

Guide to calculations for ChemTRAC reporting:

Household furniture (except wood and upholstered) manufacturing

Version 1.2

June 2013

Contents

How do I use this guide?

Part 1 of this guide will help you understand the ChemTRAC program, collect information about your facility, use the ChemTRAC calculator for Household Furniture manufacturing, and report to ChemTRAC, if needed.

Part 2 of this guide will help you reduce your facility's environmental impact.

The Appendices provide additional information about emissions calculations.

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City of Toronto, 2012

For more information about ChemTRAC, call 3-1-1 or visit www.toronto.ca/chemtrac

DISCLAIMER: This guide is for educational and informational purposes only. The City of Toronto assumes no liability for the accuracy or completeness of these materials. Readers are responsible for ensuring compliance with Toronto's Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423). These materials should not be relied upon as a substitute for legal or professional advice. Readers should seek their own legal or professional advice in regard to their use of the information contained in the guide.

Introduction to the ChemTRAC program

There are chemicals in Toronto's environment that can harm our health. These substances come from vehicle exhaust, homes, businesses and other sources.

Toronto Public Health identifies 25 of these chemicals as "priority substances" because they are found in our local environment at levels that are of concern for health. Evidence links these substances to short-term health effects like respiratory problems, and longer-term impacts such as cancer. In a business setting, these substances can come from process heating, cleaning with solvents, welding and other processes.

The list of 25 substances and the reporting thresholds are included in Table 6 on page 44.

ChemTRAC is a City of Toronto program that:

- tracks where businesses use and release these priority substances
- helps businesses reduce or replace these substances with safer alternatives, and
- provides the public with information on priority substances in their community.

As part of ChemTRAC, Toronto's Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423) requires many businesses to report to the City each year if they use or release a certain amount of priority substances to the environment. Household furniture manufacturers are covered by this bylaw.

This guide is designed to help you and other household furniture manufacturer facility owners:

- understand if your facility uses and releases any ChemTRAC priority substances
- use ChemTRAC calculators to determine if you are required to report to the City of Toronto
- use the ChemTRAC online reporting system to submit data to the City, and
- consider ways to reduce your environmental impact.

Additional information on the ChemTRAC program and the Environmental Reporting and Disclosure Bylaw is available by calling 3-1-1 or online at: [**http://www.toronto.ca/chemtrac/**](http://www.toronto.ca/chemtrac/)

The Household Furniture (except Wood and Upholstered) Manufacturing sector

The North American Industrial Classification System (NAICS) code 337126 includes all establishments that manufacture household furniture other than wood and upholstered furniture. It includes facilities that manufacture metal / brass / wrought iron beds, furniture, and free standing cabinets. It also includes facilities that manufacture glass, plastic, wicker and rattan furniture.

This guide uses the term “household furniture” manufacturers to refer to all facilities within the “Household Furniture (except Wood and Upholstered) Manufacturing” sector (NAICS 337126).

Household furniture manufacturers are required to report their data every year if they use or release above the reporting threshold. The report is due by June 30 each year. Annual data that is reported each June should cover the period from January 1 to December 31 of the previous year.

Identifying ChemTRAC substances in household furniture manufacturers

Table 1 lists the typical processes used in a household furniture manufacturing facility. Many facilities will use metal surface coatings and solvent cleaners / degreasers as part of manufacturing. Many facilities will also use natural gas-fired ovens for cooking / drying.

Table 1 also shows the ChemTRAC priority substances that are released in a typical household furniture manufacturing facility.

The ChemTRAC calculator can help you estimate the level of these substances in your business.

Table 1. ChemTRAC substances released in a typical household furniture manufacturer and their sources

ChemTRAC priority substances	Steps in manufacturing		
	Solvent degreaser	Metal coating	Natural gas fired cookers / dryers
Nitrogen Oxides			X
Formaldehyde			X
Benzene			X
Cadmium and its compounds			X
Chromium and its compounds			X
Lead and its compounds			X
Manganese and its compounds			X
Mercury and its compounds			X
Nickel and its compounds			X
Particular matter (PM _{2.5})			X
PAHs			X
Volatile organic compounds (VOCs)	X	X	X

Part 1: Gathering data, using the calculator, and reporting to ChemTRAC

Most of the substances listed in Table 1 are released in very small amounts. It is likely that only VOCs and combustion by-products NO_x and $\text{PM}_{2.5}$ would be released in amounts that could require reporting to the ChemTRAC program.

Volatile Organic Substances (VOCs). VOCs are a group of organic chemicals that easily evaporate into the air. You can often smell them. They are released from various products, including from paints, varnishes, enamels, lacquers and adhesives.

Combustion by-products from natural gas burners. Several substances are released when natural gas is burned (i.e. combusted) for drying. When natural gas is combusted to generate heat, it releases ChemTRAC priority substances. Nitrogen oxides are released in the most significant quantities. Particulate matter that is smaller than 0.0025 millimetres in diameter ($\text{PM}_{2.5}$) is also released from combustion.

The health effects of $\text{PM}_{2.5}$, VOCs and NO_x

$\text{PM}_{2.5}$. Because of their small size, $\text{PM}_{2.5}$ can lodge deeply into the lungs. Numerous studies have linked PM to aggravated cardiac and respiratory diseases such as asthma, bronchitis and emphysema, and to heart disease.

VOCs. Short-term health effects of exposure to VOCs may include: eye, nose, and throat irritation, headaches, loss of coordination, and nausea. Over longer periods, VOCs can damage the liver, kidneys, and central nervous system.

NO_x . Long-term exposure to NO_x causes or worsens respiratory disease such as emphysema and bronchitis, and can aggravate existing heart disease.

For more information on the health effects of these substances, as well as other ChemTRAC priority substances, visit

<http://www.toronto.ca/health/chemtrac/substances.htm>.

Calculating emissions

To help Toronto businesses calculate their emissions and comply with the Environmental Reporting and Disclosure Bylaw, Toronto Public Health developed calculators that are specific to industrial sectors and processes. Access these calculators from the ChemTRAC website at

<http://www.toronto.ca/health/chemtrac/tools.htm>.

These calculators help businesses do three things:

- Identify which ChemTRAC priority substances are used or released in their facility
- Calculate the amounts of ChemTRAC priority substances used or released
- Determine what they are required to report to the ChemTRAC program.

Appendix B describes how the calculators calculate estimates of the quantities of ChemTRAC priority substances that are released from your facility.

The release of ChemTRAC priority substances can be calculated using methods other than the ChemTRAC calculators. For a list of alternative methods, see

<http://www.toronto.ca/health/chemtrac/tools.htm>.

In the next section, we will work through worksheets to prepare you to use the ChemTRAC calculator for Household Furniture Manufacturing.

Worksheets for collecting information

The worksheets found on the next page are intended to help you collect all the information needed to use the ChemTRAC calculator for Household Furniture Manufacturing. Three worksheets are provided:

- Solvent degreasers
- Metal surface coatings
- Natural gas equipment for drying.

A printer-friendly version of these worksheets can be found as Appendix A. They can be printed and completed by hand so that you have all information available on-hand for entry into the ChemTRAC calculator.

Note: if your facility has more processes than are included in the ChemTRAC calculator for Household furniture manufacturing, you may need to use additional calculators to identify other emissions. You would then add these amounts to the numbers generated by the ChemTRAC calculator for Household furniture Manufacturing. You can use ChemTRAC's "Calculation of Totals" calculator to combine the findings of multiple calculators and determine if you exceed ChemTRAC thresholds. See Appendix C for more details.

Part 1: Gathering data, using the calculator, and reporting to ChemTRAC

Worksheet 1 – Solvent degreasers

This worksheet will help you collect information on the solvent degreasers in your facility. By filling in the [Worksheet 1 tables](#), you will have all the information you need to use the calculator. You should collect data on your facility for the period from January 1 to December 31 of a calendar year.

1. What types of solvent degreasers do you use?

The calculator asks you to choose the **type** of each solvent degreaser from the categories listed in [Worksheet 1 Table 1](#) below. Solvent degreasers are the cleaning agents that are used to remove oil, grease, dirt, and loose particles from surfaces before applying coatings.

You can find this information on the container of each product and use an 'X' to fill in the table below. You can add up to ten different solvent degreasers into the ChemTRAC calculator. Enter this data into [Worksheet 1 Table 1](#).

Worksheet 1 Table 1 – Types of solvent degreasers

Solvent degreaser name	Solvent degreaser type	
example: Degreaser 1 (chairs)	<input type="checkbox"/> Acetone	<input type="checkbox"/> Dichloromethane (methylene chloride)
	<input type="checkbox"/> Ethanol	<input checked="" type="checkbox"/> Tetrachloroethylene (perchloroethylene)
	<input type="checkbox"/> Methanol	
	<input type="checkbox"/> Chloroform	<input type="checkbox"/> Trichloroethylene
_____	<input type="checkbox"/> Acetone	<input type="checkbox"/> Dichloromethane (methylene chloride)
	<input type="checkbox"/> Ethanol	<input type="checkbox"/> Tetrachloroethylene (perchloroethylene)
	<input type="checkbox"/> Methanol	
	<input type="checkbox"/> Chloroform	<input type="checkbox"/> Trichloroethylene
_____	<input type="checkbox"/> Acetone	<input type="checkbox"/> Dichloromethane (methylene chloride)
	<input type="checkbox"/> Ethanol	<input type="checkbox"/> Tetrachloroethylene (perchloroethylene)
	<input type="checkbox"/> Methanol	
	<input type="checkbox"/> Chloroform	<input type="checkbox"/> Trichloroethylene
_____	<input type="checkbox"/> Acetone	<input type="checkbox"/> Dichloromethane (methylene chloride)
	<input type="checkbox"/> Ethanol	<input type="checkbox"/> Tetrachloroethylene (perchloroethylene)
	<input type="checkbox"/> Methanol	
	<input type="checkbox"/> Chloroform	<input type="checkbox"/> Trichloroethylene
Etc. _____		

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2. How much of each product do you use?

