

Guide to calculations for ChemTRAC reporting:

Wood office furniture

Version 1.1

February 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 Wood Office 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 5 on page 45.

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. Wood office furniture manufacturers are covered by this bylaw.

This guide is designed to help you and other wood office 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/>

The Wood Office Furniture Manufacturing sector

The North American Industrial Classification System (NAICS) code 337213 includes all establishments that manufacture wood furniture designed for office use, such as office chairs and desks. It includes facilities that manufacture custom designed interiors consisting of architectural woodwork and fixtures.

Wood office furniture manufacturers are required to report their data every year if they use or release any of the 25 substances 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 wood office furniture manufacturers

Table 1 lists the typical processes used in a wood office furniture manufacturing facility. Most facilities will use sawing and sanding, and wood coatings (paints, enamels, lacquers, adhesives, etc.) as part of manufacturing. Some facilities may also perform wood drying on site and use natural gas combustion to heat drying-kilns. Other facilities will purchase dried timber.

Table 1 also shows the ChemTRAC priority substances that are released in a typical wood office 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 wood office furniture manufacturer and their sources

ChemTRAC priority substances	Steps in manufacturing			
	Wood coating	Sawing	Sanding	Natural gas combustion for drying
Benzene				X
Cadmium and its compounds				X
Chromium and its compounds				X
Formaldehyde				X
Lead and its compounds				X
Manganese and its compounds				X
Mercury and its compounds				X
Nickel and its compounds				X
Nitrogen Oxides				X
PM _{2.5}		X	X	X
PAHs				X
VOCs	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 PM_{2.5}, VOCs and NO_x would be released in amounts that could require reporting to the ChemTRAC program.

Particulate Matter 2.5 (PM_{2.5}). The term “particulate matter” describes solid and liquid particles found in the air we breathe. Particulate matter that is smaller than 0.0025 millimetres in diameter is called PM_{2.5} and may not be visible to the naked eye. In a wood office furniture manufacturer, PM_{2.5} is released into the air during the sawing and sanding of wood and other materials.

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 cooking and drying wood. When natural gas is combusted to generate heat, it releases ChemTRAC priority substances.

The health effects of PM_{2.5}, VOCs and NO_x

PM_{2.5}. Because of their small size, 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 Wood Office Furniture Manufacturing.

Worksheets for collecting information

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

- Wood coatings
- Natural gas equipment for wood drying and cooking
- Dust collectors for sawing and sanding.

A printer-friendly version of these worksheets can be found as Appendix A. It 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 Wood Office 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 Wood Office 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 – Wood coatings

This worksheet will help you collect information on the wood coatings 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 wood coatings do you use?

The calculator asks you to choose the **type** of each wood coating from the categories listed in [Worksheet 1 Table 1](#) on the next page.

- **Solvent-based paints** include oil-based, enamel, and alkyd products.
- **Water-based paints** 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 wood coatings into the ChemTRAC calculator. Enter this data into [Worksheet 1 Table 1](#).

2. What is the VOC content of each product listed on the MSDS?

Often you can find a product's **VOC content** directly on its MSDS (Material Safety Data Sheets) in the Physical and Chemical Characteristics section. The VOC content will be expressed in pounds per gallon (**lb/gal**) or in grams or kilograms per litre (**g/L** or **kg/L**).

Most coating and paint manufacturers publish the MSDS for all of their products online. You can also contact the manufacturer directly to ask for your product's MSDS. Enter any VOC contents that you would like to specify in [Worksheet 1 Table 1](#) found on the next page in **kg/L**. To convert from lb/gal or from g/L you can use the online conversion tool at: http://www.unitconversion.org/unit_converter/concentration-solution.html

If you do not have information on VOC content, Question 2 can be skipped. The ChemTRAC calculator will use default values.

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

Worksheet 1 Table 1 – Types of fillers, sealers, basecoats, and topcoats

Wood coating name	Coating type	VOC content (kg/L)
example: Varnish 1 (desks)	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input checked="" type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	0.31
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
Etc. _____		

3. 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. Enter this data into [Worksheet 1 Table 2](#) on the next page. If it is easier, you can start by estimating the number of containers you purchase each week or month.

Example: 5 containers per month * 12 months per year = 60 containers per year
60 containers per year * 20 L per container = 1200 L per year

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Worksheet 1 Table 2 – Quantity of products used

Wood coating process	Containers per year	Size of containers	Quantity used
<i>example:</i> Varnish 1 (desks)	<u>60</u>	<u>20 litres</u>	<u>$60 * 20 = 1200 \text{ L}$</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Etc.			

