	Diphenylamine	Butyl acrylate	Hydrogen fluoride	Styrene	Ethyl acrylate	Acetonitrile	Sodium nitrite	Isophorone diisocyanate	Chlorine	Benzene	Methyl acrylate	Dibutyl phthalate	Acrylamide	Total Releases	% of total
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	
1																							670.42	0.89%
2																							0.00	0.00%
3	0.19																						4172.09	5.53%
4		1.72	1.67	1.49	1.33	0.40	1.21	0.91	0.88	0.36	0.20	0.13	0.10	0.06	0.05	0.05				0.010	0.005	0.002	28338.42	37.56%
5	4.86																						642.49	0.85%
6	0.51																0.04	0.03	0.02				33587.53	44.52%
7																							0.07	0.00%
8						0.35																	8020.67	10.63%
9																							0.00	0.00%
10																							0.00	0.00%
11																							0.00	0.00%
12																							0.00	0.00%
13																							3.08	0.00%
14																							0.00	0.00%
15																							0.00	0.00%
16																							0.00	0.00%
17																							0.00	0.00%
18																							3.94	0.01%
	5.56	**1.72**	**1.67**	**1.49**	**1.33**	**0.75**	**1.21**	**0.91**	**0.88**	**0.36**	**0.20**	**0.13**	**0.10**	**0.06**	**0.05**	**0.05**	**0.039**	**0.028**	**0.024**	**0.010**	**0.005**	**0.002**	**75438.70**	**100.00%**
	0.007%	0.002%	0.002%	0.0020%	0.00176%	0.001%	0.002%	0.001%	0.001%	0.000%	0.0003%	0.0002%	0.0001%	0.0001%	0.0001%	0.00007%	0.00005%	0.000037%	0.000031%	0.000013%	0.00001%	0.000003%	100.00%	

4.4 Contribution of Releases by Substances of Concern

4.4.1 Volatile Organic Compounds

VOCs are the predominant substances released in Toronto based on the estimated total releases presented in Table 2(c). Total VOCs make up approximately 49% of estimated total releases. (Note: as indicated in Section 4.2, the quantities of VOCs represent the aggregate quantity of VOCs that contribute to smog.) VOCs are common across the sectors, with 10 of the 18 sectors reporting releases of this toxic substance and estimated non-reported releases developed for an additional two sectors. The contribution of VOC releases (reported and non-reported quantities) for the sectors is presented in Figure 3.

Figure 3. Estimated Total VOC Releases by Sector



Note: No releases were reported or estimated for Chemical Distribution, Water Treatment, Medical and Diagnostic Laboratories, Construction, Funeral Services and Power Generation Sectors

VOCs include many common industrial solvents that are used in many manufacturing processes. Based on the common use of these substances, it is reasonable that this category is a significant contributor to toxic substance releases in Toronto.

4.4.2 Inorganic Substances

The estimated total release of nitrate ion represents 19% of the estimated total releases in Toronto. Ammonia represents 8% of the estimated total releases (Table 3(c)). Although ammonia is released by a few other sectors, this substance is principally released by a single sector: Waste

Management. These two substances (nitrate ion and ammonia) are products of the treatment of organic matter and can impair surface water quality through enhancing weed growth when released at high concentrations.

Following nitrate ion and ammonia, the greatest quantities of releases of inorganic substances are nitrogen oxides (8% of estimated total releases), carbon monoxide (3% of estimated total releases) and to a lesser extent, particulate matter (approximately 3% of estimated total releases for each of PM Total, PM<10 and PM<2.5). These substances are reported to NPRI as Criteria Air Contaminants and contribute to poor air quality. They are by-products of industrial and commercial operations but are not used in the manufacture of products. These inorganic substances are reported to be released by 8 to 10 of the sectors, but are likely associated with many of the sectors at quantities below the reporting thresholds.

Particulate matter is reported as three separate substances, PM<2.5, PM<10 and PM Total. PM<2.5 is the smallest-sized particulate (less than 2.5 μm in diameter) and can breathed deep into the lungs. The NPRI threshold for PM<2.5 is 0.3 tonnes. PM<10 includes particles smaller than 10 μm in diameter and therefore includes those particles reported under PM<2.5. The NPRI threshold for PM<10 is 0.5 tonnes. PM Total includes all particulate matter, including PM<10 and PM<2.5 and is reported to NPRI at a threshold of 20 tonnes. Because of the differences in reporting thresholds, the reported quantities of total particulate is not necessarily larger than those of PM<10 and PM<2.5. This discrepancy points to the effect that reporting thresholds may have on the quantities estimated from reported values. The relatively small contribution of PM Total may be related to the relatively high reporting threshold of 20 tonnes, rather than the absence of particulate matter in releases.

4.5 Summary of Findings By Sector

4.5.1 Food and Beverage Manufacturing

The 28 operations within the food and beverage sector represent 8.5% of the Toronto operations reporting to NPRI. When all operations (reporting and non-reporting) are considered, this sector represents 3.7% of Toronto operations.

The releases reported by the food and beverage sector account for 3% of the reported releases in Toronto. When the non-reporting factor of 3.8 is applied the estimated total releases are 6.2% of the estimated total releases in Toronto. These releases are all directed to air, and when releases to air only are considered, the significance of this sector increases to 8.4% of estimated total releases in Toronto.

The substances released in the greatest quantities by food and beverage operations are:

- VOCs, an estimated total quantity of approximately 3,120 tonnes;
- Nitrogen oxides an estimated total quantity of approximately 1,070 tonnes; and
- Carbon monoxide an estimated total quantity of approximately 490 tonnes.

The estimated total substances of concern released annually by this sector is approximately 5,520 tonnes.

Transfers of substances of concern from this sector are less than 1% of the total quantity transferred in Toronto, consisting principally of nickel (295 tonnes) and nitrate ion (290 tonnes).

4.5.2 Clothing Manufacturing

The clothing manufacturing and textile industries are associated with the use of dyes and pigments, which can contain heavy metals and solvents. In addition, the treatment of textiles with preservatives such as formaldehyde and stain guard or wrinkle-resistant materials can release substances of concern. The clothing manufacturing industry in Toronto is estimated to include 630 operations (5.7% of the total operations in Toronto). However, no Toronto clothing manufacturers report to NPRI.

Eleven textile manufacturers in Canada report to NPRI, and of these, seven had reportable releases in 2005. The reported releases typically consisted of VOCs, which included methyl ethyl ketone, toluene, xylene and chlorinated solvents (i.e., dichloromethane and tetrachloroethylene). Released quantities ranged from less than 1 tonne per year to more than 400 tonnes per year.

For this report, an estimated total release quantity was calculated based on the assumption that a fraction of the operations in Toronto would release VOCs similar to a dry cleaning operation. Based on this assumption, the clothing manufacturing industry represents approximately 0.1% of the estimated total releases in Toronto.

4.5.3 Printing and Publishing

There are approximately 1,100 printing and publishing operations in Toronto, representing 10.3% of Toronto operations and 6.3% of the operations reporting to NPRI. This sector represents 13% of the estimated total releases. Approximately 11,450 tonnes are estimated to be released, of which 11,350 tonnes are VOCs. This is the third most significant sector for estimated total releases. This sector has a large non-reporting factor, with the estimated non-reporting quantity representing 18% of the estimated non-reported releases.

The printing and publishing sector accounts for 26% of the estimated total releases of VOCs. When individual VOCs are considered, the greatest reported quantities are for toluene (360 tonnes, methyl ethyl ketone (200 tonnes), and isopropyl alchohol (100 tonnes).

Approximately 4,200 tonnes of substances are estimated to be transferred by operations in this sector, representing 5.5% of the overall estimated transfers. The transfers include 3,800 tonnes of toluene and 200 tonnes of methyl ethyl ketone.

4.5.4 Chemical Manufacturing

The chemical manufacturing sector represents 4.9% of the overall operations in Toronto and 28.1% of the operations that report to NPRI. Almost 20% of the operations in this sector report

to NPRI, which is the second highest reporting factor after the water treatment sector (44% reporting). This sector released an estimated total of 11,620 tonnes of substances of concern in 2005, which is 12% of the estimated total releases for Toronto. All but 7 tonnes of these releases were to air.

This sector releases the most different types of substances, which is reasonable, given the chemical basis of the sector. However, the releases in the greatest quantities are consistent with the other sectors, principally:

- VOCs at 9,340 tonnes of estimated total releases;
- Carbon monoxide at 940 tonnes of estimated total releases; and
- Nitrogen oxides at 790 tonnes of estimated total releases.

Of the VOCs reported individually to NPRI, the greatest quantities are isopropyl alcohol (230 tonnes), methanol (220 tonnes), toluene (160 tonnes), styrene (90 tonnes) and methyl ethyl ketone (80 tonnes).

This sector accounts for 38% of the estimated total transfers, with approximately 28,340 tonnes of substances. The principal substances transferred by chemical manufacturers are sulphuric acid (23,680 tonnes), xylene (1,690 tonnes), zinc (850 tonnes) and methanol (540 tonnes).

4.5.5 Wood Industries

The wood industries sector includes 457 operations of which 12 report to NPRI. This sector represents 4.1% of the overall Toronto operations considered in this study. The relatively high non-reporting factor of 4.59 accounts for this low number of operations reporting to NPRI.

The total estimated releases for this sector were 2,720 tonnes of substances of concern, representing 3% of the estimated total releases. VOCs make up the largest portion of the released substances, with an estimated total of 2,190 tonnes. Other substances released by this sector include nitrogen oxides (220 tonnes total) and particulate matter (120 tonnes total each of PM10 and PM2.5).

Of the VOCs reported individually, the principle reported releases were for toluene (67 tonnes), n-hexane (33 tonnes), methyl ethyl ketone (25 tonnes), xylene (19 tonnes) and methanol (16 tonnes).

Approximately 640 tonnes of substances of concern were estimated to have been transferred from operations in this sector, representing 0.85% of the estimated total transferred substances. The substances transferred included manganese (135 tonnes), phosphorus (125 tonnes), toluene (125 tonnes), chromium (100 tonnes) and methyl ethyl ketone (100 tonnes).

4.5.6 Other Manufacturing

The other manufacturing sector includes diverse operations not included in the specific manufacturing sectors identified through the selection process. These would include

manufacturers of metal products, computer equipment and automotive parts. Because of this it is a very significant sector, representing 34.4% of the operations reporting through NPRI and 19.6% of the overall operations in Toronto. The variety of operations also results in a significant non-reporting factor of 2.95. A reported 5,350 tonnes of releases from this sector make up 14% of the total reported releases. When the estimated non-reported quantities are added, the total releases increase to 21,100 tonnes, representing 24% of the estimated total releases. Nearly all of these releases are to air, with only approximately 12 tonnes of the estimated total being released to other media. When only air releases are considered, the other manufacturing sector is responsible for 32% of the releases – the highest percentage of any sector.

The other manufacturing sector releases the second greatest quantity of VOCs (after printing and publishing), with 8,700 tonnes released annually. It also releases (estimated total) the most nitrogen oxides (3,500 tonnes), carbon monoxide (900 tonnes), particulate matter (2,200 tonnes PMTotal, 2,000 tonnes PM10 and 1,700 tonnes PM2.5) and sulphur dioxide (1,200 tonnes).

A estimated total of 33,590 tonnes of substances of concern are transferred by the other manufacturing sector, representing 44.5% of the estimated total transferred materials. This is the highest contribution by sector. The greatest quantities of transferred materials are zinc (11,000 tonnes), copper (7,000 tonnes) and aluminium (6,100 tonnes). Some of these materials may be recycled.

4.5.7 Chemical Distribution

The chemical distribution sector represents 0.9% of the operations reporting to NPRI and only 0.3% of the overall operations in Toronto. The estimated total release from this sector is 4.5 tonnes, only 0.01% of the total releases in Toronto. Of this, 1.46 tonnes are released to air. The releases to all media include cyanides (2.54 tonnes), trichloroethylene (0.76 tonnes), carbon monoxide (0.38 tonnes), cadmium (0.24 tonnes), arsenic (0.23 tonnes), dichloromethane (0.15 tonnes), ethylene glycol (0.15 tonnes) ethylbenzene (0.14 tonnes) and methyl methacrylate (0.12 tonnes). Despite the relatively low quantities released by this sector, for many of these substances, this sector is a significant source of releases.

Only 0.07 tonnes of substances (toluene and xylene) are transferred by this sector, representing a negligible contribution overall.

4.5.8 Waste Management

The six reporting operations in the waste management sector include only municipal sewage treatment plants. The 83 other waste management operations in Toronto that do not report through NPRI include solid and liquid waste management operations such as private and municipal waste transfer stations and waste transport systems. The releases from the non-reporting operations would be very different in nature and quantity than the releases from sewage treatment plants. Therefore it was recognized that the reported quantities could not form the basis for estimating non-reported quantities and in the absence of characterization information on the other operations in this sector, no estimate was made for the non-reporting factor. In essence, this sector was considered to be 100% reporting.

Although this sector represents only 1.8% of the reporting operations, and less than 1% of the overall operations, it was responsible for the highest quantity of releases in Toronto. The releases account for 27% of the total estimated releases, with approximately 24,300 tonnes of substances released, principally associated with nitrate ion and ammonia released to surface waters. Of this quantity, only approximately 570 tonnes were released to air. When only air releases are considered, this sector represents less than 2% of the total estimated releases for Toronto. The substances released to air are principally nitrogen oxides (560 tonnes), carbon monoxide (290 tonnes) and VOCs (210 tonnes).

Transfers of substances of concern for this sector represent 10% of the estimated total transfers, with a total of 8,000 tonnes being transferred annually. The greatest transfers were from mercury (4,000 tonnes), phosphorus (2,000 tonnes) and ammonia (1,400 tonnes).

4.5.9 Water Treatment

The water treatment sector has reported releases and transfers to NPRI in the past, but for 2005, no reported quantities were released. With only nine water treatment plants in Toronto, this sector is small, representing 1% of the reporting operations and 0.1% of the overall operations.

4.5.10 Medical and Diagnostic Laboratories

Medical and diagnostic laboratories (and research laboratories as well) were identified as a potential for the release of substances of concern, because of their use of specialized chemicals. Chemical usage may include standard solvents for sample preparation but will also include very rare and sometimes very toxic chemicals. Two laboratories (commercial operations) in Canada reported to NPRI in 2005. The releases from these facilities were related to lead and its compounds. These were not considered representative of the types of laboratories present in Toronto, especially those associated with research and medical diagnostics.

Based on the limited data available for Toronto operations, no release estimates could be prepared for this sector.

4.5.11 Auto Repair and Maintenance

None of the 675 operations in this sector reported to NPRI. The paints used in auto body shops contain VOCs, which are emitted when the paint is applied to a car or part. Some metals may also be emitted during sanding operations, but these releases would likely be contained in air filters. Based on 1991 data, the US EPA estimated that 2.3 tonnes of solvent are emitted annually per employee in a typical operation. This information and documentation of the controls imposed on automotive paints since 1991 were used to estimate the total releases from this sector, at 1,150 tonnes of VOCs (see Appendix C for the complete rationale).

No information was available to estimate transfers of substances of concern for this sector.

4.5.12 Fuelling Services

Fuelling operations reported through NPRI include only bulk storage facilities. Retail sales of fuel (i.e., gas stations) are exempt from reporting, and yet releases occur during filling gasoline storage tanks and vehicles.