You can estimate how much of each product you used last year by multiplying the number of containers you use each year by the volume of each container in litres or gallons. Enter this data into [Worksheet 1 Table 2](#) below. If it is easier, you can start by estimating the number of containers you purchase each week or month.

*Example: $\underline{2}$ containers per month * 12 months per year = $\underline{24}$ containers per year
 $\underline{24}$ containers per year * $\underline{20\text{ L}}$ per container = $\underline{480\text{ L}}$ per year*

[Worksheet 1 Table 2 – Quantity of products used](#)

Solvent name	Containers per year	Size of containers	Quantity used (litres or gallons)
<i>example:</i> Degreaser 1 (chairs)	<u>24</u>	<u>20 litres</u>	<u>$24 * 20 = 480\text{ L}$</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Etc. _____	_____	_____	_____

3. How much of each product do you reclaim as liquid?

Some facilities reuse solvents or reclaim them using distillation systems. These systems are described in the section entitled *Control technologies for reducing emissions*.

If you do not reclaim solvents as liquids, then you should leave this table blank. If you do reclaim or reuse solvents, enter the quantity of liquid reclaimed and reused (in litres) into [Worksheet 1 Table 3](#) below. Again, you can start by estimating the volume reused each day, week or month.

[Worksheet 1 Table 3 – Quantity of products reclaimed](#)

Solvent name	Quantity reclaimed (L)
<i>example:</i> Degreaser 1 (chairs)	<u>300 L</u>
_____	_____
_____	_____
_____	_____
_____	_____
Etc. _____	_____

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Worksheet 2 – Metal surface coatings

This worksheet will help you collect information on the metal surface coatings in your facility. By filling in the [Worksheet 2 tables](#), you will have all the information you need to use the calculator. You should collect data on your facility for the period from January 1 to December 31 of a calendar year.

4. What types of metal surface coatings do you use?

The calculator asks you to choose the **type** of each paint or coating from the categories listed in [Worksheet 2 Table 1](#) below.

- Solvent-based coatings include oil-based, enamel, and alkyd products.
 - a. **High solids** coatings contain at least 65% solid components (binders, pigments and additives).
 - b. **Uncontrolled**, low solids coatings contain less than 65% solid components.
High solid coatings have lower VOC emissions than traditional solvent-based coatings.
- **Waterborne coatings** include acrylic and latex products.

You can find this information on the container of each product and use an 'X' to fill in the table below. You can add up to ten different coatings into the ChemTRAC calculator. Enter this data into [Worksheet 2 Table 1](#).

Worksheet 2 Table 1 – Types of metal surface coatings

Metal surface coating name	Process control (type)
<i>example:</i> Coating 1 (chairs)	<input checked="" type="checkbox"/> <i>Uncontrolled (solvent-based)</i> <input type="checkbox"/> <i>High solids coating (65% solids)</i> <input type="checkbox"/> <i>Waterborne coating</i>
_____	<input type="checkbox"/> <i>Uncontrolled</i> <input type="checkbox"/> <i>High solids coating (65% solids)</i> <input type="checkbox"/> <i>Waterborne coating</i>
_____	<input type="checkbox"/> <i>Uncontrolled</i> <input type="checkbox"/> <i>High solids coating (65% solids)</i> <input type="checkbox"/> <i>Waterborne coating</i>
_____	<input type="checkbox"/> <i>Uncontrolled</i> <input type="checkbox"/> <i>High solids coating (65% solids)</i> <input type="checkbox"/> <i>Waterborne coating</i>
Etc. _____	

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5. How much of each product do you use?

You can estimate how much of each product you used last year by multiplying the number of containers you use each year by the volume of each container in litres or gallons. Enter this data into [Worksheet 1 Table 2](#) below. If it is easier, you can start by estimating the number of containers you purchase each week or month.

*Example: 3 containers per month * 12 months per year = 36 containers per year
36 containers per year * 20 L per container = 720 L per year*

[Worksheet 2 Table 2 – Quantity of products used](#)

Coating name	Containers per year	Size of containers	Quantity used (litres or gallons)
<i>example:</i> Coating 1 (chairs)	<u>36</u>	<u>20 litres</u>	<u>36 * 20 = 720 L</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Etc. _____	_____	_____	_____

6. What is the average thickness of your coatings? (OPTIONAL)

If you have information on coating thickness specific to your facility, enter it in the table below in millimeters (mm). If the different coatings you use have different thicknesses, you should estimate the average thickness. Enter this data into [Worksheet 2 Table 3](#).

Otherwise, you can leave this table blank and use the calculator's default value of 1 mm.

[Worksheet 2 Table 3 – Quantity of products used \(optional\)](#)

What is the average thickness of your coatings?	_____ mm
---	----------

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Worksheet 3 – Natural gas fired equipment (for cooking, drying)

Skip this worksheet if no natural gas fired ovens / dryers / cookers are in operation at your facility.

This worksheet will help you collect information on the quantity of natural gas used by your drying / cooking ovens and on any relevant control technologies (such as filters to capture emissions). You should collect data on your facility for the period from January 1 to December 31 of a calendar year.

7. What control technologies are installed on your ovens?

You can find this information in the operating manuals for each oven.

Descriptions of control technologies can be found in *Control technologies for reducing emissions*. If you do not know which control technologies are in place, assume that none are.

Ovens are equipped with (add a checkmark):

- | | |
|---|--------------|
| a. Low NO _x burners only | _____ |
| b. Low NO _x burners with recirculated flue gas | _____ |
| c. None (no control technologies) | <u> X </u> |

8. How much natural gas is used to heat your ovens / cookers / dryers?

This question can be answered using EITHER Option A or Option B.

Option A – What is the total amount of natural gas used to heat your ovens? You can get this information from your annual gas bills. You should consider only gas used for oven heating. One way to know how much gas is used to heat your ovens is to compare winter and summer bills. Winter bills will likely include oven heating and facility heating. Summer months will likely include only oven heating.

Option B – What is the thermal rating of your ovens? This rating (in BTU/hr, or kJ/hr) would be found in your oven's operating manual. You will also need to estimate the average number of hours per day, days per week, and weeks per year that your ovens are used.

Option A. Total natural gas used to heat the ovens

example:

2000 m³ (cubic metres) OR _____ ft³ (cubic feet)

OR

Option B. Thermal rating of the ovens

_____ BTU/hr OR _____ kJ/hr

Also estimate the average time that the ovens are turned on and heating:

_____ hours per day and _____ days per week and _____ weeks per year

Using the calculator

To calculate your use and release of ChemTRAC substances, you need to enter the information from the worksheets in this guide into the appropriate sections of the ChemTRAC calculator for Household Furniture Manufacturing. The ChemTRAC calculator will then automatically calculate the quantities of ChemTRAC substances released from processes found in your household furniture manufacturing facility. This section of the guide provides a step-by-step walkthrough of the use of the calculator.

Getting started

The ChemTRAC calculator for household furniture manufacturers can be read with software such as Microsoft Excel or Open Office. To find a copy of the calculator, go to <http://www.toronto.ca/health/chemtrac/tools.htm> and click on the *Household Furniture Manufacturing* link found under the *Manufacturing (NAICS 32 and 33)* heading.

The calculator consists of five different screens:

- Instructions
- Input-Output
- All Substances
- Calculations
- References

You only have to enter information into the Input-Output screen. The Instructions screen illustrated below can help you use the calculator. The other screens are provided mainly for reference and are discussed in Appendix B. You do not need to enter information in these screens.¹

You can navigate between screens by clicking the buttons on the left side of each screen or by clicking on the tabs at the bottom of each screen. The navigation buttons are illustrated on the next page.

¹ If you have site-specific emission factors for any ChemTRAC substance, they can be entered manually in the Calculator screen. See Appendix B for details.

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Household Furniture (except wood and upholstered) Manufacturing
Version 3.1 Last Update: December 13, 2011 VS & MDS

This page contains necessary instructions that will help you use this calculator to estimate the amount of priority substances and other chemicals that are manufactured, processed, otherwise used (MPO) and released during **Household Furniture Manufacturing**

How to use this calculator:	1. Click on the "Input-Output" Tab 2. Fill out the appropriate amounts in the yellow boxes 3. Scroll down to view the Output Summary
Input Summary:	1. Select the type(s) and enter the quantities of solvent degreaser(s) used and reclaimed during the reporting year 2. Enter the application rate of metal surface coatings used during the reporting year and select any process control used for each type of coating 3. Enter the quantity of natural gas used during the reporting year 4. Select the appropriate emissions control installed on natural gas-fired equipment 5. Enter the quantity of natural gas used during the reporting year OR Enter the total combined maximum thermal input for all natural gas-fired equipment onsite and operating schedule
Output summary:	This table gives you the estimated quantity of ChemTRAC priority substances this process manufactured, processed, otherwise used and released for the reporting year.
Other processes:	If your facility has other activities or sources that MPO or release priority substances (chemicals), then you need to calculate the amounts of chemicals for these activities as well. Please go to the ChemTRAC website for other calculators and more information.
Total MPO and Releases:	Once you have your estimates for activity(ies) or process(es), enter the amounts of MPO and release of each substance from each process into the "Calculation of Totals" calculator (available at www.toronto.ca/chemtrac) to determine if you need to report.
Before you start make sure you have:	- the type and quantity used (in litres) of all solvent degreasers used and reclaimed during the reporting year - the type and area coated (in square metres) of all metal surface coatings used during the reporting year - the quantity of natural gas used during the reporting year (in cubic metres) OR - the total combined maximum thermal input for all natural gas-fired equipment onsite and operating schedule - the type of emissions control installed on natural gas-fired equipment <i>Note: some of these may not apply to your facility</i>

Navigation buttons

Instructions Input-Output Calculations References +

The Instructions screen

The calculator should open on the Instructions screen. This screen contains instructions on how to use the calculator to estimate the amount of ChemTRAC substances and other substances that are used and released by your household furniture manufacturer. It also provides a brief overview of the contents of the calculator. **You do not need to enter any information on this screen.**

The Input-Output screen

The Input-Output screen is the screen where you will enter all of the information applicable to your facility. Information is typed in **yellow boxes**. Any cells that do not apply to your facility can be left blank. **Dropdown menus** are also used to input some information.