4. What is the control efficiency for VOC emissions? (from VOC emission control equipment)

Thermal oxidizers and catalytic oxidizers are examples of VOC emissions control equipment. See the *Control technologies for reducing emissions* section of this guide for more information on different types of control technologies.

If you do not operate VOC emissions control equipment for VOCs emitted from coatings, then you should enter “0%” for all products.

The control efficiency is the percentage of VOCs that are **removed** by the control equipment. Higher percentages indicate greater VOC removal. For example, regenerative thermal oxidizers can destroy 99% VOCs. Their control efficiency would be 99%. You can find this information in the product manual or by consulting your supplier.

Enter the control efficiencies for each product in [Worksheet 1 Table 3](#).

Worksheet 1 Table 3 – Control efficiency for VOC emissions

Wood coating process	Control efficiency <i>If no VOC control equipment is used, control efficiency is 0%</i>
<i>example:</i> Varnish 1 (desks)	0%
_____	_____
_____	_____
_____	_____
_____	_____
Etc. _____	_____

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Worksheet 2 – Natural gas fired equipment (for drying / cooking)

Skip this worksheet if no natural gas fired ovens or kilns for wood drying or cooking are in operation at your facility.

This worksheet will help you collect information on the quantity of natural gas used by your wood 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.

5. 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. | No control technologies | _____ |

6. How much natural gas is used to heat your ovens?

This question can be answered using EITHER Option 6A or Option 6B.

Option 6A – 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 6B – 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 6A. Total natural gas used to heat the ovens

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

OR

Option 6B. 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

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Worksheet 3 – Dust collectors (for sawing and sanding)

Skip this worksheet if no dust collectors, baghouses, fabric filters or cyclones are in operation at your facility.

This worksheet will help you collect information on any dust collectors at your facility that help control the sawdust from sawing and sanding. The term “dust collectors” also refers to baghouses, fabric filters and cyclones associated with sanding and sawing. You should collect data on your facility for the period from January 1 to December 31 of a calendar year.

7. If dust collectors are in operation, what are the details of their use?

Information is needed on the airflow rate of the dust collector. Airflow is the speed at which the dust collector takes in air. You can find the airflow rate in the dust collector’s operating manual. You can collect this information in:

- Cubic metres per minute
- Cubic metres per hour
- Litres per minute OR
- Litres per second.

You can then use the conversion tool in the ChemTRAC calculator to enter the airflow rate in cubic feet per minute (cfm).

You will specify the process associated with the dust collector.

You will also need to estimate the time that the dust collectors are removing dust from the air. Information can be put into [Worksheet 3 Table 1](#) below.

Information on a typical dust collector has been filled out as an example. If multiple dust collectors are found in the facility, you should enter them separately (in different rows of the table).

Worksheet 3 Table 1 – Dust collectors

Air flow rate	Airflow rate units	Process	How often are dust collectors operating?		
			Hours per day	Days per week	Weeks per year
<i>example:</i> <u>2,000</u>	<i>x cfm</i> <input type="checkbox"/> m^3/s <input type="checkbox"/> L/m <input type="checkbox"/> L/s <input type="checkbox"/> m^3/h	<u>Sanding</u>	<u>8</u>	<u>5</u>	<u>50</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

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 Wood Office Furniture Manufacturing. The ChemTRAC calculator will then automatically calculate the quantities of ChemTRAC substances released from processes found in your wood office 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 wood office 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 *Wood Office 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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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/or released during the manufacture of wood office furniture.

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 coating(s) used and reclaimed during the reporting year
2. Enter the control efficiency of any emissions control equipment used in the coating area of the facility during the reporting year
3. Select the appropriate emissions control installed on natural gas-fired equipment
4. 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

5. Enter the airflow rate of dust collectors used during the reporting year
6. Select the process associated with each dust collector
7. Enter the operating schedule for the dust collectors onsite

Output summary: This table gives you the estimated quantity of ChemTRAC priority substances this activity manufactured, processed, otherwise used and/or released for the reporting year.

Other processes: If your facility has other activities or sources that MPO and/or release ChemTRAC priority substances (chemicals), you will need to calculate the chemical amounts contributed from these activities as well. Please go to the [ChemTRAC website](#) for other calculations and more information.

Total MPO and Releases: Once you have your estimates for all the activities or processes at your facility, enter the chemical amounts from each process into the "Calculation of Totals" calculator (available at [www.toronto.ca/chemtrac](#)) to determine if you are required to report.