Estimates have been calculated for the release of VOCs from fuelling stations per litre of throughput at the station [US EPA, 1995] with a typical gas station estimated to release approximately 2,400 mg VOCs per litre of gasoline used. Ontario regional volumetric data were used to approximate gasoline use in Toronto. Based on this information (Appendix C) 7,000 tonnes of VOCs are estimated to be released from Toronto gas stations annually. These releases would be directed to air.

No information was available to estimate the transfers of substances of concern from this sector.

4.5.13 Transportation Support

Only one Toronto facility reports for the Transportation Sector. NRPI data for transportation fleet stations and depots across Canada report releases of 19 to 26 tonnes of VOCs at each facility, which is in general agreement to the estimated releases for gas stations (Appendix C). The TBD2005 identified 417 operations within the transportation support sector and it was assumed that this would include vehicle storage, maintenance, and fuelling services for a small portion (assumed to be 20%) of the sector. These assumptions resulted in an estimated 2,300 tonnes of VOC releases that are not reported to NRPI.

No information was available to estimate transfers of substances of concern from this sector.

4.5.14 Construction

One of the estimated 1,050 construction operations in Toronto reports to NPRI for releases associated with a concrete crushing plant. None of the transient construction sites report to NPRI. A review of the NPRI database provides similar results with reporting facilities related to aggregate processing, paving, highway and road construction and maintenance and building material warehousing. No construction sites report under NPRI. The reports for facilities that do report to NPRI indicate that releases are related to carbon monoxide, particulate matter and occasionally VOCs. These releases are consistent with those reported for the Toronto facility. A review of emission factors for the Construction Sector did not identify comprehensive factors covering the various types of activities represented through this sector. Therefore the total estimate for the Construction Sector was extrapolated from the reported data and employment estimates with a non-reporting factor of 200.5 (Appendix C).

The estimated total releases for the construction sector are 100 tonnes, representing 0.12% of the overall releases. These releases would be to air. No transfers of substances of concern were reported by this sector and no information was available to estimate transfers.

4.5.15 Laundry Services (Dry Cleaning)

One of the 320 operations in this sector reports to NPRI. The releases from this single operation were not considered to be representative of the sector, therefore US EPA emission factors [US EPA, 1981] were used to estimate releases from dry cleaning operations. Assumptions were made based on equipment size, production rates and controls on emissions, to calculate the total non-reported releases of 224 tonnes of VOCs. When added to the reported quantities for the one operation, this results in a total estimated release of 255 tonnes, representing 0.29% of the overall releases.

No information was available to estimate transfers of substances of concern for this sector.

4.5.16 Funeral Services

None of the 68 operations in this sector reported to NPRI and no emission factor data could be obtained. Air monitoring was conducted at the St. John's Norway Crematorium in the east part of Toronto indicated that these facilities are associated with low emissions of lead, mercury, zinc, particulate matter and dioxins and furans [Senes, 2000]. The Senes report provides emission rates on an hourly basis which were used to estimate a total of 0.05 tonnes of releases for this sector. This is 0.0001% of the overall releases for Toronto.

No information was available to estimate transfers of substances of concern for this sector.

4.5.17 Power Generation

The reported releases for the power generation sector reflect releases from district heating systems, as other types of power generation operations are not present in Toronto. Employment identified in the database for this sector included head offices of many of the utility companies; operations that would not be associated with releases similar to the district heating systems. Therefore, for this sector, it was assumed that the NPRI quantities represented the entire sector and that no non-reported releases or transfers existed.

The releases for this sector are principally from nitrogen oxides (250 Tonnes) and carbon monoxide (130 tonnes), representing 0.5% of the estimated total releases for Toronto and 0.6% of the air only releases. All releases from this sector are to air.

No transfers of substances of concern were reported for this sector.

4.5.18 Property Management/Institutional

The operations reporting to NPRI in this sector included property management firms, hospitals and other institutional operations. These operations represent 12.7% of the operations reporting to NPRI and 22.4% of the overall operations in Toronto. The sector reported releases of less than 200 tonnes, representing 0.5% of the reported releases. The non-reporting factor for the property management sector is high at 6.58, indicating that many of the operations in Toronto are not required to report to NPRI. Therefore the contribution of this sector increases substantially to

1.7% (1,500 tonnes) of the estimated total releases when non-reported quantities are included. All of the releases are to air and are primarily related to nitrogen oxides (760 tonnes) and particulate matter (360 tonnes of PM10 and 275 tonnes of PM2.5).

In considering the effect of the use of employment numbers in estimating the non-reported quantity for this sector, it was recognized that property management firms would have few employees who managed buildings occupied by employees of other firms and that the institutional employment numbers would not be truly reflective of the building size, because it did not include provision for spaces occupied by patients or students. As such, there is significant (although not quantifiable) uncertainty associated with the total releases from the property management/institutional sector.

This sector transfers only 0.01% of the estimated total substances of concern, consisting of approximately 4 tonnes of mercury.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the review of existing reporting systems and estimated quantities of the release of substances of concern, it is concluded that:

- While many of Toronto's operations report to various environmental reporting mechanisms (for example Toronto Sewer Use By-law); however; only the National Pollutant Release Inventory (NPRI) is readily accessible to the public.
- 3% of Toronto's industrial, commercial and public operations report to NPRI.
- 56% of releases to air, water and land are not reported to NPRI.
- 77% of releases to air are not reported to NPRI.
- No use and storage data are reported to NPRI.
- Over 99% of releases in Toronto are to air; with the exception of waste management sector which releases primarily to water.
- It is estimated that about 88,600 tonnes/year of substances are released in Toronto.
- It is estimated that about 75,400 tonnes/year of substances are transferred in Toronto.
- About 70% of the estimated releases are Criteria Air Contaminants, (i.e., volatile organic compounds (VOCs), nitrogen oxides, carbon monoxide and particulate matter) which contribute to poor air quality (i.e., smog).
- A limited number of substances (sulfuric acid, mercury, zinc, phosphorus, copper, aluminum, ammonia, toluene, xylene, manganese and chromium) make up about 95% of reported transfers.
- *Toronto's Ten Key Carcinogens* are reported to be released and transferred in much lower quantities than other substances, typically contributing to less than 1% of the reported quantities.

- VOCs that are not contributors to smog as identified by NPRI (e.g., dichloromethane, ethylbenzene, trichloroethylene, tetrachloroethylene, etc.) contribute less than 1% to the reported and estimated total releases.
- Small operations such as automotive repair shops, dry cleaners and funeral services do not typically report through NPRI. They contribute less than 1% to the estimated total releases in Toronto.
- There are limited data for the storage of substances of concern in Toronto as reported through the Environmental Emergencies Planning Registry.
- Reporting systems other than NPRI are not easily accessible to the public and the environmental information is not compiled for interpretation.
- The CMA 2005 Industry Profiles and NPRI data were used to identify 18 sectors with the potential for the use, storage, release and transfer of substances of concern. The selected sectors represent approximately 40% of the Toronto workforce, and essentially 100% of the workforce in the goods producing sectors.

Based on the conclusions and the identified gaps in information outlined above, estimates and public health impacts could be improved by:

- The use and storage of substances of concern could be quantified for selected sectors such as general manufacturing and chemical distribution. A review of hazardous waste management data may assist in the identification of operations with the potential for storage of substances of concern; however, the publicly available information does not provide quantities of waste generated. A more detailed review of the TURA data for releases of substances of concern in these sectors could also be conducted to assess variability in the quantities used and released, within a single regulatory regime.
- The local effects of small operations that use and release substances of concern could be assessed to evaluate whether their relatively small contribution to total releases is significant at a local scale.
- The contribution of laboratories could not be quantified in this study. Although relatively small quantities of substances of concern are likely associated with these operations, the potential for very toxic substances to be present may warrant a more detailed review of these facilities.
- The release estimates may be assessed for relevance to public health by comparing the toxic equivalence of the various substances reported through NPRI. This will allow the ranking of the chemical emissions by importance to public health.
- The release estimates may be compared to air quality data to provide context to the contribution of releases from the identified sectors on concentrations of these substances in Toronto air. The air quality data may also be compared to health benchmarks considered to be safe for public health to provide an indication of areas of concern related to releases of substances of concern.

6.0 REFERENCES

Board of Health, *Access To Environmental Information Decisions Made By The Board Of Health.* http://www.toronto.ca/health/hphe/pdf/boh_enviro_info_june_2006.pdf. June 19, 2006.

Canadian Environmental Law Association, *Creating Community Right-to-Know Opportunities in the City of Toronto*, prepared for Toronto Public Health, January 2006.

City of Toronto, *Toronto Business Directory*. Economic Research, Economic Development, City of Toronto. 2005.

City of Toronto Economic Development, *Census Metropolitan Area (CMA) Industry Profiles*, *http://www.toronto.ca/invest-in-toronto/xls/industry_profiles_2005.xls*, accessed January 2007.

Environment Canada, *Guide for Reporting to the National Pollutant Release Inventory*, available at www.ec.gc.ca/npri, 2005.

NPRI, http://www.ec.gc.ca/pdb/npri/npri_online_data_e.cfm, accessed January 2007.

Toronto Public Health, *Access to Environmental Information: Preventing Pollution, Avoiding Risks*, June 2006.

ToxProbe Incorporated, *Potential for Occupational and Environmental Exposure to Ten Carcinogens in Toronto*, prepared for Toronto Public Health, March 2002.

TURA, http://www.turi.org/content/content/view/full/2757/, accessed January 2007.

Senes Consultants Limited, *Report on Ambient Air Monitoring and Source Testing at the St. John's Norway Crematorium*, prepared for City of Toronto Public Health Department, June 2000.

United States Environmental Protection Act, *Compilation of Air Pollutant Emission Factors (AP-42)*, Fifth Edition available at: http://epa.gov/air/oaqps/efactors.html#ratings. accessed January 2007.

US EPA, *AP 42, Volume 1, 5th Edition, Chapter 4:Evaporation Loss Sources, Chapter 4.2.2.8 Automobile and Light Truck Surface Coating Operations*, August 1982, obtained at http://www.epa.gov/ttn/chief/ap42/ch04/final/c4s02_2h.pdf. January 2007.

US EPA, *AP 42, Volume 1, 5th Edition, Chapter 5: Petroleum Industry Final Section*, January 1995, obtained at http://www.epa.gov/ttn/chief/ap42/ch05/final/c05s02.pdf. January 2007.

APPENDIX A

NPRI List of Substances and Thresholds

(Note: List extracted from Guide for Reporting to the National Pollutant Release Inventory, 2005)

Appendix 1 – Overview of Substances and Thresholds for Reporting to the 2005 NPRI *(Reproduced from page 5 for easy reference.)*

Part Number	Substance	Mass Threshold	Concentration Threshold	Unit for Reporting
Threshold Based on Quantity Manufactured, Processed or Otherwise Used				
1A	231 core substances	10 tonnes	1%	tonnes
1B	mercury[1]	5 kg	n/a	kg
	cadmium[1]	5 kg	0.1%	kg
	arsenic[1] hexavalent chromium compounds lead[2] tetraethyl lead	50 kg	0.1%	kg
Polycyclic Aromatic Hydrocarbons (PAHs) – Threshold Based on Special Criteria				
2	17 individual PAHs	incidental manufacture and release, disposal or transfer for recycling of 50 kg total, or any quantity for wood preservation using creosote	n/a	kg
Dioxins/Furans and Hexachlorobenzene (HCB) – No Threshold. Obligatory Reporting for Facilities Used for or Engaged in Specific Activities				
3	dioxins/furans HCB	activity-based	n/a	g TEQ[3], g
Criteria Air Contaminants (CACs) – Threshold Based on Quantity Released to Air				
4	carbon monoxide oxides of nitrogen sulphur dioxide total particulate matter	20 tonnes	n/a	tonnes
	volatile organic compounds	10 tonnes	n/a	tonnes
	PM_{10}[4]	0.5 tonnes	n/a	tonnes
	$PM_{2.5}$[5]	0.3 tonnes	n/a	tonnes
Speciated Volatile Organic Compounds (VOCs) – Additional Reporting Requirements				
5	60 VOCs including individual substances, isomer groups and other groups and mixtures	1 tonne of 10-tonne air release threshold for VOCs (Part 4) has been met	n/a	tonnes

n/a – not applicable
[1] and its compounds
[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys
[3] See 4.8.1, "What Are Toxic Equivalents (TEQs) of Dioxins/Furans" for an explanation of these units
[4] See glossary for definition of PM_{10}
[5] See glossary for definition of $PM_{2.5}$

The substances are listed alphabetically in six parts. The reporting criteria for the substances listed in each Part differ and are explained in Step 1. Explanations of the footnotes and substance qualifiers are also provided in Step

Part 1A Substances

Name	CAS Number[1]
Acetaldehyde	75-07-0
Acetonitrile	75-05-8
Acetophenone	98-86-2
Acrolein	107-02-8
Acrylamide	79-06-1
Acrylic acid [2]	79-10-7
Acrylonitrile	107-13-1
Alkanes, C_{6-18}, chloro	68920-70-7
Alkanes, C_{10-13}, chloro	85535-84-8
Allyl alcohol	107-18-6
Allyl chloride	107-05-1
Aluminum [3]	7429-90-5
Aluminum oxide [4]	1344-28-1
Ammonia (total) [5]	*
Aniline [2]	62-53-3
Anthracene	120-12-7
Antimony [6]	*
Asbestos [7]	1332-21-4
Benzene	71-43-2
Benzoyl chloride	98-88-4
Benzoyl peroxide	94-36-0
Benzyl chloride	100-44-7
Biphenyl	92-52-4
Bis(2-ethylhexyl) adipate	103-23-1
Bis(2-ethylhexyl) phthalate	117-81-7
Boron trifluoride	7637-07-2
Bromine	7726-95-6
1-Bromo-2-chloroethane	107-04-0
Bromomethane	74-83-9
1,3-Butadiene	106-99-0
2-Butoxyethanol	111-76-2
Butyl acrylate	141-32-2
i-Butyl alcohol	78-83-1
n-Butyl alcohol	71-36-3
sec-Butyl alcohol	78-92-2
tert-Butyl alcohol	75-65-0
Butyl benzyl phthalate	85-68-7
1,2-Butylene oxide	106-88-7
Butyraldehyde	123-72-8
C.I. Acid Green 3	4680-78-8
C.I. Basic Green 4	569-64-2
C.I. Basic Red 1	989-38-8
C.I. Direct Blue 218	28407-37-6
C.I. Disperse Yellow 3	2832-40-8
C.I. Food Red 15	81-88-9
C.I. Solvent Orange 7	3118-97-6
C.I. Solvent Yellow 14	842-07-9
Calcium cyanide	156-62-7
Calcium fluoride	7789-75-5
Carbon disulphide	75-15-0
Carbon tetrachloride	56-23-5
Carbonyl sulphide	463-58-1
Catechol	120-80-9
CFC-11	75-69-4
CFC-12	75-71-8
CFC-13	75-72-9
CFC-114	76-14-2
CFC-115	76-15-3
Chlorendic acid	115-28-6
Chlorine	7782-50-5
Chlorine dioxide	10049-04-4
Chloroacetic acid [2]	79-11-8
Chlorobenzene	108-90-7
Chloroethane	75-00-3
Chloroform	67-66-3
Chloromethane	74-87-3
3-Chloro-2-methyl-1-propene	563-47-3
3-Chloropropionitrile	542-76-7
Chromium [8]	*
Cobalt [6]	*
Copper [6]	*
Cresol [2,9]	1319-77-3
Crotonaldehyde	4170-30-3
Cumene	98-82-8
Cumene hydroperoxide	80-15-9
Cyanides [10]	*
Cyclohexane	110-82-7
Cyclohexanol	108-93-0
Decabromodiphenyl oxide	1163-19-5
2,4-Diaminotoluene [2]	95-80-7
2,6-Di-*t*-butyl-4-methylphenol	128-37-0
Dibutyl phthalate	84-74-2
o-Dichlorobenzene	95-50-1
p-Dichlorobenzene	106-46-7
3,3'-Dichlorobenzidine dihydrochloride	612-83-9
1,2-Dichloroethane	107-06-2
Dichloromethane	75-09-2
2,4-Dichlorophenol [2]	120-83-2
1,2-Dichloropropane	78-87-5
Dicyclopentadiene	77-73-6
Diethanolamine [2]	111-42-2
Diethyl phthalate	84-66-2
Diethyl sulphate	64-67-5