The Input-Output screen can be filled out using the responses to the questions found within **Worksheets 1, 2, and 3** of this guide. The input-output screen includes examples that do not enter into your facility's calculation.

Once you input your facility's information into the appropriate yellow boxes and dropdown menus, the calculator automatically calculates the quantities of ChemTRAC substances that are manufactured, processed, otherwise used and released to air from your facility.² The values are displayed in the **Output table** found at the bottom of the Input-Output screen. The next pages will walk you through the Input-Output screen. The image on the next page illustrates the different areas of the input-output screen.

² The definitions for 'Manufactured', 'Processed', 'Otherwise Used', and 'Released to Air' can be found on the References screen of the ChemTRAC calculator.

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Input

Solvent Degreaser	Type	Quantity Used (L/yr)	Quantity Released to Air (L/yr)
Example - Spray Booth	Mechanical	70	40
Type name here	Select one		
	Select one		
	Select one		
	Select one		
	Select one		
	Select one		
	Select one		
	Select one		
	Select one		
	Select one		

Metal Surface Coating

Estimated coating thickness*: 1 mm

Metal Surface Coating	Process Control	Volume of Coating Used (L/yr)	Application Rate (m ² /yr)
Example - Spray Booth	Uncontrolled	900	800
Type name here	Select One		0
	Select One		0
	Select One		0
	Select One		0
	Select One		0
	Select One		0
	Select One		0
	Select One		0
	Select One		0
	Select One		0

* The default coating thickness is 1 mm. If a specific thickness is available for your process, then please enter it.

Natural Gas Fired Ovens/Conveyers/Boilers

Identify emissions control installed: None

Please complete ONLY A OR B

A) the quantity of natural gas (NG) used

Total quantity of natural gas used: 600,000 m³/yr

OR

B) the power rating and operating schedule of the generator

Total maximum thermal input for all natural gas fired cooking equipment: BTU/hr

Operating schedule: hours/day

days/week

weeks/year

OUTPUT

ChemTRAC Priority Substances	Quantity (kg/yr)			
	Manufactured	Processed	Otherwise Used	Released to Air
Benzene	0	0	0	0
Chromium, and its compounds	0	0	0	0
Chromium (non-hexavalent), and its compounds	0	0	0	0
Formaldehyde	1	0	0	1
Lead, and its compounds	0	0	0	0
Manganese, and its compounds	0	0	0	0
Mercury, and its compounds	0	0	0	0
Nickel, and its compounds	0	0	0	0
Nitrogen Oxides (NOx)	961	0	0	961
Particulate Matter (PM2.5)	73	0	0	73
Total PM10	0	0	0	0
Volatile Organic Compounds (VOCs)	53	0	0	53

n/a - not applicable

*total components released to air

Unit Conversion Table

1	gallon (US)	=	3.78541178	L
1	cubic feet (ft ³)	=	0.0283	m ³
1	square feet (ft ²)	=	0.0929	m ²

Use this box to convert coatings and solvents into litres and volume of gas into cubic metres

Enter data from Worksheet 1 here

Enter data from Worksheet 2 here

Enter data from Worksheet 3 here

The output values are calculated here

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Entering information from Worksheet 1: Solvent degreasers

The image below displays the area of the Input-Output screen where you enter information from Worksheet 1 on solvent degreasers. As an example, the sample information from Worksheet 1 is entered into the appropriate areas of the screen.

Question 1: The type “**tetrachloroethylene (perchloroethylene)**” is selected from the dropdown menu.

Question 2: The quantity of “**480**” L is entered into the yellow box.

Question 3: “**300**” is entered into the yellow box for quantity reclaimed.

If you have information on quantity of solvent in gallons rather than litres, you can use the Unit Conversion Table illustrated on the next page to convert to litres.

Solvent Degreaser	Type	Quantity Used (L/yr)	Quantity Reclaimed as Liquid (L/yr)
Example	Methanol	70	40
Degreaser 1 (chairs)	Tetrachloroethylene (perchloroethylene)	480	300
	Select one	0	0

Entering information from Worksheet 2: Metal surface coatings

The image below displays the area of the Input-Output screen where you enter information from Worksheet 2 on metal coatings. As an example, the sample information from Worksheet 2 is entered into the appropriate areas of the screen.

Question 4: “**Uncontrolled**” (low solids, solvent-based coating) is selected from the dropdown menu.

Question 5: “**720**” is typed into the yellow box as the volume of coating used (L/yr).

Question 6 (optional): If you have information on the thickness of coatings in your facility (in mm), you can enter it into the yellow box at the top of image below. Otherwise, you should leave the default thickness of 1mm.

In the example below, no facility-specific thickness was entered. The calculator used the default thickness of 1mm to automatically calculate the application rate of 720 m²/yr in the grey box.

Metal Surface Coating			
Estimated coating thickness*:		1 mm	
Metal Surface Coating	Process Control	Volume of Coating Used (L/yr)	Application Rate (m ² /yr)
Example - Coating Line	Uncontrolled	900	1000
Coating 1 (chairs)	Uncontrolled	720	720
	Select One	0	0

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If you have information on quantity of coating in gallons, you can use the Unit Conversion Table illustrated in the section below to convert to litres.

Entering information from Worksheet 3: Natural gas fired ovens/cookers/dryers

The image on the next displays the area of the Input-Output screen where you enter information on ovens used for cooking and drying wood. Sample information is entered into the appropriate areas of the screen.

If you have information on natural gas use in cubic feet, you can use the Unit Conversion Table illustrated on the next page to convert to cubic metres.

Question 7: “**None**” (uncontrolled) is selected from the dropdown menu.

Question 8 - Option A: “**2000**” m³/yr is entered as the quantity of natural gas used.

Natural Gas Fired Ovens/Cookers/Dryers		
Identify emissions control installed: None		
Please complete ONLY A OR B		
A) the quantity of natural gas (NG) used		
Total quantity of natural gas used:	2,000	m ³ /yr
OR		
B) the power rating and operating schedule of the generator		
Total maximum thermal input for all natural gas fired cooking equipment:		BTU/h
Operating schedule:		hours/day
		days/week
		weeks/year

Using the Unit Conversion Table

You will need to use the Unit Conversation Table at the bottom right hand side of the input-output screen if:

- **Your information on quantity of solvent degreasers or metal surface coatings is in gallons rather than litres**
- **Your information on quantity of natural gas is in cubic feet rather than cubic metres**

The Unit Conversion Table is illustrated on the next page. Type your input value (in gallons / cubic feet) in the appropriate yellow box. The tool will automatically convert the input value into the correct units in the blue column at the right of the table. Enter the new value (in litres / cubic metres) into the main input table.

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Unit Conversion Table				
1	gallon (US)	=	3.78541178	L
1	cubic feet (ft ³)	=	0.0283	m ³

Reading the Output table

The Output table displays the quantities of ChemTRAC substances that are manufactured, processed, released, or otherwise used in your facility. These values are the results of all of the calculations based on the information entered in the Input-Output Screen. The Output table below is the result of the sample information entered in the *Using the Calculator* section above.

OUTPUT SUMMARY (Only ChemTRAC priority substances)				
ChemTRAC Priority Substances	Quantity (kg/yr)			
	Manufactured ¹	Processed ¹	Otherwise Used ¹	Released to Air ¹
Benzene	0	0	0	0
Cadmium	0	0	0	0
Chromium (non-hexavalent) and its compounds	0	0	0	0
Formaldehyde	0	0	0	0
Lead and its compounds	0	0	0	0
Manganese and its compounds	0	0	0	0
Mercury and its compounds	0	0	0	0
Nickel and its compounds	0	0	0	0
Nitrogen Oxides (NOx)	3	0	0	3
Particulate Matter (PM2.5)	0	0	0	0
Total PAHs	0	0	0	0
Volatile Organic Compounds (VOCs)	0	781	0	294

¹ Definitions available in references

You should compare the values that are manufactured, processed or otherwise used to the ChemTRAC reporting thresholds to see if you are required to report ChemTRAC substances. See Interpreting Results on page 18 for more details.

Interpreting results

Compare results to thresholds. Once the amounts of ChemTRAC substances manufactured, processed, otherwise used have been calculated, you must compare these amounts to the ChemTRAC reporting thresholds listed in the Environmental Reporting and Disclosure Bylaw.³ These thresholds are also listed in Appendix C of this guide.

