

Guide to calculations for ChemTRAC reporting:

Softwood veneer and plywood manufacturing

Version 1.1

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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 softwood veneer and plywood 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.

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

Introduction to the ChemTRAC program.....	1
The Softwood Veneer and Plywood Manufacturing sector	2
Identifying ChemTRAC substances	3
Calculating emissions.....	5
Worksheets for collecting information	6
Using the calculator.....	13
Interpreting results.....	21
Reporting to ChemTRAC.....	23

Part 2: Reducing your facility's environmental impact

Pollution prevention strategies.....	29
Control technologies for reducing emissions.....	30
More ways to reduce costs and improve performance	33
Getting started with pollution prevention	34

Additional Material

Appendix A. Printer-friendly worksheets	36
Appendix B. Additional material related to the ChemTRAC calculator	39
Appendix C. Combining the calculator with other sources.....	44
Appendix D. Reporting Checklist	47

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

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

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 46.

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. Softwood veneer and plywood manufacturers are covered by this bylaw.

This guide is designed to help you and other softwood veneer and plywood manufacturing 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 Softwood Veneer and Plywood Mills sector

The North American Industrial Classification System (NAICS) code 321212 includes establishments that manufacture softwood veneer and plywood. It excludes facilities that are primarily engaged in preserving purchased plywood.

This guide uses the term “softwood veneer and plywood manufacturers” to refer to all facilities within the Softwood Veneer and Plywood Mills sector.

Softwood veneer and plywood 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 softwood veneer and plywood manufacturers

Table 1 lists the typical substances and processes used in a softwood veneer and plywood manufacturing facility. Most facilities will use one or more resin, and will use sawing and sanding as part of manufacturing. Facilities that manufacture softwood veneer will also use veneer dryers.

Table 1 also shows the ChemTRAC priority substances that are released in a typical softwood veneer and plywood manufacturing facility. The ChemTRAC calculator can help you estimate the levels of these substances in your business.

Table 1. The processes used in manufacturing that release ChemTRAC substances

ChemTRAC priority substances	Veneer drying ¹	Resins ²			Sawing, sanding, chipping
		Urea formaldehyde	Phenol formaldehyde	Other	
Formaldehyde	X	X	X		
Acetaldehyde	X		X		
Acrolein	X				
Nitrogen oxides (NO _x)	X				
Benzene	X				
Volatile Organic Compounds (VOCs)	X	X	X	X	
Particulate matter (PM _{2.5})	X		X		X

1. The priority substances released from veneer drying depend on the equipment used.

2. Priority substances are emitted from resin application as well as from the use of plywood presses.

Formaldehyde. Formaldehyde is a colorless gas with a characteristic pungent smell. It is reacted with phenol or urea to produce resins used as permanent adhesives for plywood and carpet manufacturing.

Acetaldehyde. Acetaldehyde is an organic compound that occurs widely in a nature and is produced industrially on a large scale. It is used in the production of perfumes, resins and dyes.

Acrolein. Acrolein is an unstable compound with an acrid smell. It is used in industrial processes e.g. in herbicides, in leather tanning, and photography. Other sources include fossil fuel combustion and the burning of wood and plastics

Nitrogen oxides. Nitrogen oxides (NO_x) are highly reactive gases. They include nitrogen dioxide (NO₂), nitrous acid and nitric acid. NO_x is produced by all combustion processes in the presence of air.

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

Benzene. Benzene is a colorless and flammable organic compound that is used as a solvent for fats, waxes, resins, oils, inks, paints, plastics, and rubber. It is also released through the combustion of natural gas.

Volatile Organic Substances (VOCs). VOCs are a group of organic chemicals that easily evaporate into the air. You can often smell them. In a softwood veneer and plywood manufacturing facility, VOCs are released from manufacturing products including fillers, sealers, basecoats and topcoats.

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 softwood veneer and plywood manufacturer, PM_{2.5} is released during the sawing, sanding and chipping of wood and other materials.

The health effects of ChemTRAC substances

Formaldehyde. Formaldehyde is carcinogenic to humans. It is a weak initiator of cancer and a strong promoter of cancer. It is also highly reactive and can irritate the nose, eyes, skin, throat and lungs at low levels of chronic exposure.