Name	CAS Number[1]
Dimethylamine	124-40-3
N,N-Dimethylaniline [2]	121-69-7
N,N-Dimethylformamide	68-12-2
Dimethyl phenol	1300-71-6
Dimethyl phthalate	131-11-3
Dimethyl sulphate	77-78-1
4,6-Dinitro-*o*-cresol [2]	534-52-1
2,4-Dinitrotoluene	121-14-2
2,6-Dinitrotoluene	606-20-2
Dinitrotoluene [11]	25321-14-6
Di-n-octyl phthalate	117-84-0
1,4-Dioxane	123-91-1
Diphenylamine	122-39-4
Epichlorohydrin	106-89-8
2-Ethoxyethanol	110-80-5
2-Ethoxyethyl acetate	111-15-9
Ethyl acrylate	140-88-5
Ethylbenzene	100-41-4
Ethyl chloroformate	541-41-3
Ethylene	74-85-1
Ethylene glycol	107-21-1
Ethylene oxide	75-21-8
Ethylene thiourea	96-45-7
Fluorine	7782-41-4
Formaldehyde	50-00-0
Formic acid	64-18-6
Halon 1211	353-59-3
Halon 1301	75-63-8
HCFC-22	75-45-6
HCFC-122 and all isomers [12]	41834-16-6
HCFC-123 and all isomers [13]	34077-87-7
HCFC 124 and all isomers [14]	63938-10-3
HCFC-141b	1717-00-6
HCFC-142b	75-68-3
Hexachlorocyclopentadiene	77-47-4
Hexachloroethane	67-72-1
Hexachlorophene	70-30-4
n-Hexane	110-54-3
Hydrazine [2]	302-01-2
Hydrochloric acid	7647-01-0
Hydrogen cyanide	74-90-8
Hydrogen fluoride	7664-39-3
Hydrogen sulphide	7783-06-4
Hydroquinone [2]	123-31-9
Iron pentacarbonyl	13463-40-6
Isobutyraldehyde	78-84-2
Isophorone diisocyanate	4098-71-9
Isoprene	78-79-5
Isopropyl alcohol	67-63-0
p,p'-Isopropylidenediphenol	80-05-7
Isosafrole	120-58-1
Lithium carbonate	554-13-2
Maleic anhydride	108-31-6

Name	CAS Number[1]
Manganese [6]	*
2-Mercaptobenzothiazole	149-30-4
Methanol	67-56-1
2-Methoxyethanol	109-86-4
2-Methoxyethyl acetate	110-49-6
Methyl acrylate	96-33-3
Methyl *tert*-butyl ether	1634-04-4
p,p'-Methylene*bis*(2-chloroaniline)	101-14-4
1,1--Methylene*bis* (4-isocyanatocyclohexane)	5124-30-1
Methylene*bis*(phenylisocyanate)	101-68-8
p,p'-Methylenedianiline	101-77-9
Methyl ethyl ketone	78-93-3
Methyl iodide	74-88-4
Methyl isobutyl ketone	108-10-1
Methyl methacrylate	80-62-6
N-Methylolacrylamide	924-42-5
2-Methylpyridine	109-06-8
N-Methyl-2-pyrrolidone	872-50-4
Michler's ketone [2]	90-94-8
Molybdenum trioxide	1313-27-5
Naphthalene	91-20-3
Nickel [6]	*
Nitrate ion [15]	*
Nitric acid	7697-37-2
Nitrilotriacetic acid [2]	139-13-9
p-Nitroaniline	100-01-6
Nitrobenzene	98-95-3
Nitroglycerin	55-63-0
p-Nitrophenol [2]	100-02-7
2-Nitropropane	79-46-9
N-Nitrosodiphenylamine	86-30-6
Nonylphenol and its ethoxylates[16]	*
Octylphenol and its ethoxylates[17]	*
Paraldehyde	123-63-7
Pentachloroethane	76-01-7
Peracetic acid [2]	79-21-0
Phenol [2]	108-95-2
p-Phenylenediamine [2]	106-50-3
o-Phenylphenol [2]	90-43-7
Phosgene	75-44-5
Phosphorus [18]	7723-14-0
Phosphorus (total)[19]	*
Phthalic anhydride	85-44-9
Poly-meric diphenylmethane diisocyanate	9016-87-9
Potassium bromate	7758-01-2
Propargyl alcohol	107-19-7
Propionaldehyde	123-38-6
Propylene	115-07-1
Propylene oxide	75-56-9
Pyridine [2]	110-86-1
Quinoline [2]	91-22-5

Name	CAS Number[1]
p-Quinone	106-51-4
Safrole	94-59-7
Selenium [6]	*
Silver [6]	*
Sodium fluoride	7681-49-4
Sodium nitrite	7632-00-0
Styrene	100-42-5
Styrene oxide	96-09-3
Sulphur hexafluoride	2551-62-4
Sulphuric acid	7664-93-9
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethylene	127-18-4
Tetracycline hydrochloride	64-75-5
Thiourea	62-56-6
Thorium dioxide	1314-20-1
Titanium tetrachloride	7550-45-0
Toluene	108-88-3
Toluene-2,4-diisocyanate	584-84-9
Toluene-2,6-diisocyanate	91-08-7
Toluenediisocyanate [11]	26471-62-5
1,2,4-Trichlorobenzene	120-82-1
1,1,2-Trichloroethane	79-00-5
Trichloroethylene	79-01-6
Triethylamine	121-44-8
1,2,4-Trimethylbenzene	95-63-6
2,2,-4-Trimethylhexamethylene diisocyanate	16938-22-0
2,4,-4-Trimethylhexamethylene diisocyanate	15646-96-5
Vanadium [20]	7440-62-2
Vinyl acetate	108-05-4
Vinyl chloride	75-01-4
Vinylidene chloride	75-35-4
Xylene [21]	1330-20-7
Zinc[6]	*

See Step 1 for an explanation of these qualifiers.

- • No single CAS number applies to this NPRI 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 "fume or dust"
- 4 "fibrous forms"
- 5 "Ammonia (total)" means the total of both of ammonia (NH_3 – CAS No. 7664-41-7) and the ammonium ion (NH_4^+) in solution.
- 6 "and its compounds"
- 7 "friable form"
- 8 "and its compounds" except hexavalent chromium compounds
- 9 "all isomers" including 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)
- 10 "ionic"
- 11 "mixed isomers"
- 12 "all isomers" including, but not limited to, HCFC-122 (CAS No. 354-21-2)
- 13 "all isomers" including, but not limited to, HCFC-123 (CAS No. 306-83-2) and HCFC 123a (CAS No. 90454-18-5)
- 14 "all isomers" including, but not limited to, HCFC 124 (CAS No. 2837-89-0), and HCFC 124a (CAS No. 354-25-6)
- 15 "in solution at a pH of 6.0 or greater"
- 16 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; 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; 127087-87-1.
- 17 Includes octylphenol and its ethoxylates with the following CAS numbers: 140-66-9; 1806-26-4; 27193-28-8; 68987-90-6; 9002-93-1; 9036-19-5.
- 18 "yellow or white"
- 19 Does not include phosphorus (yellow or white) with CAS Number 7723-14-0.
- 20 "(except when in an alloy) and its compounds"
- 21 "all isomers" including 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

Part 1B Substances

Name	CAS Number	Name	CAS Number
Mercury [6]	*	Hexavalent chromium compounds	*
Cadmium[6]	*	Lead[22, 23]	*
Arsenic[6]	*	Tetraethyl lead	78-00-2

[22] "and its compounds" except tetraethyl lead
[23] Does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

Part 2 Substances

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

Part 3 Substances

Name	CAS Number
Hexachlorobenzene	118-74-1
Dioxins and Furans [24]	*

See Steps 1 and 2 for an explanation of this footnote.
[24]This class of substances is restricted to the following congeners:

- 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (1746-01-6);
- 1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin (40321-76-4);
- 1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin (39227-28-6);
- 1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin (19408-74-3);
- 1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin (57653-85-7);
- 1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin (35822-46-9);
- Octachlorodibenzo-*p*-dioxin (3268-87-9);
- 2,3,7,8-Tetrachlorodibenzofuran (51207-31-9);
- 2,3,4,7,8-Pentachlorodibenzofuran (57117-31-4);
- 1,2,3,7,8-Pentachlorodibenzofuran (57117-41-6);
- 1,2,3,4,7,8-Hexachlorodibenzofuran (70648-26-9);
- 1,2,3,7,8,9-Hexachlorodibenzofuran (72918-21-9);
- 1,2,3,6,7,8-Hexachlorodibenzofuran (57117-44-9);
- 2,3,4,6,7,8-Hexachlorodibenzofuran (60851-34-5);
- 1,2,3,4,6,7,8-Heptachlorodibenzofuran (67562-39-4);
- 1,2,3,4,7,8,9-Heptachlorodibenzofuran (55673-89-7); and
- Octachlorodibenzofuran (39001-02-0).

Part 4 Substances

Name	CAS Number	Name	CAS Number
Carbon monoxide	630-08-0	PM_{10} [26]	*
Oxides of nitrogen (expressed as NO_2)	11104-93-1	Sulphur dioxide	7446-09-5
$PM_{2.5}$ [25]	*	Total particulate matter[27]	*
		Volatile organic compounds[28]	

[25] Means any particulate matter with a diameter less than or equal to 2.5 microns
[26] Means any particulate matter with a diameter less than or equal to 10 microns
[27] Means any particulate matter with a diameter less than 100 microns
[28] Refer to Appendix 5 for definition of VOC.

Part 5 Substances

Individual Substances

Name	CAS Number[1]	Name	CAS Number[1]
Acetylene	74-86-2	D-Limonene	5989-27-5
Adipic acid	124-04-9	Methanol	67-56-1
Aniline[2]	65-53-3	Methyl ethyl ketone	78-93-3
Benzene	71-43-2	2-Methyl-3-hexanone	7379-12-6
1,3-Butadiene	106-99-0	Methyl isobutyl ketone	108-10-1
2-Butoxyethanol	111-76-2	Myrcene	123-35-3
n-Butyl acetate	123-86-4	Beta-Phellandrene	555-10-2
Chlorobenzene	108-90-7	Phenyl isocyanate	103-71-9
p-Dichlorobenzene	106-46-7	Alpha-Pinene	80-56-8
1,2-Dichloroethane	107-06-2	Beta-Pinene	127-91-3
Dimethylether	115-10-6	Propane	74-98-6
Ethyl alcohol	64-17-5	Propylene	115-07-1
Ethyl acetate	141-78-6	Styrene	100-42-5
Ethylene	74-85-1	1,2,4-Trimethylbenzene	95-63-6
Formaldehyde	50-00-0	Trimethylfluorosilane	420-56-4
n-Hexane	110-54-3	Toluene	108-88-3
Isopropyl alcohol	67-63-0	Vinyl acetate	108-05-4

Isomer Groups

Name	CAS Number	Name	CAS Number
Anthraquinone[29]	*	Hexane[30]	*
Butane[29]	*	Hexene[29]	25264-93-1
Butene[29]	25167-67-3	Methylindan[29]	27133-93-3
Cycloheptane[29]	*	Nonane[29]	*
Cyclohexene[29]	*	Octane[29]	*
Cyclooctane[29]	*	Pentane[29]	*
Decane[29]	*	Pentene[29]	*
Dihydronapthalene[29]	*	Terpene[29]	68956-56-9
Dodecane[29]	*	Trimethylbenzene[31]	25551-13-7
Heptane[29]	*	Xylene[29]	1330-20-7

Other Groups and Mixtures

Name	CAS Number	Name	CAS Number
Creosote	8001-58-9	Mineral spirits	64475-85-0
Heavy aromatic solvent naphtha	64742-94-5	Naphtha	8030-30-6
Light aromatic solvent naphtha	64742-95-6	Stoddard solvent	8052-41-3

[29] "all isomers,"

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

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

APPENDIX B

Toronto Industry Sectors

	Industry	NAICS	Employment
1	**Goods Producing Sector**	11-33	651,980
2	**Agriculture, Forestry, Fishing and Hunting**	11	9,560
3	Crop Production	111	4,680
4	Animal Production	112	2,310
5	**Mining and Oil and Gas Extraction**	21	2,770
6	Utilities	22	15,590
7	Electric Power Generation, Transmission and Distribution	2211	12,040
8	**Construction**	23	162,760
9	Prime Contracting	236	62,630
10	Trade Contracting	237,238	100,120
11	**Manufacturing**	31-33	461,300
12	Food Manufacturing	311	53,360
13	Beverage and Tobacco Product Manufacturing	312	6,700
14	Beverage Manufacturing	3121	6,700
15	Textile Mills and Textile Product Mills	313-314	3,810
16	Clothing Manufacturing	315	21,330
17	Leather and Allied Product Manufacturing	316	1,660
18	Wood Product Manufacturing	321	12,730
19	Paper Manufacturing	322	11,390
20	Printing and Related Support Activities	323	23,860
21	Petroleum and Coal Products Manufacturing	324	2,000
22	Chemical Manufacturing	325	36,480
23	Basic & Pesticide	3251,3253	2,650
24	Resins & Paint	3252,3255	3,670
25	Pharmaceuticals	3254	20,410
26	Plastics and Rubber Manufacturing	326	35,170
27	Non-Metallic Mineral Product Manufacturing	327	8,430
28	Primary Metal Manufacturing	331	8,540
29	Fabricated Metal Product Manufacturing	332	39,400
30	Machinery Manufacturing	333	25,830
31	Computer and Electronic Product Manufacturing	334	34,440
32	Computer and Peripheral Equipment Manufacturing	3341	10,210
33	Communications Equipment Manufacturing	3342	3,420
34	Semiconductor and Other Electronic Component Manufacturing	3344	12,730
35	Navigational, Measuring, Medical and Control Instruments Manufacturing	3345	4,470
36	Manufacturing and Reproducing Magnetic and Optical Media	3346	2,290
37	Electrical Equipment, Appliance and Component Manufacturing	335	9,310
38	Transportation Equipment Manufacturing	336	73,620
39	Motor Vehicle Body, Trailer and Parts Manufacturing	3361-3363	65,070
40	Motor Vehicle Manufacturing	3361	16,380
41	Motor Vehicle Body, Trailer Manufacturing	3362	2,190
42	Motor Vehicle Parts Manufacturing	3363	46,500
43	Aerospace Product and Parts Manufacturing	3364	7,110