If results exceed thresholds you must report. If a ChemTRAC priority substance is manufactured, processed, or otherwise used in an amount equal to or greater than its ChemTRAC reporting threshold, then you would need to report that substance and the quantity released to air.

Combining multiple calculation methods. Some facilities may need to add results of the ChemTRAC calculator for Household Furniture with emissions from other processes that happen in the facility. This is discussed in Appendix C.

If there are no other processes and, therefore, the ChemTRAC calculator is the only tool used to estimate emissions, the values in the Output Summary table of the calculator can be compared directly to the ChemTRAC reporting thresholds. See an example in Table 2.

Table 2 on the next page compares the Output table from the section above to ChemTRAC thresholds. This example uses the values from the worksheets and from the section: *Using the calculator*.

³ The full by-law can be found at <http://www.toronto.ca/health/chemtrac/report.htm>.

Part 1: Gathering data, using the calculator, and reporting to ChemTRAC

Table 2. Comparison of results from the ChemTRAC calculator and reporting thresholds

Output Summary table from the ChemTRAC calculator					Comparison to reporting thresholds	
ChemTRAC Priority Substances	Manufactured (kg/yr)	Processed (kg/yr)	Otherwise used (kg/yr)	Released to Air (kg/yr)	ChemTRAC threshold (kg/yr)	Is reporting required?
Benzene	0	0	0	0	100	No
Cadmium and its compounds	0	0	0	0	1	No
Chromium (non-hexavalent) and its compounds	0	0	0	0	100	No
Formaldehyde	0	0	0	0	100	No
Lead and its compounds	0	0	0	0	10	No
Manganese and its compounds	0	0	0	0	10	No
Mercury and its compounds	0	0	0	0	1	No
Nickel and its compounds	0	0	0	0	100	No
Nitrogen Oxides	3	0	0	3	200	No
Particular matter (PM _{2.5})	0	0	0	0	30	No
Total PAHs	0	0	0	0	10	No
Volatile organic compounds (VOCs)	0	781	0	294	100	YES

In the Table 2 example, VOCs are manufactured, processed, or otherwise used in quantities above the reporting thresholds.

Therefore, in this example, the processing and release of VOCs would need to be reported to ChemTRAC.

Reporting to ChemTRAC

You are only required to report to ChemTRAC if you meet or exceed reporting thresholds for one or more priority substances.

Facilities that meet or exceed reporting thresholds for one or more substances must use the Online Reporting System to report to the ChemTRAC program. You can access the system from any computer with an internet connection. If your facility is exempt or below reporting thresholds, you can use the system to notify the City and volunteer environmental information.

You can find the online reporting system on the ChemTRAC webpage:
<http://www.toronto.ca/health/chemtrac/report.htm>.

You will need the following information to report to ChemTRAC

- Your First Time Access Code **OR** Registration ID
- Your facility name, address, number of employees and contact information
- Your NAICS code
- The names of substances you are reporting
- Quantities of priority substances (in kilograms).

The screenshot shows the City of Toronto website's 'ChemTRAC - 4 Steps to Reporting' page. The page header includes the City of Toronto logo and navigation links: HOME, CONTACT US, HOW DO I...?, and a search bar. Below the header is a navigation bar with links: LIVING IN TORONTO, DOING BUSINESS, VISITING TORONTO, and ACCESSING CITY HALL. The main content area is titled 'ChemTRAC - 4 Steps to Reporting' and includes a sub-header 'Reporting to the Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423)'. A red box highlights the link 'Ready to report? ChemTRAC Online Reporting System'. A black arrow points from a text box on the right, which says 'Click here to access the system', to this link. Below the link, there is a paragraph explaining the responsibility of facility owners and a link to 'Frequently Asked Questions about Reporting'. Further down, a section titled 'The following steps are provided as a guide to help you report:' shows a four-step process: Step 1 (Determine if the Bylaw applies to you), Step 2 (Determine if you need to report in a given year), Step 3 (Prepare your data for reporting), and Step 4 (Submit your data online by June 30th).

Part 1: Gathering data, using the calculator, and reporting to ChemTRAC

[Frequently asked questions](#)
[Contact us](#)
[Terms of use](#)
[User Guide](#)

ChemTRAC

You are in a secure site.



Welcome to the ChemTRAC data reporting system

This application will allow you to:

- Report the use and release of priority substances under Toronto's Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423)
- Indicate if your facility is below reporting thresholds
- Indicate that the reporting requirements do not apply to your facility
- Provide information on your facility's environmental activities

To report online, you will need the **First Time Access Code** or your **Registration ID**.

To protect your privacy and security it is recommended that you close the browser after submitting your information.

To protect the secured exchange of information between you and this secure site, this transaction requires that your browser supports 128-bit data encryption. To continue, you may be asked to download and install the latest version of your browser.

As a security precaution, page sessions will end automatically as indicated at the top of each page.

To proceed with reporting information on chemical use and release you must read and consent to the [Terms of Use](#) and click the **I Agree** button below.

Note: Use of the browser Back button is not supported. Please use the reporting system's back/next button(if applicable) to navigate when necessary.

I do not Agree

I Agree

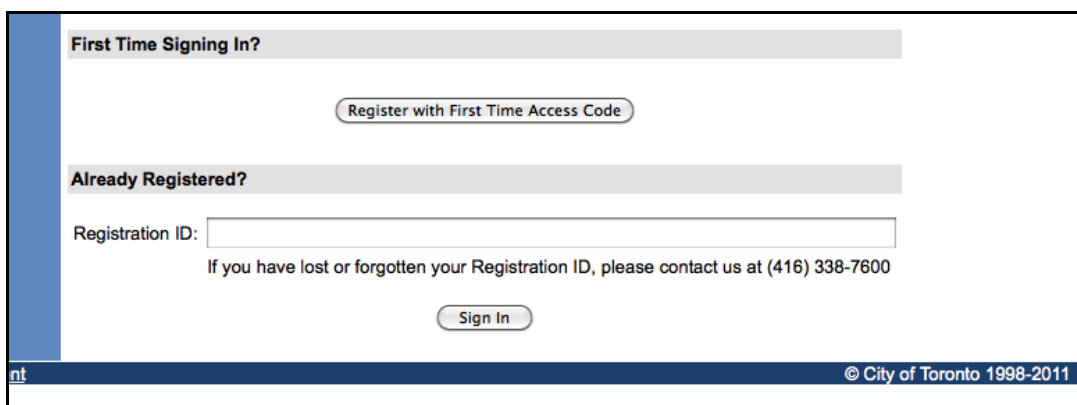
First Time Access Code for new users

If you are a first time user, you 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 3-1-1.

Registration ID for facilities already in the system

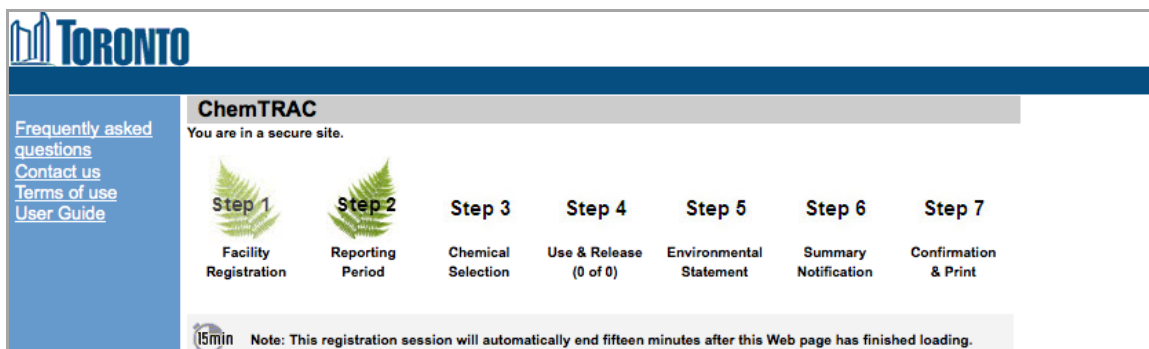
If you have already reported in the online system, you have been issued a Registration ID. This ID number is to be used for future visits to the ChemTRAC reporting system. If you have lost your Registration ID, please call 416-338-7600.

Part 1: Gathering data, using the calculator, and reporting to ChemTRAC



Once you have entered the online reporting system

The online system has seven steps. You will see your progress at the top of the screen. In the screenshot below, Step 1 is complete and Step 2 is in progress.



To move to the next step, you must enter all the required information on the screen and click the “Next” button at the bottom of the screen. You can use the “Back” button to change the information you provided in previous steps.

Please remember to have all your information ready before you enter the system. **You will only have fifteen minutes to complete each screen before the system logs you out.** If your session expires before you hit the "submit" button, you will need to re-enter all your information. If you are running out of time, you can reset the countdown without losing information by switching to a different page then returning to the page you were working on.

Step 1. Facility registration

In Step 1, you will enter your facility name, address, number of employees and company contact information. You will also enter your **NAICS code** in the section entitled “Type of facility”. You must begin by selecting the 2-digit NAICS code from the dropdown menu. For household furniture manufacturers, this will be “33 – Manufacturing”. Then, you can select the appropriate 4-digit code (3371), and finally, the 6 digit code (337126).

Part 1: Gathering data, using the calculator, and reporting to ChemTRAC

NAICS 2-Digit:	33 - Manufacturing	▼
NAICS 4-Digit:	3371 - Household & Inst. Furniture & Cabinet Mfg.	▼
NAICS 6-Digit:	337126 - All Other Household Furniture Mfg.	▼

Step 2. Reporting period

In Step 2, you will choose the calendar year from the dropdown menu and select “Yes” in response to the statement “I am ready to report for the year above”.

