



*Environmental Reporting and Disclosure Bylaw  
(Municipal Code Chapter 423)*

Guide to Reporting

Version 3.0  
March 2012



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Please note that this version replaces all previous versions.  
Check [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac) for updates and other program resources

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Distribution: This document and other chemtrac resources are available at:  
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## 1.0 Introduction

ChemTRAC is a program in Toronto that aims to improve public health and to make businesses sustainable by reducing the use and releases of toxic chemicals. Part of this program is the Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423) which mandates some industries to report the use and releases of some toxic chemicals.

This guide can help you determine if the bylaw applies to your facility or business and how to report if it does.

### How to use this guide

This guide is for owners and operators of businesses and facilities in the City of Toronto. The first part of this guide follows the steps that you may go through to find out if your facility or business needs to report. The second part of the guide is the information you will need once you know you are required to report. The third part will guide you how to navigate through the online reporting system to submit data on amounts of priority substances released, manufactured, processed and otherwise used in your facility.

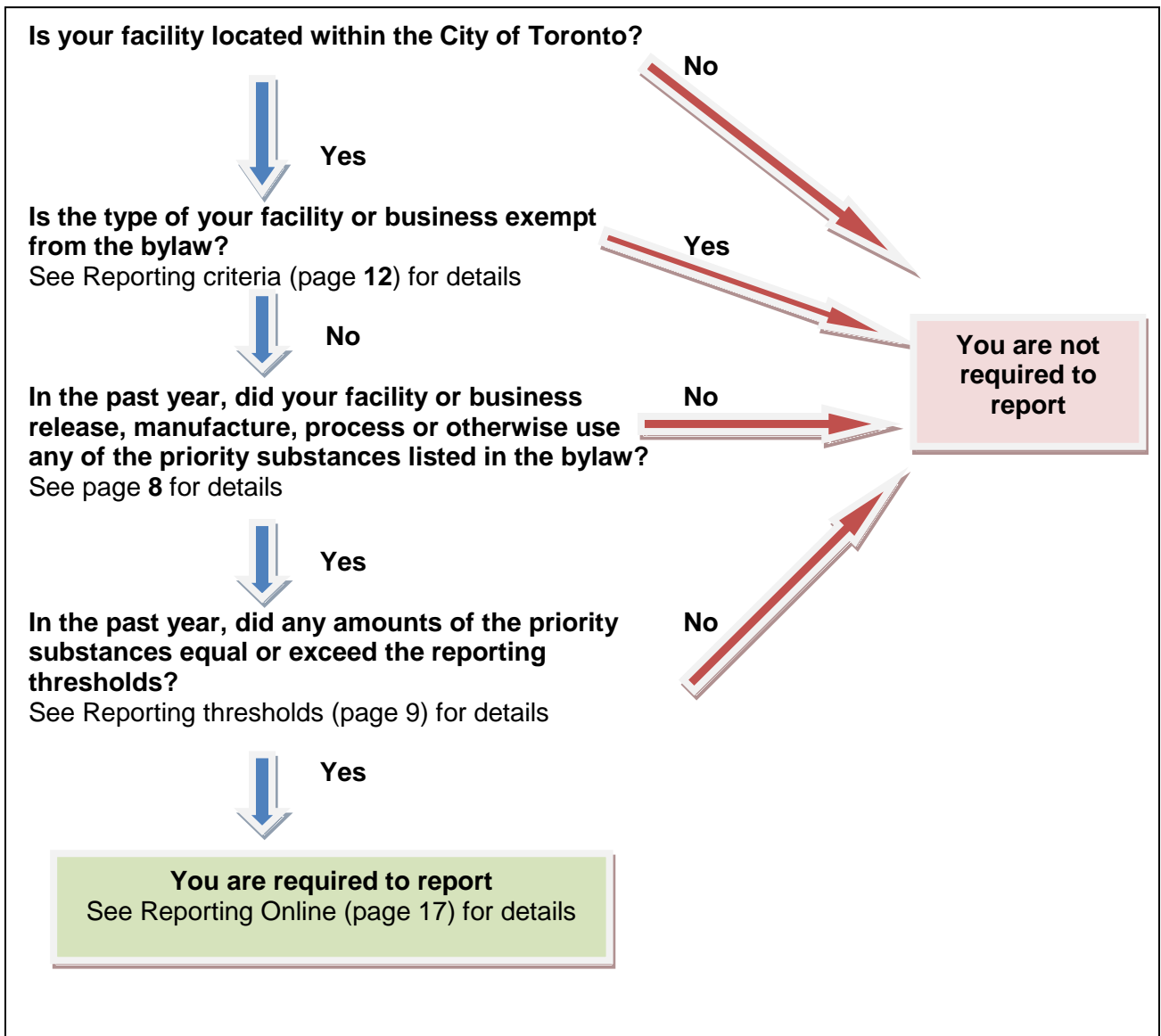
We recommend that you also review the Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423). You can find the bylaw on [ChemTRAC web site](#).

This guide is one in a series of ChemTRAC resources to help you. You can find more information and resource guides at [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac).

## 2.0 Do I need to report?

The first step in reporting is to determine if your facility or business in the City of Toronto is captured by the Environmental Reporting and Disclosure Bylaw. Please note that reporting is done every year. The amounts of chemicals your facility releases, manufactures, processes or otherwise uses may change from year to year. Therefore, some years you may not meet the reporting criteria, which means you would not have to report for those years. It is important to check every year if you need to report or not. The following diagram (Figure 2.1) will help you determine if your facility needs to report.

**Figure 2.1:** Steps to check if you need to report



## 2.1 Why to report?

There are thousands of facilities in Toronto that release, manufacture, process or otherwise use small amounts of toxic chemicals. Even though the individual amounts may seem small, they can add up in our environment to levels that may affect health. Our first step to protect the health of our community is to track 25 priority substances that have been found to be present in Toronto's environment and have known adverse health effects. Then, this information can be used to take actions to reduce the use and release of these substances by our local businesses. In addition to the environmental reporting, ChemTRAC includes the promotion of pollution prevention activities to Toronto businesses.

Toxic reduction and reporting programs are found all over the world and have been developed by all levels of government. Canada's largest and longest-running reporting program is the National Pollutant Reporting Inventory (NPRI). It requires large facilities to report on their emissions of certain chemicals. Ontario also has a Toxics Reduction Act, which targets the same facilities as the NPRI.

An important part of ChemTRAC is the Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423), passed by City Council in December 2008. The bylaw was developed through an extensive consultation and research process. Toronto Public Health examined chemicals present in the community, compiled best practices from other toxic reduction programs and consulted with businesses, residents and community organizations. ChemTRAC and the bylaw were developed based on these findings, to make a program tailored to the needs of facilities and residents in Toronto.

## 2.2 Reporting timelines

The Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423) came into force January 1, 2010 and reporting is being phased in over the next few years. The type of facility you own or operate determines when you will need to start tracking the chemicals you release, manufacture, process or otherwise use and when you will be required to begin reporting.

There are three groups of facilities with different reporting deadlines to ChemTRAC (Phase 1, Phase 2 and Phase 3). Figure 2.2 shows how these facilities were grouped and when each type of facility will need to start tracking chemical data and when to report. You are required to report your data every year by June 30 for the previous year's data.

### **Example: When to report**

*ABCD Cleaner* has determined that it is required to report. Because dry cleaning facilities are a Phase 2 facility, *ABCD Cleaner* will track the chemicals it uses in 2011. It may be required to report its data to the City of Toronto no later than June 30, 2012.

(*ABCD Cleaner* is a fictional facility used for illustrative purposes only. It is not intended to represent an actual business.)

**Figure 2.2: Phases for reporting**

*Phase 1 Facilities*

➔ These facilities filled a report in 2011 for their data collected in 2010. They must file their second report by June 30, 2012.

Phase 1 Facilities by Industrial Sector	NAICS code <sup>1</sup>
Manufacturing, including chemical and petroleum products	324 to 326
Food and beverage manufacturing, tobacco products	3111 to 3122
Power generation	2211
Printing and publishing	3231 and 511
Water and wastewater treatment	2213
Wood industries	3211 to 3219 and 3371 to 3379

*Phase 2 Facilities*

➔ These facilities need to track amounts of priority substances released, manufactured, processed or otherwise used during 2011 and submit a report by June 30 of 2012.

Phase 2 Facilities by Industrial Sector	NAICS code
Automotive repair & maintenance	8111
Chemical wholesale	4184
Dry cleaning & laundry services	8123
Funeral services	8122
Medical & diagnostic services	6215
Waste management & remediation services	5621 to 5629

*Phase 3 Facilities*

➔ These facilities need to track amounts of priority substances released, manufactured, processed or otherwise used during 2012 and submit a report by June 30 of 2013.

Phase 3 Facilities by Industrial Sector	NAICS code
Other sectors not exempt under the bylaw	Includes 313, 315, 331 to 339, 488, 811, 8121

<sup>1</sup> NAICS = North American Industry Classification System. The NAICS codes assigned to the business sectors are for information purposes. Businesses may or may not follow the NAICS code shown in the tables.

### 3.0 Reportable Priority Substances

The Environmental Reporting and Disclosure Bylaw lists 25 priority substances as shown in Figure 3.1. These substances are in the bylaw because they are in Toronto's environment at levels that can have adverse impact on human health. To find out more about the health effects of these toxics, visit [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac).