Before you start make sure you have:

- the type and quantity of wood coatings used (in litres) during the reporting year
- the control efficiency of emissions control equipment installed in the coating area of the facility (as a percentage, contact your supplier if you do not have this information available)
- the quantity of natural gas used during the reporting year (in cubic metres) or
- the total maximum combined thermal input of all natural gas-fired equipment (in BTU/h)
- the operating schedule for natural gas-fired equipment
- the type of emissions control installed on natural gas-fired equipment
- the airflow rate of dust collectors (in cubic feet per minute)
- the operating schedule for dust collection during the reporting year

Note: some of these may not apply to your facility

! " # \$ % ' & ()
* + , ' (-)

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 wood office 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, orange (mandatory)** and **light blue boxes** (optional). 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 **Worksheet 1, 2 and 3** of this guide. Note that the entries marked as 'examples' in the input-output screen 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

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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through the Input-Output screen. The image on the next page illustrates the different areas of the input-output screen.

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Wood Coating Process

Coating	VOC content* (mass VOC/kg)	Quantity Used (litres)	Control Efficiency (%)
Example	0.25	7000	85

Enter data from Worksheet 1 here

Gas Flow Data

Please complete ONLY A or B

A) Quantity of Natural Gas

Total quantity of natural gas used: m³/yr

B) Thermal Input and Operating Schedule

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

Operating schedule: days/week

Identify emissions control installed:

Enter data from Worksheet 2 here

Unit Conversion Table

1.00	cubic foot (ft³)	=	0.028 m³
1.00	cubic foot (ft³)	=	0.1 m³
1.00	cubic metres per minute	=	15.0 cfm
1.00	litres per minute	=	0.015 cfm
1.00	litres per second	=	0.12 cfm
1.00	cubic metres per hour	=	0.9 cfm

Use this box to convert volume of gas to cubic metres and to convert flow rate to cfm

For dust collectors, baghouses, fabric filters, or cyclones units associated with sanding and routing, please indicate the following:

Name	Flow rate (m³/min)	Hours/Day	Days/Week	Weeks/Year
Example Process 1	2.000	8	5	50

Enter data from Worksheet 3 here

ChemTRAC Priority Substances

	Manufactured*	Processed*	Otherwise Used*	Released to Air*
Acetone	0.0	0.0	0.0	0.0
Chloroform	0.0	0.0	0.0	0.0
Chlorinated (non-halocarbon) and its compounds	0.0	0.0	0.0	0.0
Formaldehyde	0.0	0.0	0.0	0.0
Lead and its compounds	0.0	0.0	0.0	0.0
Manganese and its compounds	0.0	0.0	0.0	0.0
Mercury and its compounds	0.0	0.0	0.0	0.0
Nickel and its compounds	0.0	0.0	0.0	0.0
Nitrogen Oxides (NOx)	0.0	0.0	0.0	0.0
Polycyclic Aromatic Hydrocarbons (PAHs)	0.0	0.0	0.0	0.0
Total PAHs	0.0	0.0	0.0	0.0
Isobutyl Alcohol (IBAC)	0.0	0.0	0.0	0.0

The output values are calculated here

Entering information from Worksheet 1: Wood coatings

For Varnish 1 (desks), “**varnish and shellac**” is selected from the dropdown menu.

“1200” L/yr is entered into the yellow box for quantity used.

“0” is entered into the yellow box for control efficiency.

Entering information from Worksheet 2: Natural gas fired ovens/cookers/dryers

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.

If your information on quantity of natural gas is in cubic feet, you will need to use the box at the bottom right hand side of the input-output screen. Enter the

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volume in cubic feet in the top yellow box. The tool will automatically calculate the volume in cubic metres in the blue column at the right of the table. Enter the volume in cubic metres into the main input table.

Unit Conversion Table				
1.00	cubic feet (ft ³)	=	0.028	m ³
1.00	square feet (ft ²)	=	0.1	m ²
1.00	cubic meters per minute	=	35.3	cfm
1.00	litres per minute	=	0.035	cfm
1.00	litres per second	=	2.12	cfm
1.00	cubic metres per hour	=	0.6	cfm

Entering information from Worksheet 3: Dust collectors

The image on the next page displays the area of the Input-Output screen where you enter information from Worksheet 3 on dust collectors. As an example, the sample information from Worksheet 3 is entered into the appropriate areas of the screen:

The **flow rate** of “**2,000**” **cfm** is entered into the yellow box.

The **process** of “**sanding**” is selected from the dropdown menu.

Finally, an operating schedule of **8** hours per day, **5** days per week, **and 50** weeks per year is entered in the appropriate boxes.

If you have information on flow rate in units other than cubic feet per minute (cfm), you can use the Unit Conversion Table illustrated on the next page to convert to cfm.