If your calculations showed you to be below the reporting threshold, you can enter “No” in response to the statement “I am ready to report for the year above” and then enter “I do not meet the threshold.”

Step 3. Chemical selection

In Step 3, you will identify the substances that your facility used or released at or above reporting thresholds. The example below builds off of Table 2 in this guide. Recall that VOCs were the only substances that exceeded thresholds.

<input type="checkbox"/>	Polycyclic Aromatic Hydrocarbons (PAHS)
<input type="checkbox"/>	11104-93-1 Nitrogen Oxides (NOx)
<input type="checkbox"/>	Particulate Matter 2.5 (PM 2.5)
<input checked="" type="checkbox"/>	Volatile Organic Compounds (VOCs) Total

Step 4. Use and release

In Step 4, you will enter information for each substance that you identified in Step 3. You will begin by determining whether a substance was used or released, and from where / to where.

For household furniture manufacturers, VOCs are “processed” and “released to air”.

Next, you will need to **enter the total quantity of the substances that your facility manufactured and released, in kilograms and without decimals**. For example, 17.2 kg would be rounded to 17 kg and 17.6 kg rounded to 18 kg.

Finally, you will select an estimation method from the dropdown menu.

Select “ChemTRAC calculator” if you have used the ChemTRAC calculator.

The example on the next page illustrates how to complete Step 4 for VOCs using information from Table 2 of this guide.

Part 1: Gathering data, using the calculator, and reporting to ChemTRAC

Volatile Organic Compounds (VOCs) Total (Reporting Threshold = 100.0 kg)		
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" value="781"/>	ChemTRAC calculator
Otherwise Used: ⓘ	<input type="text"/>	- Select Estimation Method From List -
Total Use:	<input type="text" value="781"/>	
Release to Air: ⓘ	<input type="text" value="294"/>	ChemTRAC calculator
Release to Land: ⓘ	<input type="text"/>	- Select Estimation Method From List -
Release to Surface Water: ⓘ	<input type="text"/>	- Select Estimation Method From List -
Total Release:	<input type="text" value="294"/>	

Step 5. Environmental statement

In Step 5, you have the option of entering information about your environmental activities including: if you have completed environmental training courses, created a Pollution Prevention Plan, or adopted an Environmental Management System. Pollution Prevention Plans are discussed briefly in the Pollution prevention strategies section on page 26 of this guide. You will also specify if you report to the National Pollutant Release Inventory or to the Toronto Sewer Use Bylaw.

Steps 6 and 7. Summary notification, confirmation and printing

In Steps 6 and 7, you will not enter any new information. You will review the information you provided, submit your report, and receive a printable record.

Optional reporting for facilities below threshold levels of priority chemicals

For those businesses or facilities that do not meet or exceed ChemTRAC thresholds, the online reporting system allows you to identify yourself as a “non-reporter”. This will allow you to stay informed on ChemTRAC program initiatives. It will also help Toronto Public Health assess trends over time and gauge the effectiveness of the ChemTRAC program.

Part 2: Reducing the environmental impact of your facility

This section of the guide provides information about reducing the environmental impact of your facility.

- *It provides an overview of pollution prevention strategies*
- *It identifies relevant control technologies for reducing emissions*
- *It provides guidance on getting started with pollution prevention.*

Pollution prevention strategies

The ChemTRAC program requires facilities to report on substances that are manufactured, processes or otherwise used in quantities that are equal to or greater than ChemTRAC reporting thresholds. Although it is not required as part of the ChemTRAC program, it is good business practice for facilities to also take action to reduce the creation, use and release of ChemTRAC priority substances.

Minimizing the use and release of harmful substances at the source is called pollution prevention (or P2) and is widely recognized as good business practice. Collecting data for ChemTRAC gives you the information you need to consider P2 options in your facility.

How can a business benefit from pollution prevention (P2)?

- P2 can reduce operating costs from the use of chemicals and energy
- P2 can reduce the costs of waste management and the risk of liability
- P2 can improve worker health and safety
- P2 can improve community relations and build a business' reputation as socially and environmentally responsible
- P2 can improve a business' ability to respond to consumer demands for "greener" products

Pollution prevention strategies

Businesses have many options for reducing the use of harmful substances in their facilities. Not all of the options will be relevant to all businesses. Three types of strategies and examples specific to household furniture manufacturers are presented below.

1. **Use low-cost, good operating practices.** Simple changes to normal practices can reduce the use and release of harmful chemicals at no cost to business owners.

For example: Only mix the amount of coating that you need, and use it all. Keep containers closed when not in use.

2. **Install control technologies or equipment.** New control technologies and equipment can reduce the release of harmful chemicals and save money by improving operating efficiency.

For example: Purchase high efficiency equipment for application of paints and coatings.

3. **Modify products or inputs.** Traditional products and processes can be replaced with alternatives that use and release less harmful chemicals.

For example: Switch to water-based coatings, or choose solvent-based coatings with lower VOC content.

Control technologies for reducing emissions

Control technologies can reduce the quantity of ChemTRAC substances that are released from household furniture manufacturers.

Technology for reducing VOCs from coatings and paint

Recall that volatile organic compounds (VOCs) are released from metal surface coatings. There are three types of technologies that are commonly used to reduce these VOC emissions: low VOC paints and coatings, high efficiency application equipment and VOC control equipment.

Low VOC paints and coatings. Manufacturers can dramatically reduce their VOC emissions by using different products and paints. Many of these environmentally-friendly products are no more expensive than traditional products.

- **Waterborne paints and coatings** generally have lower VOC contents than solvent-based coatings.
- **UV curable coatings, “high solids” coatings and powder coatings** also result in lower VOC emissions.
- **Low VOC and VOC-free solvent-based products** are also available. Low VOC paint contains less than 50 grams of VOCs per litre. Zero VOC paints contain less than 5 grams of VOCs per litre. They are typically priced as premium products.

High efficiency application equipment. Manufacturers can also reduce VOC emissions by increasing the transfer efficiency of the equipment they use for applying coatings and paints (Table 3). Increasing transfer efficiency reduces the quantity of product that is wasted, reduces emissions of VOC, and saves money.

Table 3 Typical transfer efficiency values for different application equipment⁴

Application equipment	Transfer efficiency
Air atomized spray	0.25
Airless spray	0.25
High volume low pressure spray guns	0.60
Non-rotational automatic electrostatic spray	0.70
Rotating head electrostatic spray	0.80
Dip coat and flow coat	0.90
Electrodeposition	0.95

VOC control equipment. VOC emissions control equipment can dramatically reduce VOC emissions.

⁴ Metal Furniture Surface Coating, EPA 1983. http://www.epa.gov/ttn/chief/ap42/ch04/final/c4s02_2m.pdf.

Part 2: Reducing your facility's environmental impact

Catalytic oxidizers can achieve 95% VOC destruction at low temperatures. They are compact, lightweight systems that have low operating costs and low capital costs.

Regenerative thermal oxidizers are higher capacity systems that are commonly used in paint spray booths and by coatings manufacturers. They can achieve 99% VOC destruction efficiency. They operate at high temperatures but can recover and reuse up to 95% of the heat they generate.

Carbon adsorbers / absorbers can also remove VOCs from an air stream by adsorbing the vapour onto an activated carbon surface.

The ChemTRAC calculator can be used to estimate a control technology's emission reduction potential.

Without changing any of the other values entered in the Input-Output screen for "**wood coatings**", change all of the coating types to "**paint water-based**". Check the new level of VOCs in the output table. They should be less than half the original number.

Technology for reducing VOC emissions from solvent degreasers

Recall that volatile organic compounds (VOCs) are released from solvent degreasers (or solvent cleaners) used to prepare surfaces for coating. There are two common control technologies that can help decrease VOC emissions from the cleaning process: low VOC cleaners, solvent recycling, and VOC control equipment.

Low VOC solvent degreasers. Not all degreasers generate the same VOC emissions. Chlorinated and halogenated solvents (e.g. chloroform, methylene chloride, perchloroethylene and trichloroethylene) generate relatively high levels of VOC emissions per litre used. Facilities can reduce their emissions by switching to solvents with lower VOCs.

- **Alcohols** (e.g. ethanol and methanol) and **ketones** (e.g. acetone) generally have the lowest VOC emissions by volume.

Solvent reclamation. Facilities can reuse solvents from previous cleanings for initial cleanings, until they lose their effectiveness. They can also purchase solvent distillation units to recover and clean solvents for reuse. Solvent stills are available in a wide range of sizes, and can recover approximately 70% reusable solvent from used solvent⁵.

VOC control equipment. Carbon adsorbers / absorbers and thermal or catalytic incinerators can also be used to recover or destroy VOCs from solvents.

⁵ U.S. EPA. 2003. Profile of the Wood Furniture and Fixtures Industry.
<http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/wood.html>

Part 2: Reducing your facility's environmental impact

Technology for reducing emissions from cooking and drying

Recall that nitrogen oxides and other ChemTRAC substances are released from the combustion of natural gas in kilns and ovens used for cooking and drying. There are two common control technologies that can help decrease the amount of nitrogen oxides released as a by-product of combustion: low NO_x burners and recirculated flue gas.⁶

Low NO_x burners. When natural gas is used to create heat, the gas passes over a flame, gets combusted, generates heat, and produces combustion by-products, including NO_x. A low NO_x burner combusts the gas in several stages. This allows the flame to burn at a cooler temperature, which reduces the amount of NO_x that is created as a by-product. A low NO_x burner can reduce NO_x creation by about 50%.