**Figure 3.1:** Priority Substances Listed in the Environmental Reporting and Disclosure Bylaw

Chemical	CAS No. <sup>b</sup>
<b>Group A</b>	
Acetaldehyde	75-07-0
Acrolein	107-02-8
Benzene	71-43-2
1,3-Butadiene	106-99-0
Cadmium and its compounds <sup>a</sup>	-
Carbon tetrachloride	56-23-5
Chloroform (Trichloromethane)	67-66-3
Chromium, Hexavalent, and its compounds <sup>a</sup>	-
Chromium, Non-hexavalent, and its compounds <sup>a</sup>	-
1,2-Dibromoethane (Ethylene dibromide)	106-93-4
1,4-Dichlorobenzene	106-46-7
1,2-Dichloroethane (Ethylene dichloride)	107-06-2
Dichloromethane (Methylene chloride)	75-09-2
Formaldehyde	50-00-0
Lead and its compounds <sup>a</sup>	-
Manganese and its compounds <sup>a</sup>	-
Mercury and its compounds <sup>a</sup>	-
Nickel and its compounds <sup>a</sup>	-
Tetrachloroethylene (Perchloroethylene)	127-18-4
Trichloroethylene	079-01-6
Vinyl chloride	75-01-4
<b>Group B</b>	
Polycyclic aromatic hydrocarbons (PAHs)	-
<b>Group C</b>	
Nitrogen oxides <sup>c</sup> (NO <sub>x</sub> )	11104-93-1
Particulate matter 2.5 micrometres or less in diameter (PM <sub>2.5</sub> )	-
Volatile organic compounds (VOCs), total	-

a. expressed as the metal

b. Chemical Abstracts Service Registry Number

c. NO + NO<sub>2</sub>, expressed as NO<sub>2</sub>

### 3.1 What are chemical groups?

The priority substances listed in the Environmental Reporting and Disclosure Bylaw are divided into three groups because the reporting thresholds are calculated differently for each of the groups:

- **Group A** are the priority substances where the reporting threshold is determined by adding the amounts of the chemical manufactured (including any by-product created), processed and otherwise used.
- **Group B** refers to polycyclic aromatic hydrocarbons (PAHs, see Appendix 3). The reporting threshold for PAHs is the combined, total amount of all PAHs your facility released, disposed and/or transferred for recycling.
- **Group C** includes NO<sub>x</sub>, PM<sub>2.5</sub> and VOCs. The reporting threshold for these substances takes into account only the amounts released to air. See Appendix 4 for more details.

### 3.2 What are the reporting thresholds?

The Environmental Reporting and Disclosure bylaw establishes the reporting thresholds for the 25 priority substances (see Figure 3.2). The "Mass Reporting Thresholds" amounts are compared to the amounts released, manufactured, processed or otherwise used. When a priority substance is part of a mixture or material, if it is found in a concentration below the "Concentration Threshold", then it does not need to be considered in the calculations.

**Figure 3.2:** Reporting thresholds Listed in the Environmental Reporting and Disclosure Bylaw

<b>Chemical</b>	<b>Mass reporting threshold (kg/yr)</b>	<b>Concentration threshold (% w/w)</b>
<b>Group A</b>		
Acetaldehyde	100	1.0
Acrolein	100	1.0
Benzene	100	1.0
1,3-Butadiene	100	1.0
Cadmium and its compounds <sup>a</sup>	1.0	1.0
Carbon tetrachloride	100	1.0
Chloroform (Trichloromethane)	100	1.0
Chromium, Hexavalent, and its compounds <sup>a</sup>	10	1.0
Chromium, Non-hexavalent, and its compounds <sup>a</sup>	100	1.0
1,2-Dibromoethane (Ethylene dibromide)	100	1.0
1,4-Dichlorobenzene	100	1.0
1,2-Dichloroethane (Ethylene dichloride)	100	1.0
Dichloromethane (Methylene chloride)	100	1.0
Formaldehyde	100	1.0
Lead and its compounds <sup>a</sup>	10	0.1
Manganese and its compounds <sup>a</sup>	10	1.0
Mercury and its compounds <sup>a</sup>	1.0	0.0
Nickel and its compounds <sup>a</sup>	100	1.0
Tetrachloroethylene (Perchloroethylene)	100	1.0
Trichloroethylene	100	1.0
Vinyl chloride	100	1.0
<b>Group B</b>		
Polycyclic aromatic hydrocarbons (PAHs)	10	n/a <sup>b</sup>
<b>Group C</b>		
Nitrogen oxides <sup>c</sup> (NO <sub>x</sub> )	200	n/a
Particulate matter 2.5 micrometres or less in diameter (PM <sub>2.5</sub> )	30	n/a
Volatile organic compounds (VOCs), total	100	n/a

- a. expressed as the metal
- b. n/a = not applicable
- c. NO + NO<sub>2</sub>, expressed as NO<sub>2</sub>

### 3.3 How do I know if I manufacture, use or release any priority substances?

If you intentionally manufacture, process or use one of the priority substances, then it is simple to determine if the amounts are equal to or greater than the reporting thresholds.

It is also possible that you process or use a substance that contains one of the reportable chemicals or create the chemicals as a by-product. To find this out, you can get this information from a number of sources, including:

- **Material Safety Data Sheets (MSDS):**  
These sheets list the ingredients in a product and the concentration of the chemicals in the product, and are available from product suppliers.  
Note: If the MSDS lists a range of percentages for a substance, then you should use the mean (also called average) per cent when performing your calculations. For example, if an MSDS says that a product contains 10-20% of a substance, you should use 15% for your calculations unless you have more specific information.
- **Operating Permit or Certificate of Approval (if present):**  
These may identify the substances you may release to the environment.
- **Pollution prevention and industry guides for your processes:**  
These should indicate the chemicals that are typically used or released.
- **ChemTRAC Calculators**  
ChemTRAC calculators were developed by Toronto Public Health to predict and quantify the chemicals used and released from many industrial processes. You may find calculators that apply to your business. See [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac) for the list of calculators.

## 4.0 Reporting criteria

Businesses in the City of Toronto are required to report to ChemTRAC if they release or manufacture, process or otherwise use (depending in which Group the substance is classified) any of the priority substances listed in the Environmental Reporting and Disclosure Bylaw in amounts equal to or above the reporting thresholds.

Examples of facilities that may release, manufacture, process, or otherwise use one or more of the chemicals listed in the bylaw include:

- food and beverage manufacturing
- clothing manufacturing
- printing and publishing
- chemical manufacturing
- wood industries
- chemical distribution
- medical and diagnostic laboratories
- vehicle repair (e.g. body work and painting)
- laundry services, including dry cleaning
- funeral services

### 4.1 Exempt facilities and businesses

The following types of facilities are exempt from the bylaw and are **NOT** required to report:

- facilities engaged solely in retail sales
- medical or dental offices
- construction and building maintenance sites
- food and accommodation services, except for laundry and dry cleaning facilities located within the facility
- facilities that distribute, store or sell fuels
- facilities that maintain and repair vehicles (for example cars, trucks, locomotives, ships or aircraft). However, painting or stripping of vehicles or their components, rebuilding or remanufacturing vehicle components are not exempt from the bylaw.

Appendix 1 gives a more detailed description of the types of facilities that do not need to report.

### 4.2 Exempt sources of chemicals

The ChemTRAC priority substances may come from many different sources within a facility. Some of these sources are exempt from the bylaw. This means you do not need to include in your calculations the amounts of priority substances associated with these sources. Figure 4.1 summarize the sources that are exempt in the bylaw.

**Figure 4.1:** List of chemical sources exempt from the Bylaw

<b>Exempt source</b>	<b>Example</b>
an article (an item that already contained a priority substance before it entered your facility and that doesn't release any of the chemical when it is used or processed)	<i>A tool or part of a machine</i>
a structural component of a facility	<i>A wall or floor</i>
a product used for routine cleaning, facility and grounds upkeep	<i>Washroom sanitizer</i>
the personal items of the people in the facility	<i>Hairspray</i>
vehicle emissions	<i>Dump truck emissions</i>
intake water or air	<i>Compressed air, cooling water</i>
road dust	<i>Dust created by the movement of vehicles</i>
emissions from space heaters or hot water heaters that are not part of the process equipment	<i>Emissions from a furnace or water boiler generated to heat a building. NOTE: only exempt if the hot air or water is not used in a manufacturing process</i>
<i>materials used for the purpose of maintaining motor vehicles operated by the facility</i>	<i>Motor oil, lubrication materials</i>

See Appendix 2 for a more detailed description of source exemptions.

## 5.0 Estimating amounts released, manufactured, processed and otherwise used

Once you have determined the chemicals you release, manufacture, process or otherwise use, you will need to determine if your facility meets or exceeds any of the chemical reporting thresholds.

You can estimate these amounts in a number of ways. Appendix 5 describes the main methods for the estimation. You can also use the free ChemTRAC calculators available at [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac).

Once you have calculated the amounts of the chemicals, then compare these amounts with the reporting threshold for each chemical. If any amount of a priority substance is equal to or more than the threshold listed in the Environmental Reporting and Disclosure Bylaw then you are required to submit a report.