	Industry	NAICS	Employment
44	Furniture and Related Product Manufacturing	337	29,950
45	Office Furniture (including fixtures) Manufacturing	3372	6,760
46	Miscellaneous Manufacturing	339	23,290
47	Medical Equip. & Supplies Manufacturing	3391	2,760
48	Manufacturing - Durables	321,327,331	265,550
49	Manufacturing - Non-Durables	311-	195,760
50	**Services Producing Sector**	41-91	2,111,380
51	**Wholesale Trade**	41	130,320
52	Food, Beverage and Tobacco Wholesaler-Distributors	413	20,110
53	Food Wholesaler-Distributors	4131	18,520
54	Personal and Household Goods Wholesaler-Distributors	414	23,770
55	Textile, Clothing and Footwear Wholesaler-Distributors	4141	6,490
56	Pharmaceuticals, Toiletries, Cosmetics and Sundries Wholesaler-Distributors	4145	7,730
57	Motor Vehicle and Parts Wholesaler-Distributors	415	7,370
58	Building Material and Supplies Wholesaler-Distributors	416	17,190
59	Machinery, Equipment and Supplies Wholesaler-Distributors	417	38,180
60	Computer and Communications Equipment and Supplies Wholesaler-Distributors	4173	15,400
61	Miscellaneous Wholesaler-Distributors	418	19,760
62	Wholesale Agents and Brokers	419	2,180
63	**Retail Trade**	44-45	314,650
64	Motor Vehicle and Parts Dealers	441	24,530
65	Furniture and Home Furnishings Stores	442	13,490
66	Electronics and Appliance Stores	443	19,030
67	Building Material and Garden Equipment and Supplies Dealers	444	17,800
68	Food and Beverage Stores	445	69,250
69	Health and Personal Care Stores	446	24,450
70	Gasoline Stations	447	8,580
71	Clothing and Clothing Accessories Stores	448	37,300
72	Sporting Goods, Hobby, Book and Music Stores	451	14,050
73	General Merchandise Stores	452	54,910
74	Miscellaneous Store Retailers	453	23,350
75	Non-Store Retailers	454	7,930
76	**Transportation and Warehousing**	48-49	127,480
77	Air Transportation	481	10,750
78	Rail Transportation	482	2,810
79	Truck Transportation	484	30,110
80	Transit and Ground Passenger Transportation	485	27,370
81	Urban Transit Systems	4851	10,160
82	Taxi and Limousine Service	4853	9,430
83	School and Employee Bus Transportation	4854	5,260
84	Support Activities for Transportation	488	18,690
85	Support Activities for Air Transportation	4881	3,460
86	Postal Service	491	13,280

	Industry	NAICS	Employment
87	Couriers and Messengers	492	15,100
88	Warehousing and Storage	493	9,380
89	**Information and Cultural Industries**	51	96,800
90	Publishing Industries	511	21,680
91	Newspaper, Periodical, Book and Database Publishers	5111	18,570
92	Software Publishers	5112	3,110
93	Motion Picture and Sound Recording Industries	512	20,400
94	Motion Picture and Video Industries	5121	17,200
95	Sound recording Industries	5122	3,190
96	Broadcasting (except Internet)	515	14,300
97	Telecommunications	517	29,510
98	Internet Service Providers, Web Search Portals, and Data Processing Services	518	4,760
99	Other Information Services	519	5,940
100	Internet Sub-Total	516 & 518	4,970
101	**Finance, Insurance, Real Estate & Leasing**	52-53	271,950
102	**Finance and Insurance**	52	210,830
103	Credit Intermediation and Related Activities	522	109,460
104	Depository Credit Intermediation	5221	94,380
105	Securities, Commodity Contracts, and Other Intermediation and Related Activities	523	46,320
106	Insurance Carriers and Related Activities	524	54,990
107	Insurance Carriers	5241	32,100
108	Agencies, Brokerage and Other Insurance Related Activities	5242	22,890
109	**Real Estate and Rental and Leasing**	53	61,110
110	Real Estate	531	51,610
111	Lessors of Real Estate	5311	14,200
112	Offices of Real Estates Agents and Brokers	5312	23,330
113	Activities Related to Real Estate	5313	14,070
114	Rental and Leasing Services	532	9,500
115	Automotive Equipment Rental and Leasing	5321	2,960
116	Commercial and Industrial Machinery and Equipment Rental and Leasing	5324	2,820
117	**Professional, Scientific and Technical Services**	54	255,080
118	Legal Services	5411	36,890
119	Accounting, Tax Preparation, Bookkeeping and Payroll Services	5412	21,890
120	Architectural, Engineering and Related Services	5413	41,240
121	Specialized Design Services	5414	14,780
122	Computer Systems Design and Related Services	5415	71,960
123	Management, Scientific and Technical Consulting Services	5416	29,270
124	Scientific Research and Development Services	5417	5,600
125	Advertising and Related Services	5418	22,950
126	Other Professional, Scientific and Technical Services	5419	10,490
127	**Administrative and Support, Waste Management and Remediation Services**	56	129,230
128	Administrative and Support Services	561	124,860
129	Employment Services	5613	23,650

	Industry	NAICS	Employment
130	Business Support Services	5614	21,160
131	Travel Arrangement and Reservation Services	5615	9,290
132	Investigation and Security Services	5616	20,880
133	Building Services	5612,5617	39,200
134	Mgmt & Other Admin Services	5611,5619	10,690
135	Waste Management and Remediation Services	562	4,370
136	**Educational Services**	61	168,920
137	Elementary and Secondary Schools	6111	101,270
138	Community Colleges and C.E.G.E.P.s	6112	11,810
139	Universities	6113	36,440
140	Other Schools and Instruction	6116	16,440
141	Educational Support Services	6117	2,050
142	**Health Care and Social Assistance**	62	224,210
143	Ambulatory Health Care Services	621	73,310
144	Medical and Diagnostic Laboratories	6215	4,670
145	Hospitals	622	63,540
146	Nursing and Residential Care Facilities	623	31,050
147	Social Assistance	624	56,320
148	Child Day Care Services	6244	29,090
149	**Arts, Entertainment and Recreation**	71	49,990
150	Performing Arts, Spectator Sports and Related Industries	711	23,000
151	Performing Arts Companies	7111	5,980
152	Spectator Sports	7112	3,050
153	Independent Artists, Writers and Performers	7115	12,300
154	Heritage Institutions	712	1,930
155	Amusement, Gambling and Recreation Industries	713	25,060
156	**Accommodation and Food Services**	72	142,260
157	Accommodation Services	721	22,430
158	Food Services and Drinking Places	722	119,830
159	Full-Service Restaurants	7221	54,720
160	Limited-Service Eating Places	7222	50,950
161	Special Food Services	7223	9,490
162	Drinking Places (Alcoholic Beverages)	7224	4,680
163	**Other Services (except Public Administration)**	81	108,770
164	Repair and Maintenance	811	34,590
165	Automotive Repair and Maintenance	8111	17,320
166	Electronic and Precision Equipment Repair and Maintenance	8112	5,900
167	Commercial and Industrial Machinery and Equipment (except Automotive and	8113	6,450
168	Personal and Household Goods Repair and Maintenance	8114	4,920
169	Personal and Laundry Services	812	34,940
170	Religious, Grant-Making, Civic, and Professional and Similar Organizations	813	27,420
171	Business, Professional, Labour and Other Membership Organizations	8139	7,860
172	Private Households	814	11,820

	Industry	NAICS	Employment
173	**Public Administration**	91	90,780
174	Federal Government Public Administration	911	21,830
175	Provincial and Territorial Public Administration	912	27,910
176	Local, Municipal and Regional Public Administration	913	40,790
177	**Private Sector**		1,958,380
178	**Public Sector**		385,280

The industry sector identification, North American Industry Classification System (NAICS) number and employment data are extracted from the Cencus Metropolitan Area (CMA) Industry Profiles prepared by the City of Toronto Economic Development in 2005 and were obtained from *http://www.toronto.ca/invest-in-toronto/xls/industry_profiles_2005.xls*, accessed January 2007.

APPENDIX C

Calculations and Assumptions

Calculating Total Estimated Releases Based on Employment

The list of businesses identified in the 2005 Toronto Business Directory (TBD2005) was compared to the businesses identified in the National Pollutant Release Inventory (NPRI). In several cases, not all the businesses listed in NPRI were in the TBD2005 and this difference was recorded. Using the TBD2005 data for the number of employees (reported in ranges), an approximate number of employees for the NPRI reporting companies was calculated using the average of the employment range, and from this value an average number of employees per NPRI reporting company was also calculated. This average value was used to estimate the number of employees with NPRI reporting companies that were not included in the TBD2005, for a total of employees at NPRI reporting companies. For example, for the Printing and Publishing sector:

- Nine of the NPRI reporting companies were listed in the TBD2005, with an approximate number of employees of 3,388, resulting in an average of 376 employees per company.
- Twelve NPRI reporting companies were not listed, with an equivalent number of employees of 4,512 (i.e., 376 x 12).
- Therefore NPRI reported releases were related to 7,900 employees.

A "non reporting calculation factor" was then determined using the ratio of workers at companies reporting to NPRI to the number of workers at companies not reporting to NPRI. Using the Printing and Publishing sector as an example, approximately 29,683 employees worked at non-reporting companies, for a non-reporting calculation factor of 3.75 (i.e., 29,683/7,900).

This calculation factor was then multiplied to the NPRI reported releases to estimate the non-reported releases. The non reporting calculation factors used in the estimates are as follows:

Sector	Non-reporting Calculation Factor
Food and Beverage Manufacturing	3.82
Clothing Manufacturing	No reporting data available basis for estimate presented in Appendix C.
Printing and Publishing	3.75
Chemical Manufacturing	1.48
Wood Industries	4.59
Other Manufacturing	2.95
Chemical Distribution	2.64
Waste Management	0
Water Treatment	0
Medical and Diagnostic Laboratories	No reporting or emission factor data, calculation factor not determined.
Auto Repair and Maintenance	Based on emission factors included in Appendix C.
Fuelling Services	Based on emission factors included in Appendix C.

Sector	Non-reporting Calculation Factor
Transportation Support	Based on emission factors included in Appendix C.
Construction	200.49
Laundry Services (Dry Cleaning)	Based on emission factors included in Appendix C.
Funeral Services	Based on emission factors included in Appendix C.
Power Generation	0
Property Management/Institutional	6.58

Estimating Releases for Sectors with Limited or No NPRI Reporting

Clothing Manufacturing

The clothing manufacturing and textile industries are associated with the use of dyes and pigments, which can contain heavy metals and solvents. The clothing manufacturing industry in Toronto is estimated to employ over 20,000 people. However, no Toronto clothing manufacturers report to NPRI.

Eleven textile manufacturers in Canada report to NPRI, and of these, seven had reportable releases in 2005. The reported releases typically consisted of volatile organic compounds (VOCs), which included methyl ethyl ketone, toluene, xylene and chlorinated solvents (i.e., dichloromethane and tetrachloroethylene). Released quantities ranged from less than 1 tonne per year to more than 400 tonnes per year.

For the purpose of estimating releases for Toronto, it was assumed that up to 25% of the approximately 400 operations with 10 or more employees would include dry cleaning of the finished products, with typical emissions of 1 tonne of VOCs per year (see Dry Cleaning calculations below).

Therefore it is estimated that the clothing manufacturing industry in Toronto would result in emission of 100 tonnes (i.e., 0.25 x 400 x 1 tonne) of VOCs, per year.

No information on the estimated release of metals from these operations was identified.

Medical and Diagnostic Laboratories

The operations at research, medical and commercial laboratories can be very specialized. Chemical usage may include standard solvents for sample preparation but will also likely include very rare and sometimes very toxic chemicals. Two laboratories (commercial operations) in Canada reported to NPRI in 2005. The releases from these facilities were related to lead and its compounds. These were not considered representative of the types of laboratories present in Toronto, especially those associated with research and medical diagnostics.

Based on the limited data available for Toronto operations, no release estimates could be prepared for this sector.

Fuelling Operations

Fuelling operations reported through NPRI include only bulk storage facilities. Retail sales of fuel (i.e., gas stations) are exempt from reporting, and yet releases occur during filling gasoline storage tanks and vehicles.

Estimates have been calculated for the release of VOCs from fuelling stations per litre of throughput at the station [US EPA, 1995]. Releases are related to the type of equipment for the storage tanks and vehicle filling. It was assumed that standard filling stations used submerged filling methods for tank filling and uncontrolled methods for vehicle filling. Emissions from tank breathing and spillage were also included. Based on these assumptions, the following emissions were included:

Storage tank filling	880 mg VOC/L throughput
Vehicle filling	1,320 mg VOC/L throughput
Breathing and spillage	200 mg VOC/L throughput

Therefore a typical gas station is estimated to release approximately 2,400 mg VOCs /L of gasoline used, or 2.4 kg/m^3.

No data were available for the throughput of gasoline in Toronto; however, Ontario regional volumetric data of gasoline usage in 2004 was available [Environment Canada, 2005]. The Ontario value of 13,284,470 m^3 was adjusted proportionately to the population of Toronto of 2,481,494, compared to a population of 11,410,046 in Ontario [Statistics Canada, 2007] resulting in approximately 2.9 million m^3 of gasoline used in Toronto.

Therefore, approximately 7 million kg or 7,000 tonnes of VOCs (i.e., 2.4 kg/m^3 x 2.9 million m^3 = 6.96 million kg) are estimated to be released from Toronto gas stations annually.

Transportation

Aside from vehicle storage and maintenance, a small portion (assumed to be 20%) of the Transportation sector would provide fuelling of vehicles. As calculated for fuelling operations above, typical gas stations release approximately 2.4 kg VOCs/m^3 of gasoline through various paths (i.e., evaporation, spillage), for a total release of 7,000 tonnes annually. The TBD2005 identified 249 gas stations in the City. Therefore each gas station would release approximately 28 tonnes of VOCs annually.

Only one Toronto facility reports for the Transportation Sector. NRPI data for transportation fleet stations and depots across Canada report releases of 19 to 26 tonnes of VOCs at each facility, which is in general agreement to the estimated releases for gas stations.

The TBD2005 identified 417 operations within the Transportation Sector, and if the assumed 20% have fuelling operations, this would result in approximately 2,300 tonnes of VOC releases (i.e., 0.2 x 417 operations x 28 tonnes = 2,335 tonnes) that are not reported to NRPI.

Construction

One Toronto facility reports to NPRI for releases associated with a concrete crushing plant. None of the transient construction sites intended to be addressed through this sector report to NPRI. A review of the NPRI database provides similar results with reporting facilities related to aggregate processing, paving, highway and road construction and maintenance and building material warehousing. No construction sites report under NPRI. The reports for facilities that do report to NPRI indicate that releases are related to carbon monoxide, particulate matter and occasionally VOCs. These releases are consistent with those reported for the Toronto facility. A review of emission factors for the Construction Sector did not identify comprehensive factors covering the various types of activities represented through this sector. Therefore the total estimate for the Construction Sector was extrapolated from the reported data and employment estimates.