Recirculated flue gas. When natural gas gets combusted over the flame to produce heat, the resulting air containing the combustion by-products is called flue gas. If the flue gas is mixed back into the natural gas being fed to the flame (i.e. recirculated), this changes the combustion process and results in less NO_x being produced. Recirculated flue gas is often used in conjunction with low NO_x burners, reducing NO_x emissions by about 70%.

Table 4 summarizes the control technologies discussed above.

Table 4. Control technologies for VOCs, PM_{2.5} and combustion by-products

Process or product	Control technology	ChemTRAC substance controlled
Paints and coatings	Water-based, high-solids, powder, low-VOC coatings	Volatile Organic Compounds (VOCs)
	High efficiency application equipment	
	VOC control equipment: thermal oxidizers, catalytic oxidizers, carbon absorbers, etc.	
Solvent degreasers	Acetone and ketone cleaners	Volatile Organic Compounds (VOCs)
	Solvent reuse and distillation	
	VOC control equipment	
Combustion of natural gas	Low NO _x burners	Nitrogen oxides (NO _x)
	Recirculated flue gas with low NO _x burners	

⁶ NO_x refers to total amounts of nitric oxide (NO) and nitrogen dioxide (NO₂).

More ways to reduce costs and improve performance

Minimizing the use and release of harmful substances is one aspect of improving environmental performance. Household furniture manufacturers can also take other steps to improve their economic and environmental sustainability.

1. **Reduce energy use.** By reducing energy use, household furniture manufacturers can save money on energy bills and reduce their environmental impact. Many energy-efficiency technologies have very short payback periods. Utilities also offer incentives for energy efficiency measures.

To reduce energy use, low-cost, good operating procedures can be adopted, and new technology or equipment can be installed. This includes:

- Undergoing an energy audit to identify opportunities for savings
- Encouraging employees to turn off lights and equipment when not in use
- Replacing old equipment with more efficient equipment
- Installing a programmable thermostat to control heating and cooling
- Assigning one person to review and track energy usage and to investigate opportunities for energy savings.

2. **Reduce water use.** Working to reduce water use can save money and provide environmental benefits.

To reduce water use, low-cost, good operating procedures can be adopted, and new technology or equipment can be installed. This includes:

- Minimizing water use in cleaning procedures
- Posting signs near sinks and hoses to encourage employees to use less water
- Purchasing high pressure, low volume cleaning equipment
- Purchasing water-saving plumbing fixtures
- Regularly checking water-supply equipment for leaks.

Getting started with pollution prevention

The good news is that you've already started by calculating emissions of ChemTRAC priority substances.

Next steps can include:

1. Evaluating actions to reduce the use and release of energy, water and ChemTRAC substances.
2. Identifying funding for upgrades to facilities and equipment.
3. Implementing all cost-effective upgrades.
4. Tracking changes in the use and release of energy, water and substances.

To help in these steps, ChemTRAC is offering **free technical assistance visits** and **training workshops** to assist businesses in creating an inventory of chemicals used at their facility, comply with the ChemTRAC program, and identify opportunities to improve their facilities' environmental performance.

For more information, visit:

http://www.toronto.ca/health/chemtrac/assistance_program.htm and
<http://www.toronto.ca/health/chemtrac/gogreen.htm>.

Additional resources on reducing the environmental impact of household furniture manufacturers include:

- Missouri Department of Natural Resources. June 2005. Preventing Pollution in Wood Furniture Manufacturing. <http://dnr.mo.gov/pubs/pub1183.pdf>
- Oklahoma Department of Environmental Quality. Pollution Prevention & Waste Reduction for Wood Furniture Manufactures. <http://www.deq.state.ok.us/factsheets/customer/woodmanf.pdf>
- Small Business Environmental Homepage. October 2004. Environmental Best Management Practices – Furniture Finishing. http://www.smallbiz-enviroweb.org/Industry/bmpfiles/BMP_FurnitureFinishing-3.pdf
- Toronto Public Health, ChemTRAC. December 2010. Resource for Greening Household Furniture Manufacturing: Pollution Prevention Information. <http://www.toronto.ca/health/chemtrac/pdf/GreenHouseholdFurniture.pdf>
- US EPA. 2003. Profile of the Wood Furniture and Fixtures Industry, Chapter V – Pollution Prevention Opportunities. <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/wood.html>

Appendices

The remaining pages of this guide offer additional material for your reference:

Appendix A. Printer-friendly versions of the worksheets.

Appendix B. Additional material related to the ChemTRAC calculator.

- *Descriptions of the remaining calculator screen*
- *How the calculator uses emission factors to calculate quantities of ChemTRAC substances*
- *How emission factors can be changed to site-specific values.*

Appendix C. Combining the ChemTRAC calculator with other sources:

How to combine the ChemTRAC calculator for Household Furniture manufacturers with emissions data from other sources.

Appendix A. Printer-friendly worksheets

These worksheets can be printed and completed by hand so that all information can be readily available for entry into the ChemTRAC calculator.

Worksheet 1 – Solvent degreasers

1. What types of solvent degreasers do you use?

Worksheet 1 Table 1 – Types of solvent degreasers

Solvent degreaser name	Solvent degreaser type
_____	<input type="checkbox"/> Acetone <input type="checkbox"/> Ethanol <input type="checkbox"/> Methanol <input type="checkbox"/> Chloroform <input type="checkbox"/> Dichloromethane (methylene chloride) <input type="checkbox"/> Tetrachloroethylene (perchloroethylene) <input type="checkbox"/> Trichloroethylene
_____	<input type="checkbox"/> Acetone <input type="checkbox"/> Ethanol <input type="checkbox"/> Methanol <input type="checkbox"/> Chloroform <input type="checkbox"/> Dichloromethane (methylene chloride) <input type="checkbox"/> Tetrachloroethylene (perchloroethylene) <input type="checkbox"/> Trichloroethylene
_____	<input type="checkbox"/> Acetone <input type="checkbox"/> Ethanol <input type="checkbox"/> Methanol <input type="checkbox"/> Chloroform <input type="checkbox"/> Dichloromethane (methylene chloride) <input type="checkbox"/> Tetrachloroethylene (perchloroethylene) <input type="checkbox"/> Trichloroethylene
Etc. _____	

2. How much of each product do you use?

Worksheet 1 Table 2 – Quantity of products used

Solvent name	Containers per year	Size of containers	Quantity used (litres or gallons)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Etc. _____	_____	_____	_____

Additional Material

3. How much of each product do you reclaim as liquid?

Worksheet 1 Table 3 – Quantity of products reclaimed

Solvent name	Quantity reclaimed (L)
_____	_____
_____	_____
_____	_____
_____	_____
Etc. _____	_____

Additional Material

Worksheet 2 – Metal surface coatings

4. What types of metal surface coatings do you use?

Worksheet 2 Table 1 – Types of metal surface coatings

Metal surface coating name	Process control (type)
_____	<input type="checkbox"/> Uncontrolled <input type="checkbox"/> High solids coating (65% solids) <input type="checkbox"/> Waterborne coating
_____	<input type="checkbox"/> Uncontrolled <input type="checkbox"/> High solids coating (65% solids) <input type="checkbox"/> Waterborne coating
_____	<input type="checkbox"/> Uncontrolled <input type="checkbox"/> High solids coating (65% solids) <input type="checkbox"/> Waterborne coating
Etc. _____	

5. How much of each product do you use?

Worksheet 2 Table 2 – Quantity of products used

Coating name	Containers per year	Size of containers	Quantity used (litres or gallons)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Etc. _____	_____	_____	_____

6. What is the average thickness of your coatings? (OPTIONAL)

You can leave this table blank and use the calculator's default value of 1mm.

Worksheet 2 Table 3 – Quantity of products used (optional)

What is the average thickness of your coatings?	_____ mm
---	----------

Additional Material

Worksheet 3 – Natural gas fired equipment (for cooking, drying)

Skip this worksheet if no natural gas fired ovens / dryers / cookers are in operation at your facility.

7. What control technologies are installed on your ovens?

Ovens are equipped with (add a checkmark):	
a. Low NO _x burners only	_____
b. Low NO _x burners with recirculated flue gas	_____
c. None (no control technologies)	_____

8. How much natural gas is used to heat your ovens / cookers / dryers?

This question can be answered using EITHER Option A or Option B.

Option A – What is the total amount of natural gas used to heat your ovens?

Option B – What is the thermal rating of your ovens?

Option A. Total natural gas used to heat the ovens
_____ m ³ (cubic metres) OR _____ ft ³ (cubic feet)
OR
Option B. Thermal rating of the ovens
_____ BTU/hr OR _____ kJ/hr
Also estimate the average time that the ovens are turned on and heating: _____ hours per day and _____ days per week and _____ weeks per year

Appendix B. Additional material related to the ChemTRAC calculator

This appendix describes the remaining screens of the ChemTRAC calculator. You do not need to enter any information into these screens.

This appendix also describes emission factors and how the ChemTRAC calculator makes use of them.

The ChemTRAC calculator All Substances screen

The All Substances screen provides a summary of the estimated quantities in kilograms per year of all ChemTRAC priority substances used and/or released by your facility that have been calculated by the ChemTRAC calculator. It also provides a summary of other substances used and/or released by your facility. You do not need to enter any information on this screen.

Refer to Table 1 of this guide to see which processes are responsible for the release of each substance.

Note that the CAS# refers to a unique identifier for the substance as given by the Chemical Abstracts Society. The CAS# is provided for reference only.

CHEMTRAC
Summary of Calculations

Instructions
This page provides a summary of the estimated quantities of all ChemTRAC priority substances manufactured, processed, otherwise used (MPO) and/or released.