### **Example: Getting ready to report**

ABCD Cleaners is a dry cleaning facility in Toronto. This type of facility is not exempt from the bylaw and is in the second phase of reporting. The operator needs to check if the facility released, manufactured, processed or otherwise used any priority substances in amounts equal to or above the reporting thresholds. To do this, the operator decides to use the ChemTRAC calculator. Using his 2011 records, he collects the data required for the calculator.

- ⇒ Using the ChemTRAC calculator for the dry cleaning sector, the facility finds that in 2011 it released 98 kg of total VOCs. The reporting threshold for total VOCs is 100kg/yr.
- ⇒ They do not have to report their 2011 data because they are below the reporting threshold. The operator decides to go into the reporting system and report that his facility is below the threshold.
- ⇒ Because they are so close to the threshold, they decide to review their data in 2012 and in future years to determine each year if they have to report.

Along with the ChemTRAC resources, you can get help from other sources including:

- NPRI toolbox <http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=65A75CDF-1>
- U.S. EPA Emission factor collection <http://www.epa.gov/ttnchie1/ap42/>
- Australian NPI Emission Estimation Manuals <http://www.npi.gov.au/publications/emission-estimation-technique/index.html>
- Industry Associations
- Your product suppliers

Note: Links to other government programs are provided for your convenience to assist in estimating chemicals. Regulatory guidance that may appear in these guides is not applicable to Toronto's Environmental Reporting and Disclosure Bylaw.

## 6.0 What information to report?

There are three types of information you will need to report to the City of Toronto:

- Facility information
- Priority Substance (Chemical) Information
- Pollution Prevention actions taken

### 6.1 Facility information

At first, you will need to report information about your facility.

Each facility that reports to ChemTRAC must include:

- name and address of the facility
- number of employees
- nature of the facility's business (by North American industry Classification (NAICS) code)
- contact information

Please note that each facility in Toronto that meets the bylaw requirements must report. A company that owns several facilities must submit a report for each facility individually.

### 6.2 Priority Substances information

You need to choose from the list of 25 priority substances those that you are going to report.

For all the substances that you have to report, you need to provide the yearly amounts (in kilograms) that you:

- manufactured
- processed
- otherwise used
- released to air (fugitive and direct emissions)
- released to surface water (spills and discharges)
- released to land (spills and on-site disposal)

Also, for each one of these quantities, you need to indicate the methods used for the calculations.

You can also provide additional information that may help the City understand your substance data.

### 6.3 Additional information

In addition to the information required by the Bylaw, you are encouraged to provide information about your facility's environmental programs and achievements. This option is available to both those who are required to report under the Bylaw as well as those who are not required. This information can help the community better understand your facility's environmental performance.

## 7.0 How to Report

Facilities must submit chemical and facility information using the ChemTRAC Online Reporting System. You can access the system at [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac) from any computer with an internet connection.

For security, first time users will need a "First Time Access Code" to use the system. The City sends most businesses their First Time Access Code by mail. If you did not receive or have lost your First Time Access Code, please call 311.

Once you are registered, the system will guide you through the steps that you are required to take in order to complete your report.

For those businesses or facilities that are not required to report, the online reporting system allows you to inform us if you are exempt from the Bylaw or under the reporting thresholds. This information is valuable to assist us with the administration of the Bylaw and to keep you informed on ChemTRAC program initiatives.

Once you have registered in the system, it will generate a unique Registration ID for you. You will need to use this ID, instead of the First Time Access Code, to log into the reporting system again. Keep this ID number for future visits to the online reporting system. If you forget your Registration ID, please call 416-338-7600.

The deadline for reporting is June 30th of each year.

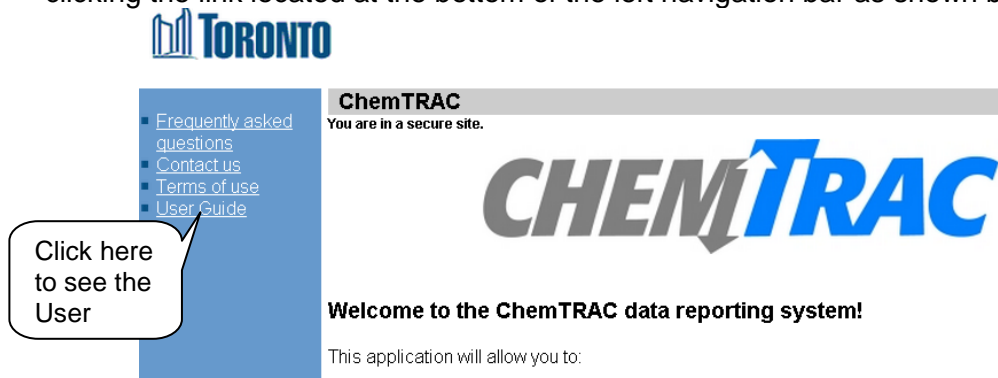
### 7.1 Reporting Online

This section describes how to use the ChemTRAC's on-line reporting system.

Once you are ready to report, you need to access the online reporting system.

To access the online reporting system, please follow the steps:

1. Open the ChemTRAC web page: [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac)
2. Click on "Ready to Report" located at the bottom right of the home page then
3. Click on the "Go to ChemTRAC Online Reporting" and you will be directed to the data reporting system. At any moment, you can consult the "User Guide" by clicking the link located at the bottom of the left navigation bar as shown below.



4. To proceed, you must read and consent to the Terms of Use by clicking the I Agree button at the bottom of the page. This will take you to the log in page.
5. Logging in: As mentioned earlier, if this is your first time accessing the system you will need to register your facility by using the First Time Access Code. If you are already registered and need to make changes or add chemical information you will need to enter your Registration ID. The City sends most businesses their First Time Access Code by mail. If you did not receive or have lost your First Time Access Code, please call 311. Once you have entered the first time access code click the Go button at the bottom of the page and you will be taken to *step 1* (facility registration). At this step you must register your facility by providing information as required.

## Step 1: Facility Registration

### Facility information

You need to enter your facility information in the fields as shown below. Required fields are indicated by **bold, coloured** text.

**Facility Information**

**Facility Name:**

**Facility Phone:**   
(e.g. 416-338-7387)

Facility Fax:

**No. of Employees:**

Web Site:

**Address:**   
(e.g. 123 Main St. W.)

Unit:

**City:** *Toronto*

**Postal Code:**   
(e.g. M5B 1W2)

### Type of Facility

Please indicate your main type of business by selecting the North American Industry Classification System (NAICS) code that best applies to your facility. If more than one code applies to your facility, select the one that captures the majority of the activities in your facility. You must select the 2-Digit NAICS code first from the drop down list right beside "NAICS 2-Digit" as shown in the figure below. After that you select the 4-digit NAICS code followed by 6-digit NAICS code. If you are not sure of your NAICS code click on "[NAICS Code Help](#)" to find your code as shown below.

Please select the first two digits of your NAICS code, then the first four digits, then the full 6-digit code. Not sure of your NAICS Code? Click this link, [NAICS Code Help](#), to search for your code.

**NAICS 2-Digit:**

**NAICS 4-Digit:**

**NAICS 6-Digit:**

Click the arrows to select your NAICS code

### Company Contact Information

In this section you need to provide the name, title and contact information of the person that should be contacted by the ChemTRAC team if necessary. The Company Contact will be listed with the Facility Information on the City's web site.

### Technical Contact Information

You need to provide the "Technical Contact" information only if this is different from the "Company Contact". This information will be used only when the City needs clarification of the submitted data. The technical contact will not be listed on the City's website. To enter the Technical Contact information, please click your mouse in the box provided to activate the fields that will allow you to enter the information as shown below.

Click here if the Technical Contact is different from the Company Contact

First Name:

Last Name:

Job Title:

Phone:

Ext:

Fax:

Email:

Click to enter Technical contact info

### Comments

In this part you can provide any additional comments about your facility. For example, explain recent changes in your operations, your commitment to reduce your environmental impact, latest upgrades in technology, etc.

### Step 2: Reporting Period

- As shown in the figure below, this section allows you to indicate whether you:
  - want to proceed to file your report for the year you selected
  - revising information you previously submitted
  - do not meet reporting thresholds for the selected year
  - are not required to report according to the bylaw
  - are only registering facility information this time

## Reporting Period

Please select the year for which you are providing information:

I am ready to report for the year above:

- I meet the reporting requirements and am providing data
  - I am revising information I previously submitted
  - I do not meet reporting thresholds
  - I am not required to report, according to Section 423-3 of the Environmental Reporting and Disclosure Bylaw
  - I am only registering my facility information at this time
- If you select any of the last three options, the application will take you directly to STEP 5. The system will still give you the opportunity to enter an environmental-related comment in the "Environmental Statement" section. This information may help the community to better understand your facility and/or environmental practices.
  - If you select any of the first two options to report chemical use and release or update chemical information you have previously reported the application will take you to STEP 3 (Chemical Selection).
  - If you choose to cancel out of the reporting application at this time, no information will be saved.