Dry Cleaners

Most dry cleaning operations in Toronto use tetrachloroethylene, a chlorinated solvent that is also known as perchloroethylene or perc. Petroleum solvents which can be used by dry cleaners are generally limited to large operations, because the flammable solvent must be stored underground.

In Ontario, operators of dry cleaning facilities are required by Ontario Regulation 323/94 to be trained in the effective environmental controls associated with dry cleaning equipment. The Ministry of the Environment (MOE) monitors the curriculum of the training courses [personal communication with Steven Neville, MOE], which are provided by colleges. Each facility must have a trained person on staff.

US EPA emission factors [US EPA, 1981] are provided based on the quantity of clothing processed or a per capita basis (i.e., population of Toronto). To estimate the quantity of clothing processed in a typical commercial operation, the following assumptions were made:

- Commercial operations typically have a single washer with a capacity of 14 kg to 27 kg. A 20-kg unit was assumed.
- It was assumed that facilities typically process 4 loads daily, 6 days per week. Therefore, 25,000 kg of clothing is processed per year (i.e., 4 loads x 20 kg/load x 312 days/year).
- Because Ontario operations are under the supervision of trained staff, and equipment improvements have likely been implemented since 1981, it was assumed that emission factors associated with well-controlled systems would apply.
- Where a range of emission rates was provided, the lowest value was used to reflect improved controls since 1981.
- The emission rate is 2.8 kg of solvent per 100 kg of clothing.

Using this emission rate, the estimated emissions for a single commercial dry cleaning facility in Toronto are 700 kg or 0.7 tonne (i.e., 2.8 kg perc/100 kg clothing x 25,000 kg clothing total). This is consistent with the findings of the US EPA, as stated in the AP 42 document, that typical

commercial operations emit less than 1 tonne of solvent per year. Based on the reported 320 dry cleaners operating in Toronto, this would be equivalent to 224 tonnes of VOCs emitted annually.

The US EPA AP 42 emission factor on a per capita basis is 0.6 kg of solvent per year [US EPA, 1981]. Toronto's population in 2001 was approximately 2.5 million, resulting in an estimate of 1,500 tonnes of VOCs emitted from dry cleaners annually. This is likely an over estimate, reflected of emission controls and solvent use in 1981, when the emission factor was calculated.

Auto Body Shops

The paints used in auto body shops contain VOCs, which are emitted when the paint is applied to a car or part. Based on 1991 data, the US EPA estimated that 2.3 tonnes of solvent are emitted annually per employee in a typical operation [US EPA, 1982]. Based on the TBD2005, there are 675 automotive repair operations in Toronto. These include muffler, transmission, glass and other repair facilities. As an estimate, it is assumed that 50% of the facilities conduct auto body repairs. Assuming an average of 3 employees per facility, approximately 1,000 employees work in this Sector in Toronto. Therefore the total emissions for Toronto are estimated to be 2,300 tonnes per year.

Consultations with the MOE and industry representatives [personal communication with Sarah Paul, MOE and John Norris, Collision Industry Action Group] indicated that emissions from auto body shops had been reduced significantly (estimated 60%) in the past decade, through product formulation and application methods. Environment Canada has proposed further reductions in the concentrations of VOCs in coating products by 2009 [Environment Canada, 2006].

If we assume emissions have decreased by 50% since the US emission factor was calculated in 1991, the total emissions from this sector would be 1,150 tonnes per year.

Funeral Services

The air monitoring conducted at the St. John's Norway Crematorium [Senes, 2000] indicated that these facilities are associated with low emissions of lead, mercury, zinc, particulate matter and dioxins and furans. The Senes report provides emission rates on an hourly basis. Assuming operations occur 8 hours per day, 5 days per week, for 50 weeks per year, this is equivalent to 2,000 hours per year.

Using this conversion factor, annual emissions would be as follows:

Lead	0.15 kg or 0.00015 tonne
Mercury	0.56 kg or 0.00056 tonne
Zinc	3.6 kg or 0.0036 tonne
Particulate Matter (PM10)	46 kg or 0.046 tonne
Dioxin/Furan	2.6×10^{-6} kg or 2.6×10^{-9} tonne

The TBD2005 identified 68 funeral operations in the City, of which only a small portion would have crematoria. For estimation purposes, it is assumed that 30% of the facilities or 20 operations provide cremation services.

Calculating The Use of Substances of concern

To calculate the quantity of substances of concern used by Toronto sectors, the NAICS code used by the NPRI system was converted to an SIC code using http://www.loglink.com/sic.asp, as recommended through the TURA website [TURA, 2007].

Information from the TURA database was retrieved based on the first two digits of the SIC code and it was confirmed that these SIC codes were similar to the representative sector identified in Table 1 of this report. In addition, it was confirmed that industries reporting in Massachusetts were similar to Toronto industries (i.e., ammunition manufacturing was not included in the values under Other Manufacturing).

The TURA data was searched by company, to identify substances of concern reported and where the substances corresponded to substances reported for the same sector through NPRI, the data was included in the reported quantities.

The data for substance under each sector was added and transferred to a summary table as presented in Appendix E of this report.

References

City of Toronto, Toronto Business Directory. Economic Research, Economic Development, City of Toronto. 2005.

Environment Canada, *Benzene in Canadian Gasoline: Report on the Effect of the Benzene in Gasoline Regulations, 2004*. November 2005.

Environment Canada, *Discussion Paper for the Development of Regulations Limiting Volatile Organic Compounds in Automotive Refinish Coatings*. May 2006.

Personal communication with Steven Neville, Ministry of the Environment, December 11, 2006.

Personal communication with Sarah Paul, Ministry of the Environment, December 14, 2006

Personal communication with John Norris, Collision Industry Action Group, December 18, 2006

Senes Consultants Limited, *Report on Ambient Air Monitoring and Source Testing at the St. John's Norway Crematorium*, prepared for City of Toronto Public Health Department. June 2000.

Statistics Canada, http://www12.statcan.ca/english/census01/products/standard/popdwell/Table-UR-D.cfm?T=1&PR=35&SR=26&S=1&O=A. January 2007.

TURA, http://www.turi.org/content/content/view/full/2757/, January 2007.

US EPA, *AP 42, Volume 1, 5th Edition, Chapter 4:Evaporation Loss Sources, Chapter 4.1 Dry Cleaning*, April 1981, obtained at http://www.epa.gov/ttn/chief/ap42/ch04/final/c4s01.pdf. January 2007.

US EPA, *AP 42, Volume 1, 5th Edition, Chapter 4:Evaporation Loss Sources, Chapter 4.2.2.8 Automobile and Light Truck Surface Coating Operations*, August 1982, obtained at http://www.epa.gov/ttn/chief/ap42/ch04/final/c4s02_2h.pdf. January 2007.

US EPA, *AP 42, Volume 1, 5th Edition, Chapter 5: Petroleum Industry Final Section*, January 1995, obtained at http://www.epa.gov/ttn/chief/ap42/ch05/final/c05s02.pdf. January 2007.

APPENDIX D

Reporting Systems

United States and New York State Toxic Release Inventory (TRI)

Through the Emergency Planning and Community Right-to-Know Act (EPCRA), the US Congress mandated that a Toxic Release Inventory (TRI) be made public. Section 313 of EPCRA requires companies to report on more than 650 designated substances that are manufactured or used, and the annual amount of the substances released to the air, water, and land and otherwise managed in on- and off-site waste management facilities. Facilities are also required to report on pollution prevention activities and chemical recycling. TRI reports are filed every year with the U.S. Environmental Protection Agency and the individual states, such as the New York State Department of Environmental Conservation. Annual TRI reports are published and the data is made available to the public through a computer database [New York Toxic Release Inventory, 2007].

Facilities report the amounts of substances of concern released on-site, the amount of substances of concern transferred off-site, production-related waste management information, and facility and substance identification. The facility must also report on the type of operations that use the substances of concern and source reduction activities conducted over the year.

The reporting requirements are standard across the various states, with facilities in designated Standard Industrial Classification (SIC) code groups and the equivalent of 10 full-time employees that manufacture or process more than 25,000 pounds (11 tonnes) or otherwise uses more than 10,000 pounds (4.5 tonnes) of a listed toxic substance during the course of the calendar year are required to submit a report. As with the National Pollutant Release Inventory (NPRI) in Canada, certain companies are exempt.

A search of the database (most recent year available was 2004) can be made based on geographical location, substance type or industry type. Information available includes on-site disposal and release data and off-site disposal and release data.

City of Eugene Oregon – Toxics Right-to-Know Program

In 1996, the City of Eugene (population 140,000) in the state of Oregon established a Toxics Right-to-Know program, which requires manufacturers to report their inputs and outputs for approximately 1,300 hazardous materials. All the reports generated by Eugene businesses are available to the public at the Eugene Public Library and on the City's website.

The Eugene program requires that companies include the substances shipped off site as product in their estimates, which accounts for almost half of the total reported. The exhaustive list of substances is included in the Toxics Right-to-Know website [City of Eugene, 2007]. As with NPRI and TRI, the employee threshold is 10 full-time employees but the quantity threshold is much lower, at approximately 1 tonne per year.

Fifty-four manufacturers had to report for 2004. State and federal facilities and public educational institutions are exempted. Currently, non-manufacturing facilities such as gas stations, auto repair shops, photo processors, and dry cleaners are not required to report.

Facilities must report the inputs and outputs, by type, of each chemical, such that total inputs and outputs for each chemical are equal within the smallest accounting unit. The information is available (to 2005) and is easily searched on-line.

Responsible Care

Responsible Care is the chemical industry's global voluntary initiative under which companies, through their national associations, seek to improve their health, safety and environmental performance, and communicate with stakeholders about the manufacture and supply of their products and processes.

Associations sign up to the initiative through the International Council of Chemical Associations (ICCA), which acts as the 'guardian' of Responsible Care, monitoring its implementation and ensuring it evolves to address current concerns and issues. Each association runs its own national program with their member companies. Through the sharing of information and a system of checklists, performance indicators and verification procedures, Responsible Care enables the industry to demonstrate how its health, safety and environmental performance has improved over the years, and to develop policies for further improvement.

Responsible Care requires companies to be open and transparent with their stakeholders, which includes local communities and authorities, environmental groups, the media, and the general public.

In Toronto, Responsible Care industries comply with NPRI and extend this compliance through public outreach programs in their communities. The extent of public outreach varies with the member companies.

City of Toronto Sewer Use Bylaw

The Sewer Use By-law sets standards for sewer discharges for 11 heavy metals and for 27 toxic organic compounds such as PCBs, pesticides, nonylphenols and nonylphenol ethoxylates. A vast cross-section of Toronto operations, including manufacturing, gas stations, auto repair facilities, photo-finishing operations, laboratories and dry cleaning operations, are subject to the bylaw. Most industry sectors that discharge any amount of a subject pollutant must prepare a Pollution Prevention Program (P2 Plans) and submit a summary to the City. The plan must identify a description of the process, list of subject pollutants, quantities and concentrations released to sewer and ways to avoid, reduce or eliminate pollutants at source. Petroleum facilities, automotive repair or vehicle wash operations can adopt Best Management Practices (BMPs) instead of submitting P2 plans.

Subject sector industry and subject pollutants are listed in Appendix 1 and 2 in Chapter 681 of the Municipal Code at: http://www.toronto.ca/legdocs/municode/1184_681.pdf

Certificates of Approval

Certificates of Approval are required for facilities that release emissions to the atmosphere, discharge contaminants to ground and surface water, provide potable water supplies, or store, transport, process or dispose of waste.

Certificates of Approval are documents prepared by Ministry of the Environment staff that permit various activities to proceed in compliance with the legislation. The Certificates of Approval address the site specific considerations relevant to the activity, provide enforceable requirements that ensure protection of human health and the natural environment, comply with legislation and policy guidelines, and acknowledge issues that fall within the mandate of the Ministry. Part of the evaluation process includes an opportunity for public participation in the decision making process. The Environmental Bill of Rights sets out rules for different types of applications and explains how Ontario residents may provide comments on the proposal.

The Certificate of Approval can be obtained from the Ministry of the Environment through a Freedom of Information request, however, the application document, which outlines the anticipated maximum emissions and which controls may be implemented is not available to the public.

Canadian Environmental Protection Act Environmental Registry – E2 (Environmental Emergency Planning)

The Environmental Emergency Regulations under the *Canadian Environmental Protection Act* (CEPA) ensures that industrial facilities using dangerous substances have emergency plans in place to prevent accidents, and respond quickly and effectively to protect the environment and human health in the event of an accident, vandalism or terrorist attack. They require persons who own or manage specified toxic and hazardous substances at or above the specified thresholds to provide required information on the substance(s), their quantities and to prepare and implement environmental emergency plans.

Environment Canada also maintains a search tool to sort the E2 database by facility name or location [Environment Canada, November 2006b]. The database provides the name, location, latitude and longitude of 30 companies in Toronto that report under E2 Planning.

Other Environmental Information Sources

Private and public databases also exist which can provide some environmental information for some sectors. Four of these known to the project team and considered in this report were the Hazardous Waste Information Network (HWIN); the database of spill and occurrences as documented by the Ministry of the Environment, records of private and retail fuel storage tanks, as documented by the Technical Standards and Safety Authority (TSSA) and provincial and federal inventories of PCB materials. Each of these databases can be obtained on a site-by-site basis through a private database supplier such as EcoLog Eris (http://www.ecologeris.com).

HWIN registers generators of hazardous waste and the database of these waste generators can be searched on-line at www.hwin.ca. Based on a company name or generator registration number, the types of hazardous wastes generated at the facility can be identified. The public database does not include quantities of wastes.

The Ministry of the Environment documents reported spills and releases of contaminants to the environment, and where available will record the action taken to clean up the spill. A summary of spills and occurrences as documented by the Spills Action Centre is available on-line in an annual report [Spills Action Centre, January, 2007].

The TSSA documents the locations of fuel tanks (above ground and underground) at private and retail fuelling stations. Documentation can be obtained upon request, based on address, at a nominal cost [TSSA, January, 2007].

Both the provincial and federal governments maintain inventories of the storage of PCB waste. The inventories identify location, quantity and type of material stored at the location. The federal inventory can be accessed in an annual on-line report [Environment Canada, March 2007]. The provincial database is not available on-line, but can reportedly be purchased on a CD ROM [Toronto Public Health, March 2007].

Each of these databases provided limited data on the use, storage, release or transfer of substances of concern in Toronto. The information is not compiled, nor easily accessible to the public.

References

New York State Toxic Release Inventory, New York State Department of Environmental Conservation. http://www.dec.state.ny.us/website/der/tri/index.html, January 2007.

Canadian Environmental Law Association. *Creating Community Right-to-Know Opportunities in the City of Toronto*. Toronto Public Health. January 2006.

CEPA, http://www.ec.gc.ca/CEPARegistry/plans/E2.cfm, January, 2007.

CEPA, http://www.ec.gc.ca/CEPARegistry/documents/regs/e2_rationale/preface.cfm, January 2007

CEPA, http://www.ec.gc.ca/CEPARegistry/participation/archives/EE_Guide_e.pdf, January, 2007.

City of Eugene website. http://www.eugene-or.gov/portal/server.pt, January 2007.

City of Eugene. *Hazardous Substance Tracking Instructions, City of Eugene Toxics Right-to-Know Program*. Undated.

City of Toronto, http://wx.toronto.ca/inter/it/newsrel.nsf/0/66900cc3261487f785256df60046324b?OpenDocument , January, 2007.