Input-Output
You are here: **All Substances**
Calculations
References
Process Flow

ChemTRAC Priority Substances	CAS #	Quantity (kg/yr)			
		Manufactured	Processed	Otherwise Used	Released to Air
Benzene	71-43-2	3364	0	0	3364
Cadmium and its compounds	n/a	1762	0	0	1762
Chromium (non-hexavalent) and its compounds	n/a	2243	0	0	2243
Formaldehyde	50-00-0	120142	0	0	120142
Lead and its compounds	n/a	801	0	0	801
Manganese and its compounds	n/a	609	0	0	609
Mercury and its compounds	n/a	416	0	0	416
Nickel and its compounds	n/a	3364	0	0	3364
Nitrogen Oxides (NOx)	11104-93-1	160188840	0	0	160188840
Particulate Matter (PM2.5)	n/a	3043588	0	0	7825283
Total PAHs	n/a	99	0	0	99
VOC	n/a	8821923	0	0	8821923
Other Substances					
2-Methylnaphthalene	91-57-6	0	0	0	38
3-Methylchloranthrene	56-49-5	0	0	0	3
7,12-Dimethylbenz(a)anthracene	57-97-6	0	0	0	26
Acenaphthene	83-32-9	0	0	0	3
Acenaphthylene	208-96-8	0	0	0	3
Anthracene	120-12-7	0	0	0	4
Arsenic	7440-38-8	0	0	0	320
Barium	7440-39-3	0	0	0	7048
Benzo(a)anthracene	56-55-3	0	0	0	3
Benzo(a)phenanthrene	218-01-9	0	0	0	3
Benzo(a)pyrene	50-32-8	0	0	0	2
Benzo(b)fluoranthene	205-99-2	0	0	0	3
Benzo(g,h,i)perylene	191-24-2	0	0	0	2
Benzo(j)fluoranthene	205-82-3	0	0	0	3

↓ Etc.

Additional Material

The ChemTRAC calculator Calculations screen

The Calculations screen provides the calculations based on the information provided in the Input-Output screen. It also includes details on the emission factors used to calculate the release of substances and an indication of emission factor data quality. You do not need to enter any information on this screen.

However, emission factors can be modified if site-specific information is available. For example, you can modify the **default VOC contents, transfer efficiencies** or **densities** of different surface coatings. You can also modify the emission factors for **natural gas combustion** listed in the Contaminant table, and for any of uncontrolled, low NO_x and low NO_x with recirculated flue gas scenarios. This is illustrated below.

If emission factors are modified, be sure that they are entered in appropriate units. All information and formulae presented in the Calculations screen are for reference only. Other than when using site-specific emissions factors, they should not be modified in any way.

Metal Surface Coating

$$E_{VOC} = \frac{(6.45 \times 10^{-4} \times A \times T \times V \times \rho)}{(S \times TE)}$$

E_{VOC} = emissions of VOC in kg/hr
 A = surface area coated m²/hr
 T = dry film thickness of coating applied (mm)
 V = VOC content of coating, including any solvents used by fraction of volume
 ρ = VOC density, assumed to be 0.88kg/L for VOCs
 S = solids content of coating, fraction by volume
 TE = transfer efficiency, fraction
 6.45×10^{-4} = Constant to convert volume of dry fraction applied from m² to L

Index	T (mm)	V (%)	S (%)	TE (%)	ρ (kg/L)	Select One
2	1	0.65	0.35	0.65	0.88	Uncontrolled
3	1	0.35	0.65	0.65	0.88	85 Volume % high solids coating
4	1	0.117	0.35	0.65	0.88	Waterborne Coating

User Input Required

A	m ² /hr
Control Technology	

Consumption: 0 m³/yr OR 0 ft³/yr

Contaminant	CAS #	Emission Factor (lb/1000000 ft ³)			Emission Rate (kg/yr)	Data Quality	Comments
		Uncontrolled	Low NO _x	Low NO _x Recirc.			
Sulphur Dioxide	7446-09-5	0.6	0.6	0.6	0.0	A	
Nitrogen Oxides	11104-93-1	100	50	32	0.0	D	
Carbon Monoxide	630-08-0	84	84	84	0.0	B	
Nitrous Oxide	10024-97-2	2.2	2.2	0.64	0.0	E	
Particulate Matter (PM2.5)	n/a	1.9	1.9	1.9	0.0	D	
Carbon Dioxide	124-38-9	120,000	120,000	120,000	0.0	A	
TOC	n/a	11	11	11	0.0	B	
Lead	7439-92-1	0.0005	0.0005	0.0005	0.0	D	
Methane	74-82-8	2.3	2.3	2.3	0.0	B	
VOC	n/a	5.5	5.5	5.5	0.0	C	
2-Methylnaphthalene	91-57-6	0.000024	0.000024	0.000024	0.00E+00	D	
3-Methylchloranthrene	56-49-5	< 0.0000018	< 0.0000018	< 0.0000018	0.00E+00	E	PAH
7,12-Dimethylbenz(a)anthracene	57-97-6	< 0.000016	< 0.000016	< 0.000016	0.00E+00	E	PAH
Acenaphthene	83-32-9	< 0.0000018	< 0.0000018	< 0.0000018	0.00E+00	E	PAH
Acenaphthylene	208-96-8	< 0.0000018	< 0.0000018	< 0.0000018	0.00E+00	E	PAH
Anthracene	120-12-7	< 0.0000024	< 0.0000024	< 0.0000024	0.00E+00	E	
Benzo(a)anthracene	56-55-3	< 0.0000018	< 0.0000018	< 0.0000018	0.00E+00	E	PAH
Benzene	71-43-2	0.0021	0.0021	0.0021	0.00E+00	B	
Benzo(a)pyrene	50-32-8	< 0.0000012	< 0.0000012	< 0.0000012	0.00E+00	E	PAH
Benzo(b)fluoranthene	205-99-2	< 0.0000018	< 0.0000018	< 0.0000018	0.00E+00	E	PAH
Benzo(g,h,i)perylene	191-24-2	< 0.0000012	< 0.0000012	< 0.0000012	0.00E+00	E	PAH

Etc.

Emission factors in these columns can be modified by the user

Additional Material

The ChemTRAC calculator References screen

The Reference screen describes the sourced of the assumptions used on the Calculations screen. Source documents can be viewed by clicking on the links. The Reference screen also provides the definitions for 'Manufactured', 'Processed', 'Otherwise Used', and 'Released to Air'. No information needs to be entered on this screen.

Note that this tool is provided solely as an aid, and the City of Toronto makes no representation or warranty as to its applicability to your facility or to your obligation to comply with the Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423). It is the responsibility of each facility owner or operator to take the necessary steps to ensure compliance with the bylaw.

CHEMTRAC

References

Version 3.1 Last Update: December 13, 2011 YS & MB

Instructions This page provides all the reference information for the emission factors and assumptions used in the Calculations spreadsheet. Click on the links below to view the source documents.

Input-Output

All Substances

Calculations

References You are here

Emission factors and an assessment of their data quality are provided in and the US EPA AP-42 "Metal Furniture Surface Coating", Section 4.2.2.12, May 1983
http://www.epa.gov/ttn/chief/ap42/ch04/final/c4s02_2m.pdf
US EPA AP-42 "Natural Gas Combustion", Section 1.4, 1998
<http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf>
National Pollutant Inventory, Environment Australia Emissions Estimation Techniques Manual Furniture and Fixtures Manufacturing, June 1999
http://www.npi.gov.au/handbooks/approved_handbooks/pubs/ffurniture.pdf
Particulate matter size fractions are estimated using South Coast Air Quality Management District "Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds", 2006
http://www.aqmd.gov/ceqa/handbook/PM2_5/finalAppA.doc

Definitions¹

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

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

Otherwise Use - Any use, disposal or release of a priority substance at a facility that does not fall under the definitions of "manufacture" or "process." This includes the use of the priority substance as a chemical processing aid, manufacturing aid or some other use.

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

¹ For details refer to the Environmental Reporting and Disclosure Bylaw available at the [ChemTRAC website](#).

Additional Material

Emission factors for household furniture manufacturers

The ChemTRAC calculators are based on published estimates of the emissions associated with different industrial processes. These estimates are called “emission factors”. Emission factors indicate the amount of a specific substance (e.g. VOCs) emitted by a specific activity (e.g. using one “net” litre of solvent degreaser).

Table 5 presents the emission factors used in the ChemTRAC calculator for Household Furniture Manufacturing.

Table 5. Emission factors used in the Household Furniture Calculator

Source	Substance	Default Emission Factors ¹	
Solvent degreasers – quantity not reclaimed as liquid	Volatile organic compounds (VOCs)	Acetone	0.792 kg/L
		Ethanol	0.792 kg/L
		Methanol	0.81 kg/L
		Chloroform	1.491 kg/L
		Methylene chloride	1.328 kg/L
		Perchloroethylene	1.625 kg/L
		Trichloroethylene	1.466 kg/L
Metal surface coatings	Volatile organic compounds (VOCs)	Uncontrolled	0.0016 kg/m ²
		High solids	0.0005 kg/m ²
		Waterborne	0.0003 kg/m ²
Natural gas combustion	Nitrogen oxides	No control	160.18 kg / 100,000 m ³
		Low NOx burner	80.09 kg / 100,000 m ³
		Low NOx & recirc. flue gas	51.26 kg / 100,000 m ³

1. For solvents, densities determine the VOC emissions per litre of solvent not reclaimed as liquid, so densities are presented in Table 5.