### Step 3: Chemical Selection

- This section allows you to select the chemical(s) you will be reporting on in this session. You may select multiple chemicals by clicking into the boxes associated with each chemical. You must select at least one chemical to continue.
- Once you have selected the chemicals that you will report on in this session, go to the bottom of the page and select the "NEXT" button to continue. You may return to the application at any time to update previously selected chemicals or enter new chemicals you wish to report.

Click the check boxes to select chemicals

CAS Number	Chemical
<input type="checkbox"/> 75-07-0	Acetaldehyde
<input type="checkbox"/> 107-02-8	Acrolein
<input type="checkbox"/> 71-43-2	Benzene
<input type="checkbox"/> 106-99-0	1,3-Butadiene
<input type="checkbox"/> 7440-43-9	Cadmium
<input type="checkbox"/> 56-23-5	Carbon tetrachloride

### Step 4: Chemical Use and Release

- This section allows you to enter the amount of manufactured, processed, otherwise used and also the amounts released to air, land, water for each

chemical you selected. A new page will be displayed for each chemical selected in Step 3.

- Appendix 6 gives examples of reporting priority substances.
- Refer to the figure below. Click in the quantity column and enter the appropriate number **in kilograms**, with no decimals (see below). Click or use the Tab key on your keyboard to navigate to the Estimation Method field. Click on the arrow on the right side of the field and select the estimation method that you used to determine the quantity. You must select an estimation method to continue.

	Quantity (kg)	Estimation Method
If you used more than one method to estimate data, please choose the main one		
Manufactured:	<input type="text"/>	- Select Estimation Method From List -
Processed:	<input type="text"/>	- Select Estimation Method From List -
Released:	<input type="text"/>	- Select Estimation Method From List -
Released to Air:	<input type="text"/>	- Select Estimation Method From List -
Release to Land:	<input type="text"/>	- Select Estimation Method From List -
Release to Surface Water:	<input type="text"/>	- Select Estimation Method From List -

Enter the amounts here

- You are not required to complete all rows. You will need to enter at least one quantity with its Estimation Method to continue.
- You may choose to "CANCEL". If so, no information from this session will be saved or submitted to the City.
- If you need to change your selection of priority substance, you can choose "BACK" to reselect the chemicals you wish to report on in this session.
- By selecting "NEXT" you continue to the next chemical you have selected. Once you have entered the information for all the selected priority substances, the system will take you to STEP 5 (Environmental Statement).
- You may return to the application at a later date, before June 30, to update previously submitted information, or enter quantities and estimation methods not previously submitted.

### Step 5: Environmental Statement

- It is optional to provide information in this section. There are two parts in this section:
  - The first is a text box where you can include an environmental statement of up to 4,000 characters.
  - In the second part you can indicate if you have done any environmental education or training activities as well as any pollution prevention actions taken in your facility.
- This information may help the community to better understand your environmental practices.
- You can enter environmental information even if you do not report any priority substances.
- If you do not wish to enter any information in this step at this time, leave the fields blank and select the "NEXT" button at the bottom of the page.

For the current reporting year, select all the items, below, that you've completed:

Environmental education/training courses  Yes  No  No Change

ChemTRAC elearning module(s)  Yes  No  No Change

If so, which module(s):

Created a Pollution Prevention Plan  Yes  No  No Change

Adopted an Environmental Management System or equivalent  Yes  No  No Change

Other (please describe):

Click the buttons to select any applicable items.

## Step 6: Summary Notification

### Submit Information

- This step allows you to review the information you have entered in the previous steps. Check if all information is correct.
- If you notice you have made an error, you can click the "BACK" button at the bottom of the screen until you have returned to the Step where you wish to correct your information.
- Once you have made your changes to the information select the "NEXT" button at the bottom of each page until you return to STEP 6 (Summary Notification). The Summary Information will show you the corrected information.
- **CAUTION: If you cancel or exit the system before submitting, your information will not be saved**
- To submit your information click on the "NEXT" button at the bottom of the page.

### Submitter

- In this section you are required to enter the name and title of the person submitting the current information. The Company Contact, that you previously entered, will be the default Submitter. If this is not the case, select "Technical Contact" or "Other" to change the information of the Submitter (see figure below).

If you are not the Company or Technical Contact, please select Other and provide your data here

Company Contact  Technical Contact  Other

First Name:

Last Name:

Job Title:

Click to change the submitter information

## Comments

You may wish to include some comments regarding the data you entered or any additional information you would like the ChemTRAC program to know. You can enter these remarks in the text box provided (maximum 256 characters). The information provided in this comments text box **will not** be shown on ChemTRAC's website.

## Step 7: Confirmation & Print

### ChemTRAC Report

- The ChemTRAC Report will display the information you submitted in this session.
- The ChemTRAC Report displays your unique **Registration ID** number. Please record this number as you will need to
  - Correct your last report
  - File your report in the following years
- If you log into the reporting system again, using your new Registration ID number, STEP 1 (Facility Registration) will not be shown. For any updates to your Facility Information, please contact us at 416-338-7600.
- Please do not use the First Time Access Code again since doing so will generate a new facility in the system instead of displaying your facility.
- The ChemTRAC Report will display a confirmation code that assures you that the information you submitted in this session has been received.
- Please be sure to print this page (see below), for your records by selecting the "PRINT" button at the bottom of the page

## ChemTRAC Report

*Thank you for submitting your information.*

**Please print this page for your records.**

### Registration Information

Until June 30th, you can use this Registration ID at any time to change or add new information:

**REGISTRATION ID: R-0002395934-6726CC**



### Notes on modifying your submitted report

- Until June 30th, you can make multiple submissions to the City to change or add to the information you have previously submitted.
- **CAUTION: New information will replace previously submitted information**
- You need to fill in the fields you need to modify.

## Appendix 1: Types of facilities exempt from reporting

The Environmental Reporting and Disclosure Bylaw does **not** apply to some types of facilities:

### **Facilities engaged solely in retail sales**

The retail sector (NAICS code 44 and 45) is involved in selling merchandise only and doesn't change or alter the merchandise. Retail sale is the final step in the distribution of merchandise, which means that retailers receive merchandise and sell it as it was received. Included in this category are retail bakeries primarily engaged in manufacturing bakery products for retail sale (NAICS code 311811) and facilities primarily engaged in retailing confectionery goods and nuts made on the premises (NAICS code 3113) that are sold to the general public on the same premise. Retail paint stores and hardware stores that sell paint (NAICS code 4441) are also exempt from reporting.

If you are a wholesaler or a manufacturer who also sells some of your products directly to the consumer, you are not exempt from reporting.

### **Medical or dental offices**

This sector consists of facilities that provide out-patient health services. The offices of physicians (NAICS 6211), dentists (NAICS 6212), and other health care providers such as chiropractors, optometrists, mental health practitioners, occupational therapists (NAICS 6213), and out-patient care centres (NAICS 6214) do not have to report.

Medical and diagnostic laboratories (NAICS 6215) and hospitals (NAICS 622) are *not* exempt from reporting.

### **Construction and building maintenance sites**

Facilities involved solely in construction, building maintenance and renovation activities are exempt from reporting.

### **Food and accommodation services**

A hotel, bed and breakfast, catering business, restaurant, coffee shop, bar, mobile food vending, long-term care facility or traveller accommodation (NAICS code 7211, 7221, 7222, 7223, or 7224) are exempt from the bylaw and do not have to report. However, laundry and dry cleaning facilities located within any of these facilities are NOT exempt from reporting (NAICS code 8123).

### **Facilities that distribute, store or sell fuels**

Gasoline stations (NAICS code 4471) and other facilities that store and distribute fuels (for example, petroleum product distributors, NAICS code 412) are exempt from reporting.

### **Facilities that maintain and repair vehicles**

You do not need to report if your facility only does general mechanical and electrical repair and maintenance services for motor vehicles, such as engine repair and maintenance, exhaust system replacement, transmission repair and electrical system repair, oil change, lubrication, washing, or tire repair,.

You may need to report if your facility uses large amounts of paints and solvents, for example, if you paint or strip vehicles or their components, rebuild or remanufacture

vehicle components. A good example of this type of facilities is auto body shops that repair and paint vehicles after a collision.

**Warehouse and distribution facilities**

Facilities that solely store and/or distribute goods do not have to report.

## Appendix 2: Sources of priority substances not included in calculations

Some sources of chemicals do not need to be included when reporting under the Environmental Reporting and Disclosure Bylaw. This means that the chemicals from these sources are *not* included in any of your calculations. If the only sources of reportable chemicals in your facility are from such sources, then you do not need to report to ChemTRAC.

### **An article**

An article is a manufactured item that does not release any priority substance when it is processed or used. A tool or mechanical part is considered to be an article. Therefore, any priority substances that are present in an article are not included in any of your calculations. For example, if you use a tool made of a metal alloy that includes chromium, you do not include the amount of chromium in this tool in any of your calculations. In a different scenario, if your facility manufactures a tool with an alloy that contains chromium, then you must include the amount of chromium in the tool in your calculations.

### **A structural component of a facility**

Any priority substance present in the material that makes up the structure of the building, such as walls and floors are not included in the calculations.

### **A product used for routine janitorial, facility building or grounds maintenance**

Cleaners, fertilizers, paints, are examples of products that could be used as part of regular cleaning and maintenance of buildings in your facility or the grounds of your facility. Do not include the chemicals found in these substances in any of your calculations. However, chemicals used in cleaning process equipment must be included.