For dust collectors, baghouses, fabric filters, or cyclones onsite associated with sanding and sawing, please indicate the following				
Flow rate (cfm)	Process	Operating Schedule		
		Hours/Day	Days/Week	Weeks/Year
Example				
2000	Sanding	8	5	50
2,000	Sanding	8	5	50
	Select			

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If your flow rate is in units **other than cfm**, you will need to use the cfm conversion box at the bottom right hand side of the input-output screen. This cfm conversion box allows you to convert flow rates into cfm (cubic feet per metre). Enter the flow rate in cubic metres per minute, litres per minute, litres per second or litres per hour in the appropriate yellow box. The tool will automatically calculate the flow rate in cfm in the blue column at the right of the table. Enter the flow rate in cfm into the main input table.

Unit Conversion Table				
1.00	cubic feet (ft ³)	=	0.028	m ³
1.00	square feet (ft ²)	=	0.1	m ²
1.00	cubic meters per minute	=	35.3	cfm
1.00	litres per minute	=	0.035	cfm
1.00	litres per second	=	2.12	cfm
1.00	cubic metres per hour	=	0.6	cfm

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.

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 19 for more details.

ChemTRAC Priority Substances	Quantity (kg/yr)			
	Manufactured ¹	Processed ¹	Otherwise Used ¹	Released to Air ¹
Benzene	0.0	0.0	0.0	0.0
Cadmium	0.0	0.0	0.0	0.0
Chromium (non-hexavalent) and its compounds	0.0	0.0	0.0	0.0
Formaldehyde	0.0	0.0	0.0	0.0
Lead and its compounds	0.0	0.0	0.0	0.0
Manganese and its compounds	0.0	0.0	0.0	0.0
Mercury and its compounds	0.0	0.0	0.0	0.0
Nickel and its compounds	0.0	0.0	0.0	0.0
Nitrogen Oxides (NOx)	4.0	0.0	0.0	4.0
Particulate Matter (PM2.5)	120.4	0.0	0.0	120.4
Total PAHs	0.0	0.0	0.0	0.0
Volatile Organic Compounds (VOCs)	0.2	372.0	0.0	372.2

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 Wood Office Furniture with emissions from other processes that happen in the facility. This is discussed in Appendix C.

If there are no other processes and, 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. Table 2 on the next page compares the Output table from the section above to ChemTRAC thresholds. This example uses the values from Worksheet 1.

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	0.0	0.0	100	No
Cadmium and its compounds	0.0	0.0	0.0	0.0	1	No
Chromium (non-hexavalent) and its compounds	0.0	0.0	0.0	0.0	100	No
Formaldehyde	0.0	0.0	0.0	0.0	100	No
Lead and its compounds	0.0	0.0	0.0	0.0	10	No
Manganese and its compounds	0.0	0.0	0.0	0.0	10	No
Mercury and its compounds	0.0	0.0	0.0	0.0	1	No
Nickel and its compounds	0.0	0.0	0.0	0.0	100	No
Nitrogen Oxides	4.0	0.0	0.0	4.0	200	No
Particulate Matter (PM_{2.5})	120	0.0	0.0	120	30	YES
Total PAHs	0.0	0.0	0.0	0.0	10	No
VOC	0.2	372.0	0.0	372.2	100	YES

In the Table 2 example, PM_{2.5} and VOCs are manufactured, processed, or otherwise used in quantities above the reporting thresholds.

Therefore, in this example, the manufacturing and release to air of PM_{2.5} would need to be reported to ChemTRAC. The processing and release of VOCs would also 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 title is 'ChemTRAC - 4 Steps to Reporting' and the subtitle is '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 'Click here to access the system' to this link. The page also includes a sidebar with links like 'Public Health Home', 'A - Z Index', 'Contact us', 'ChemTRAC Background', 'Info for businesses', '4 steps to reporting', 'Info for communities', 'Links', and 'Contact ChemTRAC'. Below the main heading, there is a paragraph explaining the responsibility of facility owners and a section titled 'The following steps are provided as a guide to help you report:' which lists four steps: 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 3-1-1.

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

The screenshot shows the ChemTRAC login interface. It has two main sections: "First Time Signing In?" and "Already Registered?". The "First Time Signing In?" section contains a button labeled "Register with First Time Access Code". The "Already Registered?" section contains a text input field for "Registration ID:" and a "Sign In" button. Below the input field, there is a note: "If you have lost or forgotten your Registration ID, please contact us at (416) 338-7600".

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.