Acetaldehyde. Acetaldehyde is possible carcinogenic to humans. Chronic exposure to low levels of inhaled acetaldehyde may increase the risk of cancer in all parts of the respiratory tract.

Acrolein. Acrolein is primarily an irritant of the respiratory tract. Chronic exposure can lead to congestion of the respiratory system in addition to irritation of the eyes, nose and throat.

Benzene. Evidence indicates that benzene is carcinogenic to humans. Chronic exposure is linked to disorders of the blood, including acute myeloid leukemia (a cancer of the blood system). Benzene can enter the body by inhalation, ingestion and absorption through the skin.

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.

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.

Nitrogen oxides. NO_x reacts with ammonia, moisture, and other compounds to form small particles that penetrate into sensitive parts of the lungs. Exposure leads to a decrease in the lungs' ability to fight infection. Nitrogen oxides are associated with mortality and hospitalization as a result of respiratory disease.

For more information on these substances and 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 estimate 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 Softwood Veneer and Plywood 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 Softwood Veneer and Plywood Manufacturing. Four worksheets are provided with sample information:

- Worksheet 1: Quantity of wood processed
- Worksheet 2: Veneer drying
- Worksheet 2: Resins
- Worksheet 3: Dust collectors (sawing, sanding and chipping)

Blank, printer-friendly versions of the worksheets are included 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 those included in the ChemTRAC calculator for Softwood Veneer and Plywood 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 Softwood Veneer and Plywood 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 – Quantity of wood processed

This worksheet will help you collect information on the quantity of wood processed in your facility, and the type(s) of product(s) produced. You should collect data on your facility for the period from January 1 to December 31 of a calendar year.

1. How much wood did you process last year?

You can estimate how much wood you processed last year by multiplying the number of wood shipments you received by the volume of each shipment. If it is easier, you can start by estimating the number of shipments per week or month.

Example: $1 \text{ shipment per month} * 12 \text{ months per year} = 12 \text{ shipments per year}$

Then: $12 \text{ shipments per year} * 5,000 \text{ board feet per shipment} = 60,000 \text{ board feet per year}$

Enter the names and quantities of wood products processed in the table below. Add up the **Quantity processed** column to estimate the **Total quantity of wood processed** last year.

Type of wood product	Shipments per year	Size of shipment	Units	Quantity processed
<i>example: Spruce for veneer</i>	<i>12</i>	<i>5,000</i>	<i>board feet</i>	<i>$12 * 5,000 = 60,000$ board feet</i>
Total quantity of wood processed:				<i>example: 60,000 board feet</i>

2. What type of wood products do you manufacture?

- **Veneer** refers to thin slices of wood, usually thinner than 3 mm (1/8 inch)
- **Plywood** consists of three or more layers of veneer, each glued with its grain at right angles to adjacent layers for strength.

Use an "X" in the table below to identify the products made by your facility.

What type of wood products do you produce?	<input type="checkbox"/> Veneer only <input type="checkbox"/> Plywood only <input checked="" type="checkbox"/> Both veneer and plywood
---	--

Note: the ChemTRAC calculator also uses information about the quantity of wood processed, the type of products produced, and the type of resin used to automatically calculate emissions from plywood presses (if relevant).

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

Worksheet 2 - Veneer drying

This worksheet will help you collect information on the equipment used for veneer drying in your facility. Veneer dryers are used after clipping wood to the appropriate size and before resin is applied. You should collect data on your facility for the period from January 1 to December 31 of a calendar year.

If you do not operate any veneer drying equipment, you can select “not applicable” in the table below or leave this section of the worksheet blank.

3. What type of veneer drying equipment do you have?

Veneer dryers typically have heated zones separated by cooling zones. If you not operate veneer drying equipment, select “not applicable” or leave this section blank.

- **Indirect-heated** veneer dryers: air is warmed over steam coils and then circulated over the veneer.
- **Direct natural gas fired** veneer dryers: gases from combustion of natural gas in on onsite boiler are blended with cooler air and circulated over the veneer.
- **Direct wood fired** veneer dryers: gases from combustion of wood are blended with cooler air and circulated over the veneer.

Use an “X” in the table on the next page to identify the type of veneer drying equipment used in your facility.