### **Personal items used by persons at a facility**

Any reportable chemical found in personal products used by staff and visitors, such as hairspray and perfume, are exempt from the bylaw.

### **Emissions from vehicles**

Emissions from the vehicles at your facility do not need to be included in any calculations. A **vehicle** is defined as any mobile equipment with a motor that is used to move equipment, including, loaders, dump trucks, forklifts, excavators and bulldozers. Please note that mobile equipment is not the same as portable. **Portable equipment** can be moved from one place to another but do not have a motor to carry out the movement. If the other criteria of the bylaw are met, you would have to include the amount of a priority substance that is associated with the use of a portable facility or equipment when you do your calculations and provide data to the City.

### **Intake water or air**

You may use water or air in your process or at the facility, such as water used for process cooling or air used as compressed air or to feed into a combustion process. You do not need to consider any priority substance that may be present in any water or air that you bring into your facility, such as substances found in piped water from the municipal system or pollutants already found in the outdoor air.

**Road dust**

The movement of vehicles or equipment at your facility might create dust. You do not need to include in your calculations any priority substances found in the road dust.

**Emissions from space heaters or hot water heaters**

The emissions from fossil fuels used to heat general-use water or to heat your facility are not included in your calculations. The emissions from fossil fuels burned to heat water used in your manufacturing processes or in industrial boilers **must** be included.

**Materials used for the purpose of maintaining motor vehicles operated by the facility**

You do not need to include in your calculations amounts of priority substances that are used in the mechanical and electrical maintenance of motor vehicles. This includes substances used for oil change, lubrication, washing and tire repair.

## Appendix 3: Polycyclic Aromatic Hydrocarbons (PAHs)

Under the bylaw, polycyclic aromatic hydrocarbons (PAHs) are defined as the chemicals identified in Schedule 1 Part 2 of the National Pollutants Release Inventory (NPRI). The following table lists the compounds in this group as found in the Canada Gazette notice of December 11, 2010 (<http://www.gazette.gc.ca/rp-pr/p1/2010/2010-12-11/html/notice-avis-eng.html#d101>). It is your responsibility to check if there is a more updated list when you report.

Facilities do not have to report on each of these individual chemicals listed below. Only the sum total of these chemicals is used in calculations.

**List of substances included in PAH calculations**

Name	CAS number	Name	CAS number
Acenaphthene	83-32-9	Dibenzo(a, h)pyrene	189-64-0
Acenaphthylene	208-96-8	Dibenzo(a, i) pyrene	189-55-9
Benzo(a)anthracene	56-55-3	Dibenzo(a, l) pyrene	191 -30-0
Benzo(a)phenanthrene	218-01-9	7H-Dibenzo(c,g)carbazole	194-59-2
Benzo(a)pyrene	50-32-8	7,12-Dimethylbenz(a)anthracene	57-97-6
Benzo(b)fluoranthene	205-99-2	Fluoranthene	206-44-0
Benzo(e)pyrene	192-97-2	Fluorene	86-73-7
Benzo(g,h,i)perylene	191-24-2	Indeno(1,2,3-c,d)pyrene	193-39-5
Benzo(j)fluoranthene	205-82-3	3-Methylcholanthrene	56-49-5
Benzo(k)fluoranthene	207-08-9	5-Methylchrysene	3697-24-3
Dibenz(a,j)acridine	224-42-0	1 -Nitropyrene	5522-43-0
Dibenzo(a,h)acridine	226-36-8	Perylene	198-55-0
Dibenzo(a, h)anthracene	53-70-3	Phenanthrene	85-01-8
Dibenzo(a,e)fluoranthene	5385-75-1	Pyrene	129-00-0
Dibenzo(a,e)pyrene	192-65-4		

## Appendix 4: Volatile Organic Compounds (VOCs)

Volatile organic compounds (VOCs) are a group of almost 1,000 organic substances that volatilize (evaporate) easily. Some VOCs undergo photochemical reactions in the atmosphere and contribute to the formation of particulate matter (PM) and ground-level ozone. High concentrations of ground-level ozone and PM contribute to smog, which affects human health.

There are many industrial and commercial sources of VOCs such as:

- loading and unloading of petroleum products
- petroleum spills
- process venting
- spill remediation
- flaring of untreated natural gas
- evaporative losses from storage tanks
- painting and stripping activities
- degreasing activities
- burning fuel (e.g., oil, wood, coal, natural gas)
- solvents and wood preservatives

The Environmental Reporting and Disclosure Bylaw uses the Canadian Environmental Protection Act (CEPA) definition for VOCs. This is found in Schedule 1 to the Canadian Environmental Protection Act, 1999, section 65 (<http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=24374285-1&offset=14&toc=show#1>). CEPA defines VOCs as: Volatile organic compounds are ones that participate in atmospheric photochemical reactions, excluding the substances listed below:

### Substances not considered VOCs

<b>Substance or group of substances <u>not</u> considered VOCs</b>	<b>CAS No.</b>
(a) methane	74-82-8
(b) ethane	74-84-0
(c) methylene chloride (dichloromethane)	75-09-2
(d) 1,1,1-trichloroethane (methyl chloroform)	71-55-6
(e) 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113)	76-13-1
(f) trichlorofluoromethane (CFC-11)	75-69-4
(g) dichlorodifluoromethane (CFC-12)	75-71-8
(h) chlorodifluoromethane (HCFC-22)	75-45-6
(i) trifluoromethane (HFC-23)	75-46-7
(j) 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114)	76-14-2
(k) chloropentafluoroethane (CFC-115)	76-15-3
(l) 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123)	306-83-2

(m) 1,1,1,2-tetrafluoroethane (HFC-134a)	811-97-2
(n) 1,1-dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
(o) 1-chloro-1,1-difluoroethane (HCFC-142b)	75-68-3
(p) 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	2837-89-0
(q) pentafluoroethane (HFC-125)	354-33-6
(r) 1,1,2,2-tetrafluoroethane (HFC-134)	359-35-3
(s) 1,1,1-trifluoroethane (HFC-143a)	420-46-2
(t) 1,1-difluoroethane (HFC-152a)	75-37-6
(u) parachlorobenzotrifluoride (PCBTF)	98-56-6
(v) cyclic, branched, or linear completely methylated siloxanes	various
(w) acetone	67-64-1
(x) perchloroethylene (tetrachloroethylene)	127-18-4
(y) 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	422-56-0
(z) 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	507-55-1
(z.1) 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC-43-10mee)	138495-42-8
(z.2) difluoromethane (HFC-32)	75-10-5
(z.3) ethylfluoride (HFC-161)	353-36-6
(z.4) 1,1,1,3,3,3-hexafluoropropane (HFC-236fa)	690-39-1
(z.5) 1,1,2,2,3-pentafluoropropane (HFC-245ca)	679-86-7
(z.6) 1,1,2,3,3-pentafluoropropane (HFC-245ea)	24270-66-4
(z.7) 1,1,1,2,3-pentafluoropropane (HFC-245eb)	431-31-2
(z.8) 1,1,1,3,3-pentafluoropropane (HFC-245fa)	460-73-1
(z.9) 1,1,1,2,3,3-hexafluoropropane (HFC-236ea)	431-63-0
(z.10) 1,1,1,3,3-pentafluorobutane (HFC-365mfc)	406-58-6
(z.11) chlorofluoromethane (HCFC-31)	593-70-4
(z.12) 1-chloro-1-fluoroethane (HCFC-151a)	1615-75-4
(z.13) 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)	354-23-4
(z.14) 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane (C <sub>4</sub> F <sub>9</sub> OCH <sub>3</sub> )	163702-07-6
(z.15) 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ( (CF <sub>3</sub> ) <sub>2</sub> CF <sub>2</sub> OCH <sub>3</sub> )	163702-08-7
(z.16) 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane (C <sub>4</sub> F <sub>9</sub> OC <sub>2</sub> H <sub>5</sub> )	163702-05-4
(z.17) 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ( (CF <sub>3</sub> ) <sub>2</sub> CF <sub>2</sub> OC <sub>2</sub> H <sub>5</sub> )	163702-06-5

(z.18) methyl acetate 79-20-9

perfluorocarbon compounds that fall into these classes:

(i) cyclic, branched or linear, completely fluorinated alkanes various

(ii) cyclic, branched or linear, completely fluorinated ethers with no unsaturations various

(iii) cyclic, branched or linear, completely fluorinated tertiary amines with no unsaturations, and various

(iv) sulphur containing perfluorocarbons with no unsaturations and with sulphur bonds only to carbon and fluorine. various

This definition doesn't name chemicals that are VOCs, but rather identifies substances that are not considered in calculating total VOCs. It is your responsibility to identify the substances that are VOCs when you do your calculations. Below are some examples of chemicals and groups of chemicals that would be considered VOCs under the bylaw.