The screenshot shows the ChemTRAC main dashboard. At the top left is the "Toronto" logo. Below it is a sidebar with links: "Frequently asked questions", "Contact us", "Terms of use", and "User Guide". The main area is titled "ChemTRAC" and includes a security notice: "You are in a secure site." Below this is a progress bar with seven steps: "Step 1 Facility Registration", "Step 2 Reporting Period", "Step 3 Chemical Selection", "Step 4 Use & Release (0 of 0)", "Step 5 Environmental Statement", "Step 6 Summary Notification", and "Step 7 Confirmation & Print". Step 1 is marked as complete with a green leaf icon, and Step 2 is marked as in progress with a green leaf icon. At the bottom left, there is a 15-minute timer icon and a note: "Note: This registration session will automatically end fifteen minutes after this Web page has finished loading."

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.

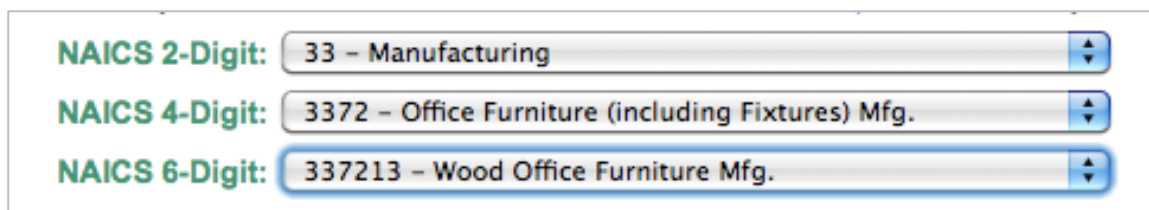
Please remember to have all your information ready before you enter the system. **You will only have fifteen minutes to complete each screen before the system logs you out.** If your session expires before you hit the "submit" button, you will need to re-enter all your information. If you are running 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 wood office furniture manufacturers, this will

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

be “33 – Manufacturing”. Then, you can select the appropriate 4-digit code (3372), and finally, the 6 digit code (337213).



The screenshot shows three dropdown menus for selecting NAICS codes. The first menu, labeled 'NAICS 2-Digit:', has '33 - Manufacturing' selected. The second menu, labeled 'NAICS 4-Digit:', has '3372 - Office Furniture (including Fixtures) Mfg.' selected. The third menu, labeled 'NAICS 6-Digit:', has '337213 - Wood Office Furniture Mfg.' selected.

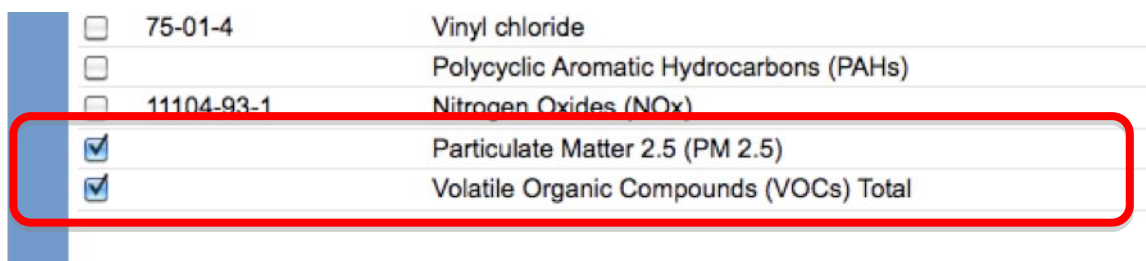
Step 2. Reporting period

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 Particulate Matter 2.5 and VOCs were the only substances that exceeded thresholds.



The screenshot shows a list of chemicals with checkboxes for selection. The chemicals listed are: 75-01-4 Vinyl chloride, Polycyclic Aromatic Hydrocarbons (PAHs), 11104-93-1 Nitrogen Oxides (NOx), Particulate Matter 2.5 (PM 2.5), and Volatile Organic Compounds (VOCs) Total. The checkboxes for Particulate Matter 2.5 (PM 2.5) and Volatile Organic Compounds (VOCs) Total are checked, and this section is highlighted with a red box.

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 commercial wood office furniture manufacturers, $PM_{2.5}$ are “manufactured” and “released to air”. 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.

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

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

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

The example below illustrates how to complete Step 4 for Particulate Matter 2.5 using information from Table 2 of this guide.

Particulate Matter 2.5 (PM 2.5) (Reporting Threshold = 30.0 kg)		
	Quantity (kg)	Estimation Method
If you used more than one method to estimate data, please choose the main one		
Manufactured:	<input type="text" value="120"/>	<input type="text" value="ChemTRAC calculator"/>
Processed:	<input type="text"/>	<input type="text" value="- Select Estimation Method From List -"/>
Otherwise Used:	<input type="text"/>	<input type="text" value="- Select Estimation Method From List -"/>
Total Use:	<input type="text" value="120"/>	
Release to Air:	<input type="text" value="120"/>	<input type="text" value="ChemTRAC calculator"/>
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 -"/>
Total Release:	<input type="text" value="120"/>	

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 27 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 wood office 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: Install wet scrubbers, mechanical collectors or fabric filters that capture more particulate matter from sawing and sanding.
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 commercial wood office furniture manufacturers. Control technologies can limit emissions from sawing and sanding.