City of Toronto, http://www.toronto.ca/water/protecting_quality/pollution_prevention/index.htm, January, 2007.

City of Toronto Sewer Use Bylaw: Pollution Prevention Plan Brochure, http://www.toronto.ca/water/protecting_quality/pollution_prevention/pdf/brochures/brochure_ppp.pdf, undated.

Environment Canada, http://www.ec.gc.ca/CEPARegistry/subs_list/ToxicList.cfm, November 2006a.

Environment Canada, https://cepae2-lcpeue.ec.gc.ca/cepae2.cfm?screen=Site/Reports&ReportID=4&Language=en&Token=Public, November 2006b.

Environment Canada, http://www.ec.gc.ca/wmd-dgd/13426772-84E5-41FF-8C87-955FF499F068/NI2005_e.pdf, March, 2007.

Responsible Care, http://www.responsiblecare.org/, November, 2006.

Responsible Care, http://www.ccpa.ca/ResponsibleCare/. November, 2006.

Responsible Care, http://www.ccpa.ca/ResponsibleCare/verification.aspx, November, 2006.

Ministry of the Environment. Green Facts, Environmental Approvals in Ontario. http://www.ene.gov.on.ca/cons/3445e01.pdf, January, 2007.

Spills Action Centre, http://www.ene.gov.on.ca/programs/6039e.pdf, January, 2007.

Toronto Public Health, http://www.toronto.ca/health/hphe/pcbs_index.htm, March, 2007.

TSSA, http://www.tssa.org/public/contact.asp, January, 2007.

United States Environmental Protection Agency. *How to Revise TRI Data*. http://www.epa.gov/triinter/guide_docs/2002/revise.pdf, January, 2007.

United States Environmental Protection Agency. *The Emergency Planning and Community Right-to-Know Act, Section 313 Releases and Other Waste Management Reporting Requirements*. http://www.epa.gov/triinter/guide_docs/2001/brochure2000.pdf, January, 2007.

APPENDIX E

Summary of Reported Quantities of Substances of Concern

Table 1
Emissions for Food and Beverage Industries: Summary

Substances of Concern Release and Transfer Reporting Project

City of Toronto

On-site Releases:

	Volatile Organic Compounds (VOCs)	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	PM - Total Particulate Matter	PM10 - Particulate Matter <= 10 Microns	Ammonia (Total)	PM2.5 - Particulate Matter <= 2.5 Microns	Sulphur dioxide	Nitric acid	Phosphorus (total)	Cadmium (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	-	-	*1*
Compound Total	646.378	220.931	101.545	65.853	47.099	45.941	16.667	0.683	0.088	0.001	0.000058
Compound % of Industry Total	56.44%	19.29%	8.87%	5.75%	4.11%	4.01%	1.46%	0.06%	0.01%	0.00%	0.00%

On-site Disposal:

None reported

Off-site Transfers:

	Nickel (and its compounds)	Nitrate ion in solution at pH >= 6.0	Nitric acid	Phosphorus (total)
	tonnes	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-
Compound Total	61.121	60.535	17	0.31
Compound % of Industry Total	43.98%	43.56%	12.23%	0.22%

On-site Air Releases:

	Volatile Organic Compounds (VOCs)	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	PM - Total Particulate Matter	PM10 - Particulate Matter <= 10 Microns	Ammonia (Total)	PM2.5 - Particulate Matter <= 2.5 Microns	Sulphur dioxide	Nitric acid	Phosphorus (total)
	tonnes	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	-	-	-	-
Compound Total	646.378	220.931	101.545	65.853	47.099	45.941	16.667	0.683	0.088	0.001
Compound % of Industry Total	56.44%	19.29%	8.87%	5.75%	4.11%	4.01%	1.46%	0.06%	0.007684%	0.000087%

Companies: **28**

Use (as reported through TURA)

	Nitric acid	VOC	Ammonia
	tonnes	*tonnes*	*tonnes*
BoH Priority Category*	-	*2,3*	*2,3*
Compound Total	84.83	39.22	19.53
Compound % of Industry Total	59.08%	27.32%	13.60%

Companies: **21**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quantity.
Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies as reported through NPRI.

Table 2

Emissions for Clothing Manufacturing: Summary

Substances of Concern Release and Transfer Reporting Project
City of Toronto

No Reported Data Available for This Sector

Table 3
Emissions for Printing Industries: Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Volatile Organic Compounds (VOCs)	n-Butyl alcohol	Ethylbenzene	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	Ethylene glycol	Phenol (and its salts)	PM2.5 - Particulate Matter <= 2.5	PM10 - Particulate Matter <= 10	Naphthalene	Methyl methacrylate	i-Butyl alcohol	Lead (and its compounds)	Cumene	Sulphur dioxide	Cobalt (and its compounds)	Nitric acid
	tonnes	*tonnes*	*tonnes*			*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*		*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	-	-	*2,3*	*2,3*	-	-	-	*2,3*	-	-	-	*2*	-	*2,3*	-	-
Compound Total	2386.964	4.537	3.55	3.326	2.8	2.06	1.2	1.125	0.716	0.463	0.358	0.196	0.11	0.033	0.02	0.012	0
Compound % of Industry Total	99.148%	0.188%	0.147%	0.138%	0.116%	0.086%	0.050%	0.047%	0.030%	0.019%	0.015%	0.008%	0.0046%	0.0014%	0.0008%	0.0005%	0.00%

On-site Disposal:

None reported

Off-site Transfers:

	Toluene	Methyl ethyl ketone	Methyl isobutyl ketone	Xylene (all isomers)	Isopropyl alcohol	Methanol	i-Butyl alcohol	Hexavalent chromium compounds	Lead (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes (kg)*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	-	*1*	*2*
Compound Total	793.557	42.104	22.131	13.711	4.933	0.916	0.04	0.035	0.031
Compound % of Industry Total	90.438%	4.798%	2.522%	1.563%	0.562%	0.104%	0.005%	0.004%	0.004%

On-site Air Releases:

	Volatile Organic Compounds (VOCs)	n-Butyl alcohol	Ethylbenzene	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	Ethylene glycol	Phenol (and its salts)	PM2.5 - Particulate Matter <= 2.5 Microns	PM10 - Particulate Matter <= 10 Microns	Naphthalene	Methyl methacrylate	i-Butyl alcohol	Lead (and its compounds)	Cumene	Sulphur dioxide	Cobalt (and its compounds)
	tonnes	*tonnes*	*tonnes*	*0*	*0*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*		*tonnes*
BoH Priority Category*	*2,3*	-	*0*	*0*	*0*	-	*0*	*3*	*3*		-	-	*2*			-
Compound Total	2386.964	4.537	3.55	3.326	2.8	2.06	1.2	1.125	0.716	0.463	0.358	0.196	0.11	0.033	0.02	0.012
Compound % of Industry Total	99.148%	0.188%	0.147%	0.138%	0.116%	0.086%	0.050%	0.047%	0.030%	0.019%	0.015%	0.008%	0.005%	0.001%	0.001%	0.000%

Companies: **21**

	Ethylene Glycol	Lead (and its compounds)
	tonnes	*tonnes*
BoH Priority Category*	-	*2*
Compound Total	22.25	2.54
Compound % of Industry Total	89.75%	10.25%

Companies: **6**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quantity.
Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies as

Table 4
Emissions for Chemical Industries:
Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Volatile Organic Compounds (VOCs)	Carbon monoxide	Oxides of nitrogen (expressed as NO2)	HCFC-142b	PM10 - Particulate Matter <= 10 Microns	PM - Total Particulate Matter	Dichloromethane	PM2.5 - Particulate Matter <= 2.5 Microns	Nonylphenol and its ethoxylates	Sodium nitrite	Methyl methacrylate	HCFC-22	Diethanolamine (and its salts)	Acetonitrile
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	-	*2,3*	*tonnes*	*2,3*	*2,3*	-	-	-	-	-	-
Compound Total	2958.509	380.089	319.863	201.042	87.026	81.275	67.04	61.55	17.717	16.357	15.969	12.183	11.935	10.3
Compound % of Industry Total	69.06%	8.87%	7.47%	4.69%	2.03%	1.90%	1.56%	1.44%	0.41%	0.38%	0.37%	0.28%	0.28%	0.24%

On-site Disposal:

	Butyl benzyl phthalate	Lead (and its compounds)
	tonnes	*tonnes (kg)*
BoH Priority Category*	-	-
Compound Total	10.115	0
Compound % of Industry Total	100.00%	0.00%

Off-site Transfers:

	Sulphuric acid	Xylene (all isomers)	Zinc (and its compounds)	Methanol	Bis (2-ethylhexyl) adipate	Ethylbenzene	Toluene	Methylenebis (phenylisocyanate)	Asbestos (friable form)	Lead (and its compounds)	Methyl ethyl ketone	Isopropyl alcohol	Ammonia (Total)	Butyl benzyl phthalate
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	*2,3*	-	*2,3*	-	-	*2,3*	-	*1*	*2*	*2,3*	*2,3*	*2,3*	-
Compound Total	9552	683.341	343.079	218.918	103.31	94.387	89.457	59.885	46.4	39.769627	32.988	31.609	26.855	20.23
Compound % of Industry Total	83.56%	5.98%	3.00%	1.92%	0.90%	0.83%	0.78%	0.52%	0.41%	0.35%	0.29%	0.28%	0.23%	0.18%

On-site Air Releases:

	Volatile Organic Compounds (VOCs)	Carbon monoxide	Oxides of nitrogen (expressed as NO2)	HCFC-142b	PM10 - Particulate Matter <= 10 Microns	PM - Total Particulate Matter	Dichloromethane	PM2.5 - Particulate Matter <= 2.5 Microns	Nonylphenol and its ethoxylates	Sodium nitrite	Methyl methacrylate	HCFC-22	Diethanolamine (and its salts)	Acetonitrile
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*3*	*3*	-	*3*	*3*	*2,3*	*3*	-	-	-	-	-	-
Compound Total	2958.509	380.089	319.863	201.042	87.026	81.275	66.94	61.55	17.628	16.357	15.968	12.183	11.934	10.3
Compound % of Industry Total	69.10%	8.88%	7.47%	4.70%	2.03%	1.90%	1.56%	1.44%	0.41%	0.38%	0.37%	0.28%	0.28%	0.24%

Companies: **93**

Use (as reported through TURA):

	Volatile Organic Compounds (VOCs)	Hydrochloric acid	Sulphuric acid	Toluenediisocyanate (mixed isomers)	N-Methyl-2-pyrrolidone	Butyl acrylate	Ammonia (Total)	Dichloromethane	Antimony (and its compounds)	Ethylene glycol	Nitric acid	Ethyl acrylate	Zinc (and its compounds)	Lead (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	-	-	-	-	-	-	-	-	-	-	-	-	-
Compound Total	124396.0168	11995.28476	3140.799051	2875.783469	1964.825704	1782.836354	1558.236203	1517.697054	1328.870265	1322.797821	1029.708615	795.9191515	782.9043398	745.4685886
Compound % of Industry Total	79.26%	7.64%	2.00%	1.83%	1.25%	1.14%	0.99%	0.97%	0.85%	0.84%	0.66%	0.51%	0.50%	0.48%

Companies: **119**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quanti
Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies

Table 4
Emissions for Chemical Industries:
Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Sulphur dioxide	n-Butyl alcohol	N-Methyl-2-pyrrolidone	Ethylbenzene	2,6-Di-t-butyl-4-methylphenol	Hydrochloric acid	Zinc (and its compounds)	Ethylene glycol	HCFC-141b	Bis(2-ethylhexyl) adipate	2-Mercaptobenzothiazole	Cyanides (ionic)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	-	-	-	-	-	-	-	-	-	-	-
Compound Total	8.716	7.982	7.83	2.934	2.055	1.99208	1.96662	1.823	1.518	1.346	0.820681	0.7
Compound % of Industry Total	0.20%	0.19%	0.18%	0.07%	0.05%	0.05%	0.05%	0.04%	0.04%	0.03%	0.02%	0.02%

On-site Disposal:

BoH Priority Category*
Compound Total
Compound % of Industry Total

Off-site Transfers:

	1,2,4-Trimethylbenzene	n-Butyl alcohol	Methyl isobutyl ketone	Ethylene glycol	Nonylphenol and its ethoxylates	Decabromodiphenyl oxide	Nickel (and its compounds)	Tetrachloroethylene	Antimony (and its compounds)	N-Methyl-2-pyrrolidone	2-Butoxyethanol	Dichloromethane
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	-	*2,3*	-	-	-	-	*1*	-	-	*2,3*	-
Compound Total	15.353	8.03	7.858	7.429	6.133	5.795	5.067	4.439	4.306	3.17	3.162	2.8
Compound % of Industry Total	0.13%	0.07%	0.07%	0.06%	0.05%	0.05%	0.04%	0.04%	0.04%	0.03%	0.03%	0.02%

On-site Air Releases:

	Sulphur dioxide	n-Butyl alcohol	N-Methyl-2-pyrrolidone	Ethylbenzene	2,6-Di-t-butyl-4-methylphenol	Hydrochloric acid	Ethylene glycol	Zinc (and its compounds)	HCFC-141b	Bis(2-ethylhexyl) adipate	Naphthalene	Triethylamine
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*3*	-	-	*2,3*	-	-	-	-	-	-	*1*	-
Compound Total	8.716	7.936	7.83	2.923	2.055	1.879	1.82	1.652	1.518	1.339	0.629	0.342
Compound % of Industry Total	0.20%	0.19%	0.18%	0.07%	0.05%	0.04%	0.04%	0.04%	0.04%	0.03%	0.01%	0.01%

Companies: **93**

Use (as reported through TURA):

	Sodium nitrite	Decabromodiphenyl oxide	Manganese (and its compounds)	Phthalic anhydride	Triethylamine	Ethylbenzene	Trichloroethylene	Acrylonitrile	Tetrachloroethylene	Nickel (and its compounds)	Phenol (and its salts)	Benzoyl peroxide
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-	-	-	-	-	-	-	-	-
Compound Total	409.6748205	318.7590195	314.0542045	160.8081117	120.3733599	90.79562824	86.31166156	42.67726686	35.27157883	31.82840005	24.93530715	22.31313137
Compound % of Industry Total	0.26%	0.20%	0.20%	0.10%	0.08%	0.06%	0.05%	0.03%	0.02%	0.02%	0.02%	0.01%

Companies: **119**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 4
Emissions for Chemical Industries:
Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Naphthalene	Triethylamine	Cumene	Ammonia (Total)	Trichloroethylene	Tetrachloroethylene	Butyl acrylate	Octylphenol and its ethoxylates	Nitrilotriacetic acid (and its salts)	Sulphuric acid	Lead (and its compounds)	p,p'-Isopropylidenediphenol
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*
BoH Priority Category*	-	-	-	*2,3*	*1*	*1*	-	-	-	-	*2*	-
Compound Total	0.629	0.342	0.341	0.329	0.319	0.302	0.198	0.1933	0.18	0.169	0.155558	0.119
Compound % of Industry Total	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.005%	0.005%	0.004%	0.004%	0.004%	0.003%

On-site Disposal:

BoH Priority Category*
Compound Total
Compound % of Industry Total

Off-site Transfers:

	Vinyl acetate	Acrylic acid (and its salts)	Trichloroethylene	n-Hexane	Formaldehyde	Chloroform	Naphthalene	Methyl methacrylate	Phenol (and its salts)	Octylphenol and its ethoxylates	p,p'-Isopropylidenediphenol	Cumene
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	-	*1*	*2,3*	*2,3*	-	-	-	-	-	-	-
Compound Total	2.786	2.197	1.919	1.35	1.249	1.2	0.694	0.674	0.602	0.537	0.487	0.367
Compound % of Industry Total	0.02%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.005%	0.004%	0.003%

On-site Air Releases:

	Cumene	Ammonia (Total)	Tetrachloroethylene	Trichloroethylene	Butyl acrylate	Lead (and its compounds)	Sulphuric acid	p,p'-Isopropylidenediphenol	Methylenebis (phenylisocyanate)	Acrylonitrile	Toluenediisocyanate (mixed isomers)	Copper (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	*3*	*1*	*1*	-	*2*	-	-	-	*2,3*	-	-
Compound Total	0.341	0.329	0.245	0.225	0.196	0.155558	0.138	0.119	0.117	0.114	0.063	0.042
Compound % of Industry Total	0.01%	0.01%	0.01%	0.01%	0.005%	0.004%	0.003%	0.003%	0.003%	0.003%	0.001%	0.001%

Companies: **93**

Use (as reported through TURA):

	n-Butyl alcohol	Butyl benzyl phthalate	Hydrogen fluoride	Diethanolamine (and its salts)
	tonnes	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-
Compound Total	17.38498647	15.13148215	12.42706427	3.139733803
Compound % of Industry Total	0.01%	0.01%	0.01%	0.002%

Companies: **119**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 4
Emissions for Chemical Industries:
Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Methylenebis (phenylisocyanate)	Acrylonitrile	Toluenediisocyanate (mixed isomers)	Copper (and its compounds)	Ethyl acrylate	Nitric acid	Hexavalent chromium compounds	Phosphorus (total)	Phthalic anhydride	Acrylic acid (and its salts)	Polymeric diphenylmethane diisocyanate	C.I. Basic Green 4	1,1-Methylenebis (4-isocyanatocyclohexane)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-	-	-	*1*	-	-	-	-	-	-
Compound Total	0.118	0.114	0.063	0.042	0.034	0.02	0.007977	0.007	0.007	0.005	0.002	0.0015464	0.001
Compound % of Industry Total	0.003%	0.003%	0.001%	0.001%	0.001%	0.0005%	0.0002%	0.0002%	0.0002%	0.0001%	0.00005%	0.00004%	0.00002%

On-site Disposal:

BoH Priority Category*
Compound Total
Compound % of Industry Total

Off-site Transfers:

	Benzoyl peroxide	Arsenic (and its compounds)	Diphenylamine	Phosphorus (total)	Butyl acrylate	Hexavalent chromium compounds	Hydrogen fluoride	Styrene	Mercury (and its compounds)	Ethyl acrylate	Acrylonitrile	Sodium nitrite	Manganese (and its compounds)
	tonnes	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-	-	*1*	-	*2,3*	*2*	-	-	-	-
Compound Total	0.355	0.163	0.146	0.093	0.08	0.073263	0.054	0.042	0.03288	0.024	0.022	0.021	0.013
Compound % of Industry Total	0.003%	0.001%	0.001%	0.001%	0.001%	0.0006%	0.0005%	0.0004%	0.0003%	0.0002%	0.0002%	0.0002%	0.0001%

On-site Air Releases:

	Nitric acid	Hexavalent chromium compounds	Ethyl acrylate	Phosphorus (total)	Phthalic anhydride	Acrylic acid (and its salts)	Antimony (and its compounds)	Decabromodiphenyl oxide	Hydrogen fluoride
	tonnes	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-	-	-			-
Compound Total	0.02	0.007977	0.034	0.007	0.007	0.004	0.001	0.001	0.001
Compound % of Industry Total	0.0005%	0.0002%	0.0008%	0.0002%	0.0002%	0.0001%	0.00002%	0.00002%	0.00002%

Companies: **93**

Use (as reported through TURA):

BoH Priority Category*
Compound Total
Compound % of Industry Total

Companies: **119**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 4
Emissions for Chemical Industries:
Summary
Substances of Concern Release and
Transfer Reporting Project
City of Toronto

On-site Releases:

	Antimony (and its compounds)	Butyl benzyl phthalate	Decabromodiphenyl oxide	Hydrogen fluoride	Isophorone diisocyanate	Methyl acrylate
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-	-	-
Compound Total	0.001	0.001	0.001	0.001	0.001	0.001
Compound % of Industry Total	0.00002%	0.00002%	0.00002%	0.00002%	0.00002%	0.00002%

On-site Disposal:

BoH Priority Category*
Compound Total
Compound % of Industry Total

Off-site Transfers:

	Methyl acrylate	Dibutyl phthalate	Acrylamide
	tonnes	*tonnes*	*tonnes*
BoH Priority Category*	-	*2,3*	-
Compound Total	0.004	0.002	0.001
Compound % of Industry Total	0.00003%	0.00002%	0.00001%

On-site Air Releases:

BoH Priority Category*
Compound Total
Compound % of Industry Total

Companies: **93**

Use (as reported through TURA):

BoH Priority Category*
Compound Total
Compound % of Industry Total

Companies: **119**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 5
Emissions for Wood Industries:
Summary

Substances of Concern Release and Transfer Reporting Project

City of Toronto

On-site Releases:

	Volatile Organic Compounds (VOCs)	Oxides of nitrogen (expressed as NO2)	PM2.5 - Particulate Matter <= 2.5 Microns	PM10 - Particulate Matter <= 10 Microns	i-Butyl alcohol	Phosphorus (total)	Cadmium (and its compounds)	Manganese (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	-	-	*1*	-
Compound Total	390.987	39.862	21.387	21.5	12.818	0.062	0.003973	0.001
Compound % of Industry Total	80.35%	8.19%	4.40%	4.42%	2.63%	0.01%	0.00%	0.00%

On-site Disposal:

None reported

Off-site Transfers:

	Manganese (and its compounds)	Toluene	Methyl ethyl ketone	Phosphorus (total)	Chromium (and its compounds)	Copper (and its compounds)	Xylene (all isomers)	Methanol	i-Butyl alcohol
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	*2,3*	*2,3*	-	*1*	-	*2,3*	*2,3*	-
Compound Total	24.169	22.375	18.744	7.211	0.868	0.836	0.194	0.167	0.129
Compound % of Industry Total	32.36%	29.96%	25.09%	9.65%	1.16%	1.12%	0.26%	0.22%	0.17%

On-site Air Releases:

	Volatile Organic Compounds (VOCs)	Oxides of nitrogen (expressed as NO2)	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns	i-Butyl alcohol	Cadmium (and its compounds)	Manganese (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*
BoH Priority Category*	*2,3*	*3*	*3*	*3*	*2,3*	*1*	-
Compound Total	390.987	39.862	21.5	21.387	12.818	0.003973	0.001
Compound % of Industry Total	80.36%	8.19%	4.42%	4.40%	2.63%	0.001%	0.0002%

Companies: **12**

Use (as reported through TURA):

	Copper (and its compounds)	Volatile Organic Compounds (VOCs)	i-Butyl alcohol	n-Butyl alcohol
	tonnes	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	*2,3*	-	-
Compound Total	597.5492153	38.54848952	17.00512565	8.671641114
Compound % of Industry Total	90.29%	5.83%	2.57%	1.31%

Companies: **8**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quantity.

Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies as reported through NPRI.

Table 6
Emissions for Other Manufacturing Industries: Summary

Substances of Concern Release and Transfer Reporting Project

City of Toronto

On-site Releases:

	Volatile Organic Compounds (VOCs)	Oxides of nitrogen (expressed as NO2)	PM - Total Particulate Matter	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns	Sulphur dioxide	Carbon monoxide	Ammonia (Total)	Aluminum (fume or dust)	n-Butyl alcohol	Phenol (and its salts)	Ethylbenzene	Zinc (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	-	-	-	-	-
Compound Total	2201.386	896.642	567.213	514.601	433.476	307.891	234.078	63.091	50.749	39.331	12.637	9.401	4.071
Compound % of Industry Total	41.16%	16.77%	10.61%	9.62%	8.11%	5.76%	4.38%	1.18%	0.95%	0.74%	0.24%	0.18%	0.08%

On-site Disposal:

None reported

Off-site Transfers:

	Zinc (and its compounds)	Copper (and its compounds)	Aluminum (fume or dust)	Manganese (and its compounds)	Sulphuric acid	Chromium (and its compounds)	Nickel (and its compounds)	Xylene (all isomers)	Lead (and its compounds)	Hydrochloric acid	Nitrate ion in solution at pH >= 6.0	Ammonia (Total)	Phosphorus (total)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-	-	*1*	-	*2,3*	*2*	-	-	*2,3*	-
Compound Total	2800.344	1770.461	1546.234	727.537	454.27	339.453	150.194	135.243	108.634684	82.508	72.81	54.324	43.181
Compound % of Industry Total	32.93%	20.81%	18.17%	8.55%	5.34%	3.99%	1.77%	1.59%	1.28%	0.97%	0.86%	0.64%	0.51%

On-site Air Releases:

	Volatile Organic Compounds (VOCs)	Oxides of nitrogen (expressed as NO2)	PM - Total Particulate Matter	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns	Sulphur dioxide	Carbon monoxide	Ammonia (Total)	Aluminum (fume or dust)	n-Butyl alcohol	Phenol (and its salts)	Ethylbenzene	Hydrochloric acid
	tonnes	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	-	-	-	-	-	-
Compound Total	2201.386	896.642	567.213	514.601	433.476	307.891	234.078	62.351	50.698	39.331	12.637	9.401	3.436808
Compound % of Industry Total	41.19%	16.78%	10.61%	9.63%	8.11%	5.76%	4.38%	1.17%	0.95%	0.74%	0.24%	0.18%	0.06%

Companies: **115**

Use (as reported through TURA)

	Volatile Organic Compounds (VOCs)	Zinc (and its compounds)	Sulphuric acid	Lead (and its compounds)	Nickel (and its compounds)	Antimony (and its compounds)	Nitrate ion in solution at pH >= 6.0	Copper (and its compounds)	Ammonia (Total)	Nitric acid	Hydrochloric acid	Hydrogen fluoride	Phenol (and its salts)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	-	-	*2*	-	-	-	-	*2,3*	-	-	-	-
Compound Total	2500.012088	1798.298592	1725.626996	759.5401545	743.2166379	601.2796312	453.28436	408.9572031	399.8355484	388.9031797	346.5138574	136.7963803	87.9062415
Compound % of Industry Total	22.93%	16.49%	15.83%	6.97%	6.82%	5.51%	4.16%	3.75%	3.67%	3.57%	3.18%	1.25%	0.81%

Companies: **240**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quantity.
Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies as reported through NPRI.

Table 6
Emissions for Other Manufacturing Industries: Summary

Substances of Concern Release and Transfer Reporting Project

City of Toronto

On-site Releases:

	Hydrochloric acid	Nitric acid	Chromium (and its compounds)	Sulphuric acid	Copper (and its compounds)	Ethylene oxide	Bis(2-ethylhexyl) phthalate	Trichloroethylene	Nickel (and its compounds)	Methyl methacrylate	Manganese (and its compounds)	sec-Butyl alcohol	Hexavalent chromium compounds
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*
BoH Priority Category*	-	-	*1*	-	-	-	-	*1*	-	-	-	-	*1*
Compound Total	3.694808	2.963	1.149	1.143	0.97	0.63	0.44	0.4	0.394	0.358	0.286	0.25	0.149987
Compound % of Industry Total	0.07%	0.06%	0.02%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%	0.006694259%	0.005%	0.005%	0.003%

On-site Disposal:

Off-site Transfers:

	Nitric acid	Methyl ethyl ketone	Silver (and its compounds)	Isopropyl alcohol	Methanol	Toluene	2-Butoxyethanol	Antimony (and its compounds)	n-Butyl alcohol	Methyl isobutyl ketone	Decabromodiphenyl oxide	Hexavalent chromium compounds	Ethylbenzene
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*
BoH Priority Category*	-	*2,3*	-	*2,3*	*2,3*	*2,3*	*2,3*	-	-	*2,3*	-	*1*	-
Compound Total	40.655	38.04	32.717	24.072	23.212	22.031	7.316	7.016	5.927	4.978	4.16	3.027618	2.898
Compound % of Industry Total	0.48%	0.45%	0.38%	0.28%	0.27%	0.26%	0.09%	0.08%	0.070%	0.0585%	0.0489%	0.0356%	0.0341%

On-site Air Releases:

	Zinc (and its compounds)	Nitric acid	Chromium (and its compounds)	Sulphuric acid	Copper (and its compounds)	Ethylene oxide	Trichloroethylene	Methyl methacrylate	sec-Butyl alcohol	Nickel (and its compounds)	Manganese (and its compounds)	Hexavalent chromium compounds	Aluminum oxide (fibrous forms)
	tonnes	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes**	**tonnes (kg)**	*tonnes*
BoH Priority Category*		-	*1*	-	-	-	-	-	*1*	-	-	*4*	-
Compound Total	2.962	2.944	1.148	0.91	0.758	0.63	0.4	0.358	0.25	0.244	0.236	0.149987	0.143
Compound % of Industry Total	0.06%	0.06%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%

Companies: **115**

Use (as reported through TURA)

	Silver (and its compounds)	Decabromodiphenyl oxide	Chromium (and its compounds)	Ethylene oxide	Aluminum (fume or dust)	n-Butyl alcohol	Chlorine	sec-Butyl alcohol	Manganese (and its compounds)	Trichloroethylene	Cadmium (and its compounds)	Tetrachloroethylene	Hydrogen cyanide
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	*1*	-	-	*2,3*	-	-	-	*1*	*1*	*1*	-
Compound Total	86.9942053	80.17774199	74.24185793	67.05502132	63.6557312	49.10279643	28.13436678	26.74681348	17.03846503	14.59020911	8.724564547	7.516272793	6.109974599
Compound % of Industry Total	0.80%	0.74%	0.68%	0.62%	0.58%	0.45%	0.26%	0.25%	0.16%	0.13%	0.08%	0.07%	0.06%

Companies: **240**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 6
Emissions for Other Manufacturing Industries: Summary

Substances of Concern Release and Transfer Reporting Project

City of Toronto

On-site Releases:

	Aluminum oxide (fibrous forms)	Lead (and its compounds)	Hydrogen cyanide	Silver (and its compounds)	Selenium (and its compounds)	Phosphorus (total)	Chlorine	Hydrogen fluoride	Cadmium (and its compounds)	Naphthalene	Cobalt (and its compounds)	Arsenic (and its compounds)	Dioxins and furans
	tonnes	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes (g) TEQ(ET)*
BoH Priority Category*	-	*2*	-	-	-	-	-	-	*1*	-	-	-	*4*
Compound Total	0.144	0.119718	0.07	0.063	0.03	0.022	0.008	0.005	0.004254	0.003	0.001	0.00097	0.000000215
Compound % of Industry Total	0.003%	0.002%	0.001%	0.001%	0.0006%	0.0004%	0.0001%	0.0001%	0.0001%	0.00006%	0.00002%	0.00002%	0.00000%

On-site Disposal:

Off-site Transfers:

	1,2,4-Trimethylbenzene	Formaldehyde	Trichloroethylene	Tetrachloroethylene	Cadmium (and its compounds)	i-Butyl alcohol	Isophorone diisocyanate	Chlorine	Benzene
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*1*	*1*	*1*	-	-	-	*2,3*
Compound Total	2.22	1.967	1.2	0.83	0.195728	0.129	0.01	0.007	0.006
Compound % of Industry Total	0.0261%	0.0231%	0.0141%	0.0098%	0.0023%	0.0015%	0.0001%	0.0001%	0.0001%

On-site Air Releases:

	Lead (and its compounds)	Selenium (and its compounds)	Phosphorus (total)	Cobalt (and its compounds)	Chlorine	Silver (and its compounds)	Cadmium (and its compounds)	Naphthalene	Arsenic (and its compounds)	Dioxins and furans
	tonnes (kg)	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes (kg)*	*tonnes (g) TEQ(ET)*
BoH Priority Category*	*2*	-	-	-	-		*1*	-	-	*4*
Compound Total	0.119718	0.03	0.022	0.013	0.008	0.005	0.004254	0.003	0.00097	0.000000215
Compound % of Industry Total	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Companies: **115**

Use (as reported through TURA)

	Oxides of nitrogen (expressed as NO2)	Arsenic (and its compounds)	Naphthalene	Cobalt (and its compounds)	Phosphorus (total)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	-	-	-	-	-
Compound Total	5.94665699	5.486868366	5.267208337	2.945318879	2.793205117
Compound % of Industry Total	0.05%	0.05%	0.05%	0.03%	0.03%

Companies: **240**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 7
Emissions for Chemical Distribution Industries: Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Trichloroethylene	Carbon monoxide	Tetrachloroethylene	Ethylene glycol	Dichloromethane	Ethylbenzene	Methyl methacrylate	Sodium nitrite	Hydrochloric acid	n-Butyl alcohol	i-Butyl alcohol	Cyanides (ionic)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*1*	*2,3*	*1*	-	-	-	-	-	-	-	-	-
Compound Total	0.209	0.104	0.059	0.042	0.042	0.039	0.032	0.016	0.003	0.003	0.002	0.001
Compound % of Industry Total	37.86%	18.84%	10.69%	7.61%	7.61%	7.07%	5.80%	2.90%	0.54%	0.54%	0.36%	0.18%

On-site Disposal:

None reported

Off-site Transfers:

	Toluene	Xylene (all isomers)
	tonnes	*tonnes*
BoH Priority Category*	*2,3*	*2,3*
Compound Total	0.014	0.004
Compound % of Industry Total	77.78%	22.22%

On-site Air Releases:

	Trichloroethylene	Carbon monoxide	Tetrachloroethylene	Ethylene glycol	Dichloromethane	Ethylbenzene	Methyl methacrylate	Sodium nitrite	Hydrochloric acid	n-Butyl alcohol	i-Butyl alcohol	Cyanides (ionic)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*1*	*2,3*	*1*	-	-	-	-	-	-	-	-	-
Compound Total	0.209	0.104	0.059	0.042	0.042	0.039	0.032	0.016	0.003	0.003	0.002	0.001
Compound % of Industry Total	37.86%	18.84%	10.69%	7.61%	7.61%	7.07%	5.80%	2.90%	0.54%	0.54%	0.36%	0.18%

Companies: **3**

Use (as reported through TURA)

	Volatile Organic Compounds (VOCs)	Hydrochloric acid	Ethylene glycol	Dichloromethane	n-Butyl alcohol	Trichloroethylene	Cyclohexane	Tetrachloroethylene	Ethylbenzene
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	-	-	-	-	*1*	-	*1*	-
Compound Total	5003.580954	965.0164591	487.8453493	368.2236493	127.4071746	102.7449748	45.66989801	22.10760617	3.887974495
Compound % of Industry Total	70.21%	13.54%	6.85%	5.17%	1.79%	1.44%	0.64%	0.31%	0.05%

Companies: **7**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quantity
Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies as reported through NPRI.

Table 8
Emissions for Waste Management:
Summary
Substances of Concern Release
and Transfer Reporting Project
City of Toronto

On-site Releases:

	Nitrate ion in solution at pH >= 6.0	Ammonia (Total)	Phosphorus (total)	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	Volatile Organic Compounds (VOCs)	Zinc (and its compounds)	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns	Copper (and its compounds)	Lead (and its compounds)	Cadmium (and its compounds)
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes (kg)*
BoH Priority Category*	-	*2,3*	-	*2,3*	*2,3*	*2,3*	-	*2,3*	*2,3*	-	*2*	*1*
Compound Total	16835	6607.1	286.94	253.5	130.9	96.55	25.17	18.147	13.443	6.2	4.424	0.2417
Compound % of Industry Total	69.34%	27.21%	1.18%	1.04%	0.54%	0.40%	0.10%	0.07%	0.06%	0.03%	0.02%	0.001%

On-site Disposal:

	Phosphorus (total)	Copper (and its compounds)	Zinc (and its compounds)	Lead (and its compounds)	Cadmium (and its compounds)
	tonnes	tonnes	tonnes	tonnes (kg)	tonnes (kg)
BoH Priority Category*	-	-	-	*2*	*1*
Compound Total	208	12.4	7.95	0.458	0.0114
Compound % of Industry Total	90.90%	5.42%	3.47%	0.20%	0.005%

Off-site Transfers:

	Mercury (and its compounds)	Phosphorus (total)	Ammonia (Total)	Xylene (all isomers)	Copper (and its compounds)	Zinc (and its compounds)	Toluene	Manganese (and its compounds)	Methylenebis (phenylisocyanate)	Methyl ethyl ketone	Nitric acid	Hydrochloric acid
	tonnes (kg)	tonnes	*tonnes*	*tonnes*	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
BoH Priority Category*	*2*	-	*2,3*	*2,3*	-	-	*2,3*	-	-	*2,3*	-	-
Compound Total	3950	2108.6	1401.6	130.237	92.3	87.805	83.364	65.36	57.74	26.947	14.51	14.474
Compound % of Industry Total	48.82%	26.06%	17.32%	1.61%	1.14%	1.09%	1.03%	0.81%	0.71%	0.33%	0.18%	0.18%

On-site Air Releases:

	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	Volatile Organic Compounds (VOCs)	Lead (and its compounds)	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns	Mercury (and its compounds)	Cadmium (and its compounds)	Zinc (and its compounds)	Phosphorus (total)
	tonnes	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes*	*tonnes*	*tonnes (kg)*	*tonnes (kg)*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2*	*1*	-	*4*	*4*	*2*	-
Compound Total	253.5	130.9	96.55	35	18.147	13.443	13	7.5	0.13	0.04
Compound % of Industry Total	44.61%	23.04%	16.99%	6.16%	3.19%	2.37%	2.29%	1.32%	0.02%	0.01%

Companies: **6**

Use (as reported through TURA)

	Hydrochloric acid	Lead (and its compounds)	Sulphuric acid	Ammonia (Total)	Mercury (and its compounds)
	tonnes	tonnes	tonnes	tonnes	tonnes
BoH Priority Category*	-	*2*	-	*2,3*	-
Compound Total	15164.76295	1352.530527	134.3133448	47.00716683	2.915358795
Compound % of Industry Total	90.80%	8.10%	0.80%	0.28%	0.02%

Companies: **5**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quantity.
Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies as reported through NPRI.

Table 8
Emissions for Waste Management:
Summary
Substances of Concern Release
and Transfer Reporting Project
City of Toronto

On-site Releases:

	Arsenic (and its compounds)	Mercury (and its compounds)	Dioxins and furans	Hexachlorobenzene
	tonnes (kg)	*tonnes (kg)*	*tonnes (g) TEQ(ET)*	*tonnes (g)*
BoH Priority Category*	-	*2*	*4*	*4*
Compound Total	0.232	0.04955	0.000000004	0.000000002
Compound % of Industry Total	0.001%	0.0002%	0.00000000002%	0.00000000001%

On-site Disposal:

BoH Priority Category*
Compound Total
Compound % of Industry Total

Off-site Transfers:

	Sulphuric acid	Methyl isobutyl ketone	Lead (and its compounds)	Ethylbenzene	Cadmium (and its compounds)	Nitrate ion in solution at pH >= 6.0	Hexavalent chromium compounds	Arsenic (and its compounds)
	tonnes	tonnes	tonnes (kg)	tonnes	tonnes (kg)	tonnes	tonnes (kg)	tonnes (kg)
BoH Priority Category*	-	2,3	2	-	1	-	1	-
Compound Total	14.474	12.972	12.168	11.819	3.45505	2.3	0.6	0.347
Compound % of Industry Total	0.18%	0.16%	0.15%	0.15%	0.04%	0.03%	0.01%	0.004%

On-site Air Releases:

BoH Priority Category*
Compound Total
Compound % of Industry Total

Companies: **6**

Use (as reported through TURA)

BoH Priority Category*
Compound Total
Compound % of Industry Total

Companies: **5**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 9
Emissions for Water Treatment:
Summary
Substances of Concern Release
and Transfer Reporting Project
City of Toronto

On-site Releases:

	Ammonia (Total)	Chlorine
	tonnes	*tonnes*
BoH Priority Category*	*2,3*	-
Compound Total	0	0

On-site Disposal:

None reported

Off-site Transfers:

None reported

On-site Air Releases:

	Ammonia (Total)	Chlorine
	tonnes	*tonnes*
BoH Priority Category*	*2,3*	-
Compound Total	0	0

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 10
Emissions for Medical and Diagnostic Laboratories: Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

No Reported Data Available for This Sector

Table 11
Emissions for Automotive Repair and Maintenance: Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

No Reported Data Available for This Sector

Table 12
Emissions for Fuelling Services:
Summary
Substances of Concern Release
and Transfer Reporting Project
City of Toronto

On-site Releases:

	Volatile Organic Compounds (VOCs)	Ethylbenzene
	tonnes	*tonnes*
BoH Priority Category*	*2,3*	-
Compound Total	68.101	0.28
Compound % of Industry Total	99.59%	0.41%

On-site Disposal:

None reported

Off-site Transfers:

None reported

On-site Air Releases:

	Volatile Organic Compounds (VOCs)	Ethylbenzene
	tonnes	*tonnes*
BoH Priority Category*	*2,3*	-
Compound Total	68.101	0.28
Compound % of Industry Total	99.59%	0.41%

Companies: **2**

NOTE: No information on TURA was found corresponding to this sector

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 13
Emissions for Transportation Support: Summary
Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Vinyl acetate	Methanol
	tonnes	*tonnes*
BoH Priority Category*	*2,3*	*2,3*
Compound Total	5.597	0.764
Compound % of Industry Total	43.99%	6.01%

On-site Disposal:

None reported

Off-site Transfers:

	Methanol	Vinyl acetate
	tonnes	*tonnes*
BoH Priority Category*	*2,3*	*2,3*
Compound Total	1.797	1.28
Compound % of Industry Total	58.40%	41.60%

On-site Air Releases:

	Vinyl acetate
	tonnes
BoH Priority Category*	*2,3*
Compound Total	5.597
Compound % of Industry Total	100.00%

Companies: **1**

NOTE: No information on TURA was found corresponding to this sector

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 14
Emissions for Construction:
Summary
Substances of Concern Release
and Transfer Reporting Project
City of Toronto

On-site Releases:

	PM10 - Particulate Matter <= 10 Microns
	tonnes
BoH Priority Category*	*2,3*
Compound Total	0.537
Compound % of Industry Total	100.00%

On-site Disposal:

None reported

Off-site Transfers:

None reported

On-site Air Releases:

	PM10 - Particulate Matter <= 10 Microns
	tonnes
BoH Priority Category*	*2,3*
Compound Total	0.537
Compound % of Industry Total	100.00%

Companies: **1**

NOTE: No information on TURA was found corresponding to this sector.

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 15
Emissions for Dry Cleaning:
Summary
Substances of Concern Release
and Transfer Reporting Project
City of Toronto

On-site Releases:

	Volatile Organic Compounds (VOCs)
	tonnes
BoH Priority Category*	*2,3*
Compound Total	31.176
Compound % of Industry Total	100.00%

On-site Disposal:

None reported

Off-site Transfers:

None reported

On-site Air Releases:

	Volatile Organic Compounds (VOCs)
	tonnes
BoH Priority Category*	*2,3*
Compound Total	31.176
Compound % of Industry Total	100.00%

Companies: **1**

NOTE: No information on TURA was found corresponding to this sector.

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Table 16

Emissions for Funeral Services: Summary

Substances of Concern Release and Transfer Reporting Project
City of Toronto

No Reported Data Available for This Sector

Table 17
Emissions for Power Generation:
Summary
Substances of Concern Release and
Transfer Reporting Project
City of Toronto

On-site Releases:

	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns
	tonnes	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*
Compound Total	250.8	129.1	11.8	11.8
Compound % of Industry Total	62.16%	32.00%	2.92%	2.92%

On-site Disposal:

None reported

Off-site Transfers:

None reported

On-site Air Releases:

	Oxides of nitrogen (expressed as NO2)	Carbon monoxide	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns
	tonnes	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*
Compound Total	250.8	129.1	11.8	11.8
Compound % of Industry Total	62.16%	32.00%	2.92%	2.92%

Companies: **2**

Use (as reported through TURA)

	Volatile Organic Compounds (VOCs)
	tonnes
BoH Priority Category*	*2,3*
Compound Total	16.25
Compound % of Industry Total	100.00%

Companies: **23**

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized

Notes:
Quantities are in metric tonnes. Where the tonnes is followed by (kg) or (g), the NPRI reporting threshold is for a smaller quantity.
Quantities reported under Use are based on TURA reported quantities for Massachusetts operations, adjusted linearly for the number of operations reporting through NPRI and therefore represent the estimated use for the same number of companies as reported through NPRI.

Table 18
Emissions for Property Management / Institutional: Substances of Concern Release and Transfer Reporting Project
City of Toronto

On-site Releases:

	Oxides of nitrogen (expressed as NO2)	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns	Carbon monoxide	Volatile Organic Compounds (VOCs)	PM - Total Particulate Matter	Sulphur dioxide
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*
Compound Total	100.631	47.694	36.249	7.032	1.096	0.797	0.694
Compound % of Industry Total	51.82%	24.56%	18.67%	3.62%	0.56%	0.41%	0.36%

On-site Disposal:

None reported

Off-site Transfers:

	Mercury (and its compounds)
	tonnes
Compound Total	0.52
Compound % of Industry Total	100.00%

On-site Air Releases:

	Oxides of nitrogen (expressed as NO2)	PM10 - Particulate Matter <= 10 Microns	PM2.5 - Particulate Matter <= 2.5 Microns	Carbon monoxide	Volatile Organic Compounds (VOCs)	PM - Total Particulate Matter	Sulphur dioxide
	tonnes	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*	*tonnes*
BoH Priority Category*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*	*2,3*
Compound Total	100.631	47.694	36.249	7.032	1.096	0.797	0.694
Compound % of Industry Total	51.82%	24.56%	18.67%	3.62%	0.56%	0.41%	0.36%

Companies: **39**

NOTE: No information on TURA was found corresponding to this sector.

Toronto Board of Health Priority Category

1 = City of Toronto Ten Key Carcinogens
2 = Children's Health
3 = Criteria Air Pollutants
4 = Stockholm Convention POPs
- = Not categorized