#### Some example categories of volatile organic compounds

Category	Example Compounds
<b>Alcohols</b>	Ethanol Isopropyl alcohol Methanol
<b>Alkanes</b>	n-Butane Propane Octane
<b>Alkenes</b>	Ethylene Propylene Isobutene trans-2-Pentene
<b>Alkynes</b>	Acetylene
<b>Aromatics</b>	Benzene Benzo(a)pyrene Fluoranthene Toluene 1,2,4-Trimethylbenzene Xylene (all isomers)
<b>Aldehydes</b>	Formaldehyde Acetaldehyde
<b>Ketones</b>	Methyl isobutyl ketone
<b>Ethers</b>	Methyl <i>tert</i> -butyl ether Tripropylene glycol monomethyl ether

**Esters**

Dimethyl phthalate  
Dibutyl phthalate

---

Please note:

- 10 VOCs are listed in the bylaw as individual substances under Group A: Acetaldehyde, Acrolein, Benzene, 1,3-Butadiene, Carbon tetrachloride, Chloroform, 1,4-Dichlorobenzene, 1,2-Dichloroethane, Formaldehyde and Trichloroethylene
- PAHs (Group B substances) are also considered VOCs
- You will need to report these Group A and Group B substances separately if your facility meets the criteria for reporting these individual substances
- You must also include these substances, along with all other VOC substances emitted at your facility to calculate the emission of total VOCs during the reporting year

Your estimate for total VOC air emissions must be based on the total mass of all VOC substances emitted at your facility for the year of your report.

## Appendix 5: Methods of Estimation

There are several ways you can estimate the amount of a chemical that was manufactured, processed, otherwise used, or released. For the estimates, facilities are expected to use reasonably available information. When you report data to the City, you are required to indicate which estimation method you used. Some examples of methods are:

- Continuous Emission Monitoring Systems (CEMS)
- Predictive Emission Monitoring (PEM)
- Source testing
- Mass balance
- Site-specific emission factor
- Published emission factor
- Engineering estimates

A description of the available estimation methods and some examples are provided below. More detailed explanation of these are provided in Environment Canada's NPRI Toolbox at <http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=65A75CDF-1>

### A5.1 Continuous Emission Monitoring Systems

Continuous emission monitoring systems (CEMS) record emissions/releases over an extended and uninterrupted period. Once the contaminant concentration and the flow rate have been determined, release or emission rates can be calculated by multiplying the contaminant concentration by the discharge flow rate or volumetric stack gas flow rate. Annual emissions/releases of the contaminant can then be estimated by multiplying the contaminant concentration by the annual flow rate of the discharged effluent or gases in the stack or duct.

#### **Example: Nitrogen oxides (NO<sub>x</sub>) emissions from an oil-fired boiler.**

*The following example illustrates the estimation of NO<sub>x</sub> emissions from an oil-fired boiler that has Continuous Emission Monitoring (CEM).*

Step 1 - Obtain the CEM Output

Period	Fuel rate, Q <sub>fuel</sub> (10 <sup>3</sup> kg/hr)	Stack Gas Flow Rate, Q <sub>stack</sub> (m <sup>3</sup> /min)	NO <sub>x</sub> measured Concentration, C (mg/L)
1:00	15.4	3 576	175
1:10	16.9	3 855	186
1:20	15.3	3 433	155
1:30	16.0	3 720	175
1:40	16.5	3 760	164
1:50	16.3	3 754	158
2:00	16.2	3 825	179

## Step 2 - Calculate emissions

The following equation is used to calculate emissions from the measured concentrations:

$$\text{CER}_x = (\text{C}_x \times \text{MW}_x \times \text{Q}_{\text{stack}} \times 60) / (\text{V} \times 10^6)$$

Where:

$\text{CER}_x$  = calculated emission rate of contaminant "x", kg/hr

$\text{C}_x$  = Concentration of contaminant "x", mg/L

$\text{M}_x$  = Molar mass of the contaminant "x", g/mole

$$\text{M}_{\text{NO}_x} = 46 \text{ g/mole (as } \text{M}_{\text{NO}_2}\text{)}$$

$\text{Q}_{\text{stack}}$  = Dry stack gas volumetric flow rate at reference conditions, m<sup>3</sup>/min  
(reference conditions: 101.325 kPa and 25°C)

$\text{V}$  = Volume occupied by 1 mole of ideal gas at reference conditions (24.45 litres/mole)

Performing this calculation for every measurement gives the results shown in the following table:

Period	Fuel rate, Q fuel (10 <sup>3</sup> kg/hr)	Stack Gas Flow Rate, Q <sub>stack</sub> (m <sup>3</sup> /min)	NOx measured Concentration, C (mg/L)	NOx calculated Emission Rate, CER (kg/hr)
1:00	15.4	3,576	175	73
1:10	16.9	3,855	186	81
1:20	15.3	3,433	155	66
1:30	16.0	3,720	175	74
1:40	16.5	3,760	164	77
1:50	16.3	3,754	158	73
2:00	16.2	3,825	179	79
			Average =	75

According to these calculations, the estimated average emission rate of NOx during the time sampled is 75 kg/hr.

## A5.2 Predictive Emission Monitoring

Predictive emission monitoring (PEM) is based on developing a correlation between contaminant release/emission rates and process parameters (e.g., fuel usage, steam production, furnace temperature). PEM may be considered a hybrid of continuous monitoring, emission factors and stack tests. A correlation test must first be performed to determine the relationship between contaminant emission rates and process parameters. Releases/emissions can then be calculated or predicted using process parameters to predict release/emission rates based on the results of the initial source test.

**Example: Emissions of particulate matter (PM<sub>2.5</sub>) from a boiler firing heavy fuel oil**  
*Emissions of particulate matter with diameter less or equal to 2.5 micrometres (PM<sub>2.5</sub>) from a boiler firing heavy fuel oil (HFO) are estimated in this example. To utilize the PEM approach, a model or relationship between PM<sub>2.5</sub> emission rates and fuel consumption must first be developed. An example of a model relationship is shown below.*

## Step 1 - Get the PEM Data

Correlate the PM<sub>2.5</sub> emission rates to the HFO consumption rate of the boiler in the PEM as listed in the table below.

Parameters	PEM data									
HFO consumption rate (GJ/h)	71	72	73	74	75	76	77	78	79	80
PM <sub>2.5</sub> emission rate (kg/h)	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.9

Once the predictive model has been tested and verified it can then be used along with the operation fuel use consumption rate to estimate annual PM<sub>2.5</sub> emissions from the unit.

The following table illustrates how the predictive model is used to estimate PM<sub>2.5</sub> emissions for a specific time period.

PEM Monitoring Results		Predicted PM <sub>2.5</sub>
Time (hr)	Fuel Rate (GJ/hr)	Emission Rate (kg/hr)
1	74	1.7
2	74	1.7
3	76	1.8
4	75	1.7
5	76	1.8
6	77	1.8
7	78	1.8
8	79	1.8
9	80	1.9
10	80	1.9
<b>Total for period</b>	769 GJ/10 hours	17.9 kg/10 hours
<b>Average for period</b>	76.9 GJ/h	1.79 kg/h

## Step 2 - Calculate Emissions

The general formula for estimating emissions for contaminant "x" is:

$$E_x = E_{x,ave} \times T$$

Where:

$E_x$  = Emission of contaminant "x", kg/year

$E_{x,ave}$  = Average emission rate of contaminant "x", kg/hr

T = Total operating hours in a given year

Given that the above boiler unit operated under the same condition for 7,500 hours in the year, the estimated PM<sub>2.5</sub> emissions ( $E_{PM2.5}$ ) would be as follows:

$$E_{PM2.5} = 1.79 \times 7,500 = 13,425 \text{ kg PM}_{2.5} \text{ /year} = 13.42 \text{ tonnes per year}$$

### A5.3 Source Testing

Source testing involves collecting a sample of the emission or effluent, then determining the concentration of one or more substances in the sample. The concentration of the substance(s) of interest is then multiplied by the volumetric flow rate to determine the amount of the substance(s) emitted/released over time. Source testing of air emissions generally involves inserting a sampling probe into the stack or duct to collect a volume of exhaust effluent isokinetically. The contaminants collected in or on various media are subsequently analyzed. For liquid effluents, grab samples or 24-hour composite samples are extracted from the effluent stream. Source testing is often conducted as a regulatory requirement for provincial, territorial or regional authorities

Next you will find two examples of this estimation method. These source testing examples are based on measured concentrations of the substance in a waste stream and the volume/flow rate of that stream.

#### **Example 1. Volatile Organic Compounds (VOC) in a painting spray booth.**

*This example illustrates the use of source test data to estimate process emissions from a paint spray booth. The materials emitted from the spray booth stack are 100% VOC.*

Step 1. Identifying Operating Parameters:

Stack flow rate: 30,000 m<sup>3</sup>/hour  
Average measured VOC concentration from stack: 0.002 kg VOC/m<sup>3</sup>  
Spray booth annual operation: 2,000 hours/year

Step 2 - Estimating Emissions

Since source testing provides a VOC concentration and the average stack exhaust flow rate, the concentration can be converted to a mass flow rate:

Mass flow rate = volumetric flow rate x concentration  
= 30,000 m<sup>3</sup>/hour x 0.002 kg VOC/m<sup>3</sup>  
= 60 kg VOC/hour

The annual VOC emissions can be estimated using the mass flow rate and the annual hours of operation for the spray booth:

VOC emissions = mass flow rate x annual hours operation  
= 60 kg VOC/hour x 2,000 hours  
= 120,000 kg VOC or 120 tonnes

#### **Example 2. Chromium (VI) in a galvanizing facility.**

*A galvanizing facility discharges its wastewater to a nearby body of water. The electroplater is required to monitor this discharge once a month for various parameters, including the release of chromium (VI). What is the annual release of chromium (VI) to the wastewater by this galvanizer?*

### Step 1

Gather wastewater flow and concentration data from the monitoring results done in compliance with the municipal by-law for wastewater discharges. Analytical results for chromium (VI) for the year are presented in the table below.