Technology for reducing VOCs from coatings and paint

Recall that volatile organic compounds (VOCs) are released from fillers, sealers, basecoats and topcoats.

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.

- **Water-based paints and coatings** generally have lower VOC contents than solvent-based coatings.
- **UV curable coatings** and **“high solids” 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 paints.

HVLP spray guns. Manufacturers can also reduce VOC emissions by increasing the efficiency of coating and painting. High volume low pressure spray guns increase transfer efficiency by up to 40-70%⁴. They are effective for both solvent- and water-based products.

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

Catalytic oxidizers that 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.

Technology for reducing emissions from cooking and drying kilns

There are two common control technologies that can help decrease the amount of combustion by-products released from natural gas used to heat ovens. They are known as low NO_x burners and recirculated flue gas. Both of these control

⁴ http://www.smallbiz-enviroweb.org/Industry/bmpfiles/BMP_FurnitureFinishing-3.pdf

Part 2: Reducing your facility's environmental impact

technologies specifically reduce the amount of NO_x that is released as a combustion by-product.⁵ These control technologies generally are not considered to reduce the amounts of other combustion by-products.

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%.

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, select "low NO_x burner" as a control for gas ovens. Check the new level of nitrogen oxides in the output table. It should be half the original number.

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. Recirculated flue gas with low NO_x burners can reduce NO_x emissions by about 70%.

Technology for reducing PM_{2.5} from sawing and sanding

Recall that particulate matter (PM_{2.5}) in the form of sawdust is released into the air during sawing and sanding.

Dust collection systems. Effective dust collection systems can reduce the amount of PM_{2.5} that is released from sawing and sanding. Fabric filters, bag houses and cyclones are examples of dust collection systems. These systems take in air with a high abundance of PM_{2.5}, collect much of the PM_{2.5} within filters or bags, and release the air with a reduced amount of PM_{2.5}. When purchasing a dust collection system, consider what capacity you need. The unit should have

An effective dust collection system can have other economic benefits:

- Sanding belts and other equipment may also last longer as dust will not become embedded in them.
- There may be a market for clean sawdust captured by dust collectors (e.g. for animal bedding or as raw material for particle board manufacturing).

⁵ NO_x refers to total amounts of nitric oxide (NO) and nitrogen dioxide (NO₂).

Part 2: Reducing your facility's environmental impact

Table 3 summarizes the control technologies discussed above.

Table 3. Control technologies for VOCs, PM_{2.5} and combustion by-products

Process or product	Control technology	ChemTRAC substance being controlled
Sawing and sanding	Dust Collection systems: fabric filters, bag houses, cyclones, etc.	Particulate matter (PM _{2.5})
Wood coatings	Water-based coatings, UV coatings, High-solids coatings, Low-VOC coatings, no-VOC coatings	Volatile Organic Compounds (VOCs)
	High volume low pressure spray guns	Volatile Organic Compounds (VOCs)
	VOC control equipment: thermal oxidizers, catalytic oxidizers, etc.	Volatile Organic Compounds (VOCs)
Combustion of natural gas	Low NO _x burners	Nitrogen oxides (NO _x)
	Recirculated flue gas with low NO _x burners	Nitrogen oxides (NO _x)

More ways to reduce costs and improve performance

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

1. **Reduce energy use.** By reducing energy use, wood office 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 commercial wood office 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 Upholstered Household Furniture Manufacturing: Pollution Prevention Information.
<http://www.toronto.ca/health/chemtrac/pdf/GreenUpholsteredFurniture.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 Commercial Wood office 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 – Wood coatings

1. What types of wood coatings do you use?
2. What is the VOC content of each product listed on the MSDS?

If you do not have information on VOC content, Question 2 can be skipped. The ChemTRAC calculator will use default values.