If site-specific emission factors are available for the facility or processes, they can be entered in the Calculations sheet of the calculator.

The box on the next page illustrates how to calculate nitrogen oxide emissions from the sample natural gas use in Worksheet 3.

Additional Material

Example: Using emission factors to estimate NO_x emissions from natural gas

In Worksheet 3, a sample facility uses 2,000 m³ of natural gas with no VOC control equipment.

The emission factor for nitrogen oxides is 160.18 kg / 100,000 m³.

Total annual emissions of NO_x from cooking / drying:

= Quantity of gas * Emissions factor (kg per unit)

= 2,000 m³ * 160.18 kg per 100,000 m³ / 100,000

= **3.2 kg of NO_x**

Appendix C. Combining the Household Furniture Calculator with other sources

Depending on your business, you may need to use more than one calculator to calculate the use and release from all processes at your facility. The "Calculation of Totals" calculator can be used to compile your data.⁷ In this calculator, you can enter the values for each process at your facility. The calculator returns the total manufactured, processed or otherwise used amounts for the facility, by substance, and then compares it to the corresponding reporting threshold.

⁷ The Calculation of Totals calculator can be found under the Totals bullet at <http://www.toronto.ca/health/chemtrac/tools.htm>.

Additional Material



Calculation of Totals

Last Update: October 21, 2011 by YS, JA, & ZI

- | |
|--|
| <p>* This page gathers information to help you determine your facility-wide substance manufacture, process, otherwise use (MPO) and release estimates.</p> <p>* For each source of priority substances, enter the process name and then provide the quantity of each substance manufactured, processed, otherwise used and released.</p> |
| <p>* In the "MPO" columns, identify whether the priority substance was Manufactured, Processed or Otherwise used. To do this you may consult the "Guide to Reporting" available at www.toronto.ca/chemtrac. The definitions are provided in the Examples tab.</p> |
| <p>* At the end of each row, you will find the facility-wide totals that need to be compared with the Mass Reporting Thresholds.</p> <p>* The last 4 columns indicate the amount of each substance that you must report to the City of Toronto</p> |

The total quantities of ChemTRAC substances that would have to be reported are listed here

Group	Pollutant	Quantity (kg/yr)				Quantity (kg/yr)				Totals to be compared with the threshold (kg/yr)	Mass Reporting Threshold (kg/yr)	Reportable?	To be reported			
		Manufactured	Processed	Otherwise Used	Released to Air	Manufactured	Processed	Otherwise Used	Released to Air				Total Manufactured	Total Processed	Total Otherwise Used	Total Released to Air
		Process#1:				Process#2:							(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)
A	Acetaldehyde*									0	100	No	---	---	---	---
	Acrolein*									0	100	No	---	---	---	---
	Benzene*									0	100	No	---	---	---	---
	1,3-Butadiene*									0	100	No	---	---	---	---
	Carbon tetrachloride*									0	100	No	---	---	---	---
	Chloroform (Trichloromethane)*									0	100	No	---	---	---	---
	Chromium (non-hexavalent) ¹									0	100	No	---	---	---	---
	1,2-Dibromoethane (Ethylene dibromide)									0	100	No	---	---	---	---
	1,4-Dichlorobenzene*									0	100	No	---	---	---	---
	1,2-Dichloroethane (Ethylene dichloride)*	Enter values from the Output Summary table of your first calculator here				Enter values from the Output Summary table of your second calculator here				0	100	No	---	---	---	---
	Dichloromethane (Methylene chloride)									0	100	No	---	---	---	---
	Formaldehyde*									0	100	No	---	---	---	---
	Manganese ¹									0	10	No	---	---	---	---
	Nickel ¹									0	100	No	---	---	---	---
	Tertrachloroethylene (Perchloroethylene)									0	100	No	---	---	---	---
	Trichloroethylene*									0	100	No	---	---	---	---
	Vinyl chloride									0	100	No	---	---	---	---
Cadmium ¹									0	1	No	---	---	---	---	
Chromium (hexavalent) ¹									0	10	No	---	---	---	---	
Lead ¹									0	10	No	---	---	---	---	
Mercury ¹									0	1	No	---	---	---	---	
B	Total polycyclic aromatic hydrocarbons (PAHs)*									0	10	No	---	---	---	---
	Nitrogen oxides (NOx)									0	200	No	---	---	---	---
C	Particulate matter 2.5 (PM2.5)									0	30	No	---	---	---	---
	Total Volatile organic compounds (VOCs) ²									0	100	No	---	---	---	---

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The total combined release of substances (whether from the ChemTRAC Household Furniture Manufacturing calculator only, or from other substance quantification methods as well) should be compared to the mass reporting thresholds listed in Schedule A of the Environmental Reporting and Disclosure Bylaw and provided in Table 6 below.

Table 6. ChemTRAC priority substances and their reporting thresholds (adapted from Schedule A of the Environmental Reporting and Disclosure bylaw)

ChemTRAC substance	ChemTRAC Mass reporting threshold (kg/yr)	Concentration threshold ^c % w/w
Acetaldehyde	100	1
Acrolein	100	1
Benzene	100	1
1,3-Butadiene	100	1
Cadmium and its compounds	1	0.1
Carbon tetrachloride	100	1
Chloroform (Trichloromethane)	100	1
Chromium, Hexavalent and its compounds	10	0.1
Chromium, Non-hexavalent and its compounds	100	1
1,2-Dibromo ethane (Ethylene dibromide)	100	1
1,4-Dichlorobenzene	100	1
1,2-Dichloroethane (Ethylene dichloride)	100	1
Dichloromethane (Methylene chloride)	100	1
Formaldehyde	100	1
Lead and its compounds	10	0.1
Manganese and its compounds	10	1
Mercury and its compounds	1	0
Nickel and its compounds	100	1
Nitrogen Oxides (NO _x)	200	N/A
Particulate Matter 2.5 (PM _{2.5})	30	N/A
Polycyclic Aromatic Hydrocarbons (PAHs)	10	N/A ^b
Tetrachloroethylene (Perchloroethylene)	100	1
Trichloroethylene	100	1
Vinyl chloride	100	1
Volatile Organic Compounds (VOCs) total	100	N/A

Notes:

a. N/A = not applicable

b. The concentration threshold % w/w is not relevant to the emissions quantified using the ChemTRAC calculator for Household furniture manufacturers

Appendix D. Reporting Checklist

Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423)

Checklist for Facilities in Toronto

Make sure the data you submit in your reports are accurate. Here is a checklist to help you.

- Enter complete facility and contact information. If you are a consultant, identify yourself as the technical contact.
- Submit a **separate** report for **each** facility in Toronto.
- Complete the statement of certification.
- Report **all** of the priority substances (chemicals) that meet or exceed (equal to or greater than) the reporting thresholds.
- Report **both use and release** amounts of all priority substances that meet or exceed the reporting thresholds.
- Estimate use and release for **all** sources and processes in your facility.
 - This includes process such as heating by natural gas combustion, welding, equipment cleaning, drilling, grinding, crushing, sanding, and blending.
- Review the exemptions in the bylaw, such as building heating, and do not include these in your calculations.
- Compare current year estimates with that of previous years (if available) and explain any differences if present.
- If you report to NPRI and there is a difference between the amount of a substance reported to ChemTRAC and NPRI, explain the reason for the difference.
- You may need to make your records available for audit purposes. Securely store the records you based your report on and document:
 - Assumptions and parameters used for calculation and estimation of emissions
 - Procedures and methods used to measure emissions
 - Calibration records of any equipment used to measure emissions

Use and Release Calculations

- There are many sources of information that can help you identify the priority substances in your facility. Be sure to check all of them, including:

Additional Material

purchase records	year-end inventory	Material Safety Data Sheets (MSDS)
raw materials	Certificate of Approval or Environmental Compliance Approval	correspondence with supplier

- Use the best available method for use and release estimation. Use (if any) the most appropriate and most recent ChemTRAC calculator (available at toronto.ca/health/chemtrac/tools.htm).
- Enter all the reportable data in kilograms (kg).
- Calculate the **total** amount of a substance used and released in **all** processes.
 - For example, process 1 used 90 kg VOC and released 75 kg. Process 2 used 60 kg VOC and released 56 kg. The total amount of use would be $90+60=150$ kg and release $75+56=131$ kg.
 - To help with these calculations you can use the free online ChemTRAC totals calculator.
- Double check that **decimal places** are entered in the correct place (e.g. 3.47 vs. 347)
- Check that the **total release** amount (release to land+water+air) is equal to or less than **total use** amount (manufactured+processed+otherwise used).
- Use the **average value** for use and release estimation if the substance content is listed in a range (e.g. 10-12% VOCs) on Material Data Safety Sheets or on other sources of substance data.
- The following priority substances are VOCs. Be sure to report them separately **and also include** them in your VOC estimation:

Acetaldehyde	Acrolein	Benzene
1,3-butadiene	Carbon Tetrachloride	Chloroform
1,4-Dichlorobenzene	1,2-Dichloroethane	Formaldehyde
Trichloroethylene	Vinyl chloride	Polycyclic Aromatic Hydrocarbons (PAHs)

- Consider the effects of pollution control devices (e.g. filter) in the emission calculations.
- Consider the amount of waste transferred off-site (if any) in emission calculations.

Additional Material

Disclaimer: *This checklist is for information only. The City of Toronto assumes no liability for accuracy or completeness. Readers are responsible for ensuring compliance with Toronto's Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423). This information should not be relied upon as a substitute for legal or professional advice. Readers should seek their own legal or professional advice in regard to their use of the information contained in it.*