### Step 2

Calculate the mass loading for those days on which a chromium (VI) analysis was performed. This is done by multiplying the daily flow by the measured chromium (VI) concentration.

Concentration of Chromium (VI) in Wastewater			
Day	Wastewater Flow (10 <sup>6</sup> L/d)	Chromium (VI) Concentration (µg/L)	Chromium (VI) Releases (kg/d)
<i>Jan. 8</i>	1.57	918	1.44
<i>Feb. 12</i>	1.49	700	1.04
<i>Mar. 10</i>	1.58	815	1.28
<i>Apr. 15</i>	1.66	683	1.13
<i>May 9</i>	1.38	787	1.09
<i>June 13</i>	1.29	840	1.08
<i>July 11</i>	1.73	865	1.50
<i>Aug. 10</i>	1.60	643	1.03
<i>Sept. 8</i>	1.75	958	1.68
<i>Oct. 12</i>	1.56	681	1.06
<i>Nov. 10</i>	1.80	680	1.22
<i>Dec. 8</i>	1.63	627	1.02
<b>Average =</b>			<b>1.21</b>

### Step 3: Calculate annual releases

Based on an average daily release of 1.21 kg/d over the year and 250 days of discharge during the year, the yearly chromium (VI) discharged to water is:

$$1.21 \text{ kg/d} \times 250 \text{ d/yr} = 302.5 \text{ kg/yr} = 0.303 \text{ tonnes/yr}$$

4.2.4

## A5.4 Mass Balance Calculations

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

The general equation for a mass balance is:

$$M_{in} = M_{out} + M_{accumulated/depleted}$$

Where:

$M_{in}$  = Mass of compound in the raw material feed

$M_{\text{out}}$  = Mass of compound in the finished product and released to air, land and water

$$(M_{\text{out}} = M_{\text{product}} + M_{\text{emitted}})$$

$M_{\text{accumulated/depleted}}$  = Mass of compound accumulated or depleted in the system

The reliability of release estimates based on mass balances is dependent on the source type considered. Mass balance methods may be preferred for some releases, such as solvent use and loss. This method may not be suitable for many other sources, such as cases where chemical transformation of input streams occurs.

Pollution control equipment should be accounted for when mass balance calculations are performed.

### Example. Electroplating – Using mass balance.

*An electroplating facility operates a vapour degreaser. Suppose that 14 tonnes of trichloroethylene are used as a degreasing agent. Spent solvent and sludge that accumulate on the bottom of the degreaser are collected in drums for shipment to an off-site solvent reclaimer. Thirteen drums of solvent were sent to the reclaimer during the past year.*

*A known volume of a representative sample taken from the drums is weighed, allowed to evaporate, and reweighed. From this, it is determined that the density of the sludge is 1.03 kg/L and that the trichloroethylene concentration in the sludge shipped to the reclaimer is 30%.*

#### Step 1

The entire 14 tonnes of solvent is released from the facility either as an air emission or as a transfer in the sludge. If the quantity of spent solvent shipped to the reclaimer is known, then the quantity transferred can be calculated based on the volume of sludge and the density of the sludge as shown below:

Volume of trichloroethylene to reclaimer

$$= 13 \text{ drums} \times 210 \text{ L/drum} = 2\,730 \text{ L}$$

Mass of trichloroethylene to reclaimer:

$$= \text{volume of sludge} \times \text{density of sludge} \times \% \text{ trichloroethylene in sludge}$$

$$= 2\,730 \text{ L} \times 1.03 \text{ kg/L} \times 0.30$$

$$= 844 \text{ kg}$$

$$= 0.844 \text{ tonnes}$$

#### Step 2

The quantity of trichloroethylene emitted to air can then be calculated by mass balance by subtracting the quantity shipped in sludge to the reclaimer from the quantity purchased:

$$\mathbf{14 \text{ tonnes (purchased)} - 0.84 \text{ tonnes (to reclaimer)} = 13.164 \text{ tonnes}}$$

Note: In this example, Trichloroethylene is also a VOC. Therefore, this number will be included in the calculation of Total VOCs emissions to air.

## A5.5 Site-specific and Published Emission Factors

An emission factor is based on average measured emissions from several similar processes. Emission factors usually express releases as a ratio of quantity released to process or equipment throughput. Emission factors have been published by government agencies and industry associations for application to emission sources in their particular jurisdiction or industrial sector. Industrial facilities may also develop their own site-specific emission factors using emission-testing data and source-activity information. For a particular piece of equipment, specified emission factors may be available from the manufacturer or sales centre. When completing the report, you must specify whether a site-specific emission factor or published emission factor was used.

The basic equations for determining emissions from emission factors are as follows:

$$E_x = BQ \times CEF_x \quad \text{or} \\ E_x = BQ \times EF_x \times (100 - CE_x)/100$$

Where:

$E_x$  = Emission of contaminant x in kg

BQ = Activity rate or base quantity (BQ), base quantity unit

$CEF_x$  = Controlled emission factors of contaminant x, in kg/BQ (value is dependent on the external control device installed)

$EF_x$  = Uncontrolled emission factors of contaminant x, in kg/BQ

$CE_x$  = Overall emission control efficiency of contaminant x, %

The FIRE database and the AP-42 are comprehensive repositories of process-specific emission factors. Other emission factors for priority substances can be located using the NPRI's toolbox website.

When making use of emission factors, ensure that you note the units and convert if necessary.

The following examples demonstrate the use of published emission factors:

### **Example 1. Electroplating – Using published emission factors**

*Suppose the electroplater previously mentioned has no information about the spent solvent and sludge accumulating on the bottom of the degreaser.*

#### Step 1

In this case, the emission factor is found in a U.S. Environmental Protection Agency publication entitled "Toxic Air Pollutant Emission Factors - A Compilation for Selected Air Toxic Compounds and Sources". For an open-top vapour degreaser without emission control equipment using trichloroethylene (TCE), the emission factor is given as 0.93 tonne/tonne TCE used.

#### Step 2

Calculate the annual releases to air from the vapour degreaser as follows:

TCE released = TCE used X emission factor (TCE released/tonne used)

14 tonnes X 0.93 tonne/tonne = 13 tonnes

When emission control devices are used, atmospheric releases are estimated by multiplying the "uncontrolled" emission by the quantity  $(1 - C/100)$ , where C is the control device efficiency. In this example, no emission control devices were mentioned and therefore  $C = 0$ .

Note: In this example, Trichloroethylene is also a VOC. Therefore, this number will be included in the calculation of Total VOCs emissions to air.

### **Example 2. Dry cleaning – using published emission factors**

*Suppose that we need to estimate the amount of Perc (perchloroethylene) emitted by a well-controlled dry cleaning facility. Assume the dry cleaner averages 0.5 tonnes of garments per hour and operates for 1,500 hr/yr.*

#### Step 1

The emission factor is found in a U.S. Environmental Protection Agency publication entitled "Toxic Air Pollutant Emission Factors - A Compilation for Selected Air Toxic Compounds and Sources", in Chapter 4. Evaporation Loss Sources. There are two emission factors provided in the mentioned document, one for typical systems and another for well-controlled systems. For a well-controlled system, the emission factor is given as 3.0 kg Perc/tonne clothes cleaned.

#### Step 2

Calculate the annual releases to air from the dry cleaner as follows:

Perc released = clothes cleaned x emission factor (Perc released/tonne clothes)

Perc released = 0.5 tonne clothes/hr x 1,500 hr/yr x 3.0 kg Perc/tonne clothes

Perc released = 2,250 kg Perc/yr

Perc released = 2.25 tonnes Perc/yr

As mentioned in the previous example, when emission control devices are used, atmospheric releases are estimated by multiplying the "uncontrolled" emission by the quantity  $(1 - C/100)$ , where C is the control device efficiency. In this example, the control device efficiency is considered in the emission factor for well-controlled systems that we choose. Therefore,  $C = 0$  in our calculation.

## **A5.6 Engineering Estimates**

In many cases, sound engineering assessment is the most appropriate approach to determining process factors and base quantity values. Releases can be estimated from engineering principles and judgment, by using knowledge of the chemical and physical processes involved, the design features of the source and an understanding of the applicable physical and chemical laws. The reliability of these estimates depends on the complexity of the process and the level of understanding of its physical-chemical properties. To apply an engineering assessment method, follow these four basic principles:

Review all data pertaining to the specific source and to the industrial sector in general. Use this data to provide gross approximations and refine these using sound engineering principles as data become available to provide more accurate estimations. Whenever possible, alternate methods of calculation should be followed to cross-check each level of approximation. Employ good record keeping by documenting all related information for further emission refinement when more accurate data become available.

#### *Emission Models:*

Emission estimation models, also known as emission estimation tools, are equipment-specific and may be available from process developers and designers, government agencies or others.