Worksheet 1 Table 1 – Types of fillers, sealers, basecoats, and topcoats

Wood coating name	Coating type	VOC content (kg/L)
example: Varnish 1 (desks)	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input checked="" type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	0.31
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
_____	<input type="checkbox"/> Paint solvent-based <input type="checkbox"/> Primer <input type="checkbox"/> Paint water-based <input type="checkbox"/> Varnish & shellac <input type="checkbox"/> Enamel <input type="checkbox"/> Thinner <input type="checkbox"/> Lacquer	
Etc. _____		

Additional Material

3. How much of each product do you use?

Worksheet 1 Table 2 – Quantity of products used

Wood coating process	Containers per year	Size of containers	Quantity used
<i>example:</i> Varnish 1 (desks)	<u>60</u>	<u>20 litres</u>	<u>$60 * 20 = 1200$</u> <u>Litres</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Etc. _____	_____	_____	_____

4. What is the control efficiency for VOC emissions? (from VOC emission control equipment)

Worksheet 1 Table 3 – Control efficiency for VOC emissions

Wood coating process	Control efficiency <i>If no VOC control equipment is used, control efficiency is 0%</i>
<i>example:</i> Varnish 1 (desks)	0%
_____	_____
_____	_____
_____	_____
_____	_____
Etc. _____	_____

Additional Material

Worksheet 2 – Natural gas fired equipment (for cooking and drying)

5. What control technologies are installed on your ovens?

Ovens are equipped with (add a checkmark):

- | | | |
|----|--|-------|
| d. | Low NO _x burners only | _____ |
| e. | Low NO _x burners with recirculated flue gas | _____ |
| f. | No control technologies | _____ |

6. How much natural gas is used to heat your commercial ovens?

This question can be answered using EITHER Option 6A or Option 6B.

Option 6A – What is the total amount of natural gas used to heat your ovens?

Option 6B – What is the thermal rating of your ovens? What is its operating schedule?

Option 6A. Total natural gas used to heat the ovens
Add values in cubic metres OR cubic feet: _____ m ³ (cubic metres) or _____ ft ³ (cubic feet)
OR
Option 6B. Thermal rating of the ovens
Add values in British Thermal Units per hour, OR in kilojoules per hour: _____ 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

Additional Material

Worksheet 3 – Dust collectors (for sawing and sanding)

Skip this worksheet if no dust collectors, baghouses, fabric filters or cyclones are in operation at your facility.

7. If dust collectors are in operation at your facility, what are the details of their use?

Air flow rate	Airflow rate units	Process	How often are dust collectors operating?		
			Hours per day	Days per week	Weeks per year
<u>example:</u> <u>2,000</u>	\times cfm <input type="checkbox"/> m^3/s <input type="checkbox"/> L/m <input type="checkbox"/> L/s <input type="checkbox"/> m^3/h	<u>Sanding</u>	<u>8</u>	<u>5</u>	<u>50</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

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

Input-Output

You are here → **All Substances**

Calculations

References

Process Flow

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

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 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.

You can also modify the default VOC contents of different types of coatings. 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.

CHEMTRAC

Calculations

Instructions

*This page provides detailed calculations based on the information provided in the Input table. It also provides sample calculations and an assessment of emission factor data quality.

Input-Output

* If you have site specific emission factors you may use them in the table below. If you choose to insert your own emission factor ensure that the units have been converted accordingly.

All Substances

Calculations

References

Process Flow

Consumption:		0 m ³ /yr 0 R ³ /yr	OR	0 B TU/h 0 R ³ /yr			
Contaminant	CAS #	Uncontrolled	Emission Factor (lb/1000000 ft ³) Low NO _x	Low NO _x Recirc.	Emission Rate (kg/yr)	Data Quality	Comments
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	<	0.00E+00	E	PAH
7,12-Dimethylbenz(a)anthracene	57-97-6	<	0.000016	<	0.00E+00	E	PAH
Acenaphthene	83-32-9	<	0.0000018	<	0.00E+00	E	PAH
Acenaphthylene	208-96-8	<	0.0000018	<	0.00E+00	E	PAH
Anthracene	120-12-7	<	0.0000024	<	0.00E+00	E	
Benzo(a)anthracene	56-55-3	<	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	<	0.00E+00	E	PAH
Benzo(b)fluoranthene	205-99-2	<	0.0000018	<	0.00E+00	E	PAH
Benzo(g,h,i)perylene	191-24-2	<	0.0000012	<	0.00E+00	E	PAH

Etc.

Emission factors in these columns can be modified by the user

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.

Additional Material

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.



References

Version 3.0 Last Updated: Oct 28, 2011 JA, YS & ZI

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

Dust Collector emission factors are provided in the Ontario Ministry of the Environment publication "Procedure for Preparing and ESDM Report" PIBS #3614e03, March 2009

<http://www.ene.gov.on.ca/envision/gp/3614e03.pdf>

US EPA AP-42 "Natural Gas Combustion", Section 1.4, 1998

<http://www.epa.gov/ttn/chieff/ap42/ch01/final/c01s04.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

National Pollutant Inventory, Environment Australia Emissions Estimation Techniques Manual Furniture

http://www.npi.gov.au/handbooks/approved_handbooks/pubs/ffurniture.pdf

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.