4. What type of emissions control technology is associated with your veneer drying equipment?

Regenerative thermal oxidizers (RTOs) and regenerative catalytic oxidizers (RCOs) are two common types of equipment used to control VOC emissions from veneer drying.

- **RTOs** (regenerative thermal oxidizers) destroy VOCs using high temperatures.
- **RCOs** (regenerative catalytic oxidizers) use catalysts to destroy VOCs at lower temperatures.

Use an “X” in the table on the next page to identify the VOC control technologies used by your facility. If you not operate any emissions control technology, **select “none” or leave this section blank.** See Control technologies for reducing emissions on page 30 of this guide for additional information.

5. What percentage of veneers requires re-drying?

Often, veneers leaving the veneer dryer have not yet reached the target moisture content. They may be dried again in separate redryers or in conventional veneer dryers.

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

In the table on the next page, indicate the **percentage** of veneers dried in your facility that are redried, either in separate redryers or using the same equipment specified in Question 3.

Veneer drying equipment	
Type	<input type="checkbox"/> <i>Not applicable</i> <input type="checkbox"/> <i>Indirect heated</i> <input checked="" type="checkbox"/> <i>Direct natural gas fired</i> <input type="checkbox"/> <i>Direct wood fired</i>
Emissions control technology	<input checked="" type="checkbox"/> <i>None</i> <input type="checkbox"/> <i>RTO</i> <input type="checkbox"/> <i>RCO</i>
Percentage of veneers requiring redrying	example: <u>65%</u>

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

Worksheet 3 – Resins

This worksheet will help you collect information on resins used as adhesive coatings for wood products. You should collect data on your facility for the period from January 1 to December 31 of a calendar year.

6. What type of resins do you use?

- **Urea formaldehyde resins** are light in colour and are cured at relatively low temperatures.
- **Phenol formaldehyde resins** are darker in colour and are cured at higher temperature and pressure. They emit formaldehyde at lower levels than urea formaldehyde resins.
- **Other resins** that are formaldehyde-free include MDI (methylene diphenyl isocyanate) and PVA (polyvinyl acetate).

You can find this information on the product containers. Use an X to indicate the type of resin in the table below.

Type of resin
<input checked="" type="checkbox"/> Urea formaldehyde resin
<input type="checkbox"/> Phenol formaldehyde resin
<input type="checkbox"/> Other

7. How much resin do you use?

You can estimate how much resin you used last year by multiplying the number of bags or containers you purchased by the volume of each bag or container. If it is easier, you can start by estimating the number of shipments you processed each week or month.

Example

2 containers per month * 12 months per year = 24 containers per year

Then:

24 containers per year * 25 kg per container = 600 kg per year

You can find this information on the product containers. Use an X to indicate the type of resin in the table below.

Quantity of resin		
Containers per year	Size of containers	Total quantity used
<u>24</u>	<u>25</u> <input type="checkbox"/> L <input checked="" type="checkbox"/> kg	<u>24 * 25 = 600 kg</u>

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

Note: the ChemTRAC calculator also uses information about the quantity of wood processed, the type of products produced, and the type of resin used to automatically calculate emissions from plywood presses (if relevant).

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

Worksheet 4 – Dust collectors (sawing, sanding, chipping)

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.

8. If dust collectors are in operation at your facility, 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 feet per minute (cfm)
- Cubic metres per second (m^3/s)
- Cubic metres per hour (m^3/h)
- Litres per minute (L/m) OR
- Litres per second (L/s).

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

You will also need to specify the number of dust collectors, and the amount of time that the dust collectors remove dust from the air.

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

Process area	Number of units	Air flow rate	Airflow rate units	How often are dust collectors operating?		
				Hours per day	Days per week	Weeks per year
<i>example:</i> <u>Plywood sanding</u>	<u>1</u>	<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>8</u>	<u>5</u>	<u>50</u>
Etc.						

Using the calculator

This section of the guide provides a step-by-step walkthrough of the ChemTRAC calculator for Softwood Veneer and Plywood Manufacturing. It will help you to enter the information from the worksheets into the appropriate sections of the calculator. The ChemTRAC calculator will then automatically calculate the quantities of ChemTRAC substances released from your facility's processes.

Getting started