Emission models generally require detailed input, such as equipment specifications, process and environmental conditions and other factors that affect emissions. Generally, these models also have default input parameters, such as meteorological data, which can be used when site-specific information is not available. Review all the default data carefully to ensure that they apply to local conditions. The resulting estimates should also be reviewed to ensure their accuracy. The U.S. EPA's TANKS software, used to estimate VOC releases from storage tanks, is an example of an emission model.

## **A5.7 Sources of Information**

There are several sources of manuals, software and data that may be useful in the estimation of the amounts of the bylaw chemicals used or released by a facility. Here are some useful sources of information:

### **NPRI toolbox**

The National Pollutant Release Inventory (NPRI), Environment Canada has compiled a toolbox for facilities at

<http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=65A75CDF-1>

It has example calculations, case studies, and calculation spreadsheets for several processes (mainly for estimation of nitrogen oxides, particulate matter, and polycyclic aromatic hydrocarbons or PAHs). NPRI also provides additional guidance for specific processes such as cooling towers, welding, wastewater, and wood preservation.

### **U.S. EPA Emission factor collection**

The U.S. Environmental Protection Agency has compiled emission factors for a number of toxic chemicals in a database called Factor Information Retrieval (FIRE). WebFire is the Internet version of this resource (<http://cfpub.epa.gov/oarweb/index.cfm?action=fire.main>). In addition, the EPA's Compilation of Air Pollutant Emission Factors, known as AP-42 (<http://www.epa.gov/ttnchie1/ap42/>), provides an overview of an industry's processes, its pollution sources and the control measures to reduce emissions.

### **Australian NPI Emission Estimation Manuals**

The Australian National Pollutant Inventory (NPI) has developed a variety of Emission Estimation Technique Manuals (EETs) for diverse

industrial sectors that use or produce priority substances.  
(<http://www.npi.gov.au/publications/emission-estimation-technique/index.html>)

### **Industry Associations**

Local, provincial or national industry associations may be able to provide you with tools and other guidance to help identify reportable chemicals your facility uses. They may also be able to help you with calculations.

### **Permits and Certificates of Approval or Environmental Compliance Approval**

Municipal and provincial operating permits and certificates of approval may be another source of information about chemicals at your facility.

## Appendix 6: Examples of reporting priority substances

### Example 1: Reporting the manufacture and release of NO<sub>x</sub>

*In this example, a facility consumed 900,000 m<sup>3</sup> of natural gas in 2010 to operate its process equipment. This facility has no emission control devices for natural gas combustion. ChemTRAC calculator (found at [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac)) calculated that the combustion of this natural gas released 1,442 kg of NO<sub>x</sub> as a by-product.*

Under the Environmental Reporting and Disclosure Bylaw, creation of a by-product is considered as manufacture. Since there is no emission control device for the combustion process in this example, the quantity of NO<sub>x</sub> released (1,442 kg) to air is equal to the quantity of NO<sub>x</sub> manufactured.

Therefore in the ChemTRAC report, the facility must enter the amount (1,442 kg) as "Manufactured".

The facility must enter the same amount (1,442 kg) into the "Release To Air" field.

The ChemTRAC report for NO<sub>x</sub> for this facility is shown below:

NITROGEN OXIDES (NO <sub>x</sub> )	
Quantity (kg)	Estimation Method
If you used more than one method to estimate data, please choose the main one	
Manufactured: 1142	ChemTRAC calculator
Processed:	- Select Estimation Method From List -
Otherwise Used:	- Select Estimation Method From List -
Release to Air: 1142	ChemTRAC calculator
Release to Land:	- Select Estimation Method From List -
Release to Surface Water:	- Select Estimation Method From List -

If this facility, however did operate an emission control device with 80% efficiency, only 20% of the NO<sub>x</sub> manufactured would be released to air. Therefore the amount to enter in the RELEASE section would be 20% of the amount manufactured as shown in the next page.

## NITROGEN OXIDES (NOX)

	Quantity (kg)	Estimation Method
If you used more than one method to estimate data, please choose the main one		
Manufactured:	<input style="width: 100%;" type="text" value="1142"/>	<input style="width: 100%;" type="text" value="ChemTRAC calculator"/>
Processed:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>
Otherwise Used:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>
Release to Air:	<input style="width: 100%;" type="text" value="288"/>	<input style="width: 100%;" type="text" value="ChemTRAC calculator"/>
Release to Land:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>
Release to Surface Water:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>

### Example 2: Reporting the manufacture and release of PM<sub>2.5</sub>

*In this example, a facility released 500 kg of PM<sub>2.5</sub> in 2010 from the wood sanding process as a by-product. There is no emission control device operated at this facility.*

Under the Environmental Reporting and Disclosure Bylaw, the creation of a by-product is considered as manufacture. Since there are no emission control devices for the wood sanding process in this example, the quantity of PM<sub>2.5</sub> released (500 kg) is equal to the quantity of PM<sub>2.5</sub> manufactured.

Therefore in the ChemTRAC report, the facility must enter the amount (500 kg) as "Manufactured".

The facility must enter the same amount (500 kg) into the "Release To Air" field.

The ChemTRAC report for PM<sub>2.5</sub> for this facility is shown below:

## PARTICULATE MATTER 2.5 (PM 2.5)

	Quantity (kg)	Estimation Method
If you used more than one method to estimate data, please choose the main one		
Manufactured:	<input style="width: 100%;" type="text" value="500"/>	<input style="width: 100%;" type="text" value="ChemTRAC calculator"/>
Processed:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>
Otherwise Used:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>
Release to Air:	<input style="width: 100%;" type="text" value="500"/>	<input style="width: 100%;" type="text" value="ChemTRAC calculator"/>
Release to Land:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>
Release to Surface Water:	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text" value="- Select Estimation Method From List -"/>

### Example 3: Reporting the process and release of VOCs

*In this example, a facility used 10,000 kg of VOCs as ingredients in the manufacture of perfume in 2010. Source testing method estimated the release of 150 kg VOCs from this facility in 2010.*

Since 150 kg of VOCs was released to air from this facility, a ChemTRAC report must be submitted as the reporting threshold for VOCs (100 kg release to air) is exceeded.

The content of the ChemTRAC report must include the quantity of VOCs that is manufactured, processed, otherwise used, and released.

Since 10,000 kg of VOCs was used to manufacture perfume, this quantity must be reported as "Processed" in ChemTRAC report.

The 150 kg of VOCs released from this facility must be reported in the "Release To Air" field.

The ChemTRAC report for VOCs for this facility is shown below:

VOLATILE ORGANIC COMPOUNDS (VOCs) TOTAL		
	Quantity (kg)	Estimation Method
If you used more than one method to estimate data, please choose the main one		
Manufactured:	<input type="text"/>	- Select Estimation Method From List -
Processed:	10000	Mass balance
Otherwise Used:	<input type="text"/>	- Select Estimation Method From List -
Release to Air:	150	Source testing
Release to Land:	<input type="text"/>	- Select Estimation Method From List -
Release to Surface Water:	<input type="text"/>	- Select Estimation Method From List -

### Example 4: Reporting the manufacture, process and release of VOCs

*In this example, a facility used 10,000 kg of VOCs as ingredients in the manufacture of perfume in 2010. Source testing method estimated the release of 150 kg of VOCs from Stack 1 at this facility in 2010.*

*The manufacturing process of perfume required the consumption of 500,000 m3 of natural gas, which resulted in the release of 44 kg of VOCs as a by-product from natural gas combustion (calculation completed using ChemTRAC calculator found at [www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac)). The 44 kg of VOCs was released to air from Stack 2.*

The total quantity of VOCs released from this facility is determined by combining the emissions from Stack 1 (150 kg) and Stack 2 (44 kg), which is calculated to be (150+44) 194 kg. Therefore, the reporting threshold of VOCs (100 kg release to air) is exceeded, and a ChemTRAC report must be submitted.

The content of the ChemTRAC report must include the quantity of VOCs that is manufactured, processed, otherwise used, and released.

Since 10,000 kg of VOCs was used to manufacture perfume, this quantity must be reported as "Processed" in the ChemTRAC report.

Under the Environmental Reporting and Disclosure Bylaw, the creation of a by-product is considered as manufacture. For the combustion of natural gas, the quantity of VOCs released (44 kg) to air is equal to the quantity of VOCs manufactured.

Therefore in the ChemTRAC report, the facility must enter the amount (44 kg) as "Manufactured".

The facility must enter the amount (194 kg) into the "Release To Air" field.

The ChemTRAC report for VOCs for this facility is shown below:

<b>VOLATILE ORGANIC COMPOUNDS (VOCs) TOTAL</b>	
Quantity (kg)	Estimation Method
If you used more than one method to estimate data, please choose the main one	
Manufactured: <input type="text" value="44"/>	<input type="text" value="ChemTRAC calculator"/>
Processed: <input type="text" value="10000"/>	<input type="text" value="Mass balance"/>
Otherwise Used: <input type="text"/>	<input type="text" value="- Select Estimation Method From List -"/>
Release to Air: <input type="text" value="194"/>	<input type="text" value="Other"/>
Release to Land: <input type="text"/>	<input type="text" value="- Select Estimation Method From List -"/>
Release to Surface Water: <input type="text"/>	<input type="text" value="- Select Estimation Method From List -"/>