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

Additional Material

Emission factors for commercial wood office 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. particulate matter 2.5) emitted by a specific activity (e.g. collecting a cubic metre of air from sanding).

Table 4 presents the emission factor estimates used in the Wood Office Furniture calculator.

Table 4. Emission factors for PM_{2.5}

Source	Substance	Default Emission Factor	
Wood coatings	Volatile organic compounds (VOCs)	Paint Solvent Based	0.672 kg/L
		Paint Water Based	0.156 kg/L
		Enamel	0.42 kg/L
		Lacquer	0.732 kg/L
		Primer	0.792 kg/L
		Varnish and Shellac	0.396 kg/L
		Thinner	0.883 kg/L
		Adhesive	0.528 kg/L
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
Dust collectors – sanding	All particulate matter (PM)	20 mg/m ³	
	% PM _{2.5}	88.5%	
	Particulate matter 2.5 (PM _{2.5})	17.7 mg/m³	
Dust collectors – sawing	All particulate matter (PM)	20 mg/m ³	
	% PM _{2.5}	28.3%	
	Particulate matter 2.5 (PM _{2.5})	5.66 mg/m³	

Additional Material

Note that sawing and sanding emit the same total quantity of particulate matter per cubic metre of air, but that they emit different quantities of PM_{2.5}. For sanding, an estimated 88.5% of PM emissions are PM_{2.5}. For sawing, only 28.3% of PM emissions are PM_{2.5}.

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 below illustrates how to calculate PM_{2.5} emissions from the sample dust collector in Worksheet 1.

Example: Using emission factors to estimate PM_{2.5} emissions from sanding

In Part 1, we use a sample dust collector with an airflow rate of 2000 cubic feet per minute (cfm). This amounts to an airflow rate of 0.914 cubic metres per second (cms).

The dust collector is in operation 8 hours per day, 5 days per week, and 50 weeks per year. This amounts to 7,200,000 seconds of operation per year.

The emissions factor for sanding of 17.7 mg per m³ amounts to 0.0177 kg per m³.

Total emissions of PM_{2.5} for 2011 from sanding

= Flow (m³ per second) * Seconds of operation * Emissions factor (kg per m³)

= **0.914 m³ per second * 7,200,000 seconds per year * 0.0177 kg per m³**

= **120.3 kg of PM_{2.5}**

Appendix C. Combining the Wood Office 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.⁶ 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.

⁶ 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

• This page gathers information to help you determine your facility-wide substance manufacture, process, otherwise use (MPO) and release estimates.

• For each source of priority substances, enter the process name and then provide the quantity of each substance manufactured, processed, otherwise used and released.

• 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.

• At the end of each row, you will find the facility-wide totals that need to be compared with the Mass Reporting Thresholds.

• The last 4 columns indicate the amount of each substance that you must report to the City of Toronto.

Instructions

Calculation

Example

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

Group	Substance	Only (kg)				Only (kg)				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 (kg/yr)	Total Processed (kg/yr)	Total Otherwise Used (kg/yr)	Total Released to Air (kg/yr)
		Process#1:				Process#2:									
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)*									0	100	No	---	---	---
	Dichloromethane (Methylene chloride)									0	100	No	---	---	---
	Formaldehyde*									0	100	No	---	---	---
	Manganese ¹									0	10	No	---	---	---
	Nickel ¹									0	100	No	---	---	---
	Trichloroethylene (Perchloroethylene)									0	100	No	---	---	---
	Trichloroethylene*									0	100	No	---	---	---
	Vinyl chloride									0	100	No	---	---	---
B	Cadmium ¹									0	1	No	---	---	---
	Chromium (hexavalent) ¹									0	10	No	---	---	---
C	Lead ¹									0	10	No	---	---	---
	Mercury ¹									0	1	No	---	---	---
	Total polycyclic aromatic hydrocarbons (PAHs)*									0	10	No	---	---	---
	Nitrogen oxides (NOx)									0	200	No	---	---	---
	Particulate matter 2.5 (PM2.5)									0	30	No	---	---	---
	Total Volatile organic compounds (VOCs) ²									0	100	No	---	---	---

Enter values from the Output Summary table of your first calculator here

Enter values from the Output Summary table of your second calculator here

Etc...

Additional Material

The total combined release of substances (whether from the ChemTRAC Wood office 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 5 below.

Table 5. 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:

- N/A = not applicable
- The concentration threshold % w/w is not relevant to the emissions quantified using the ChemTRAC calculator for Commercial Wood office 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

Additional Material

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:

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)

Additional Material

- 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.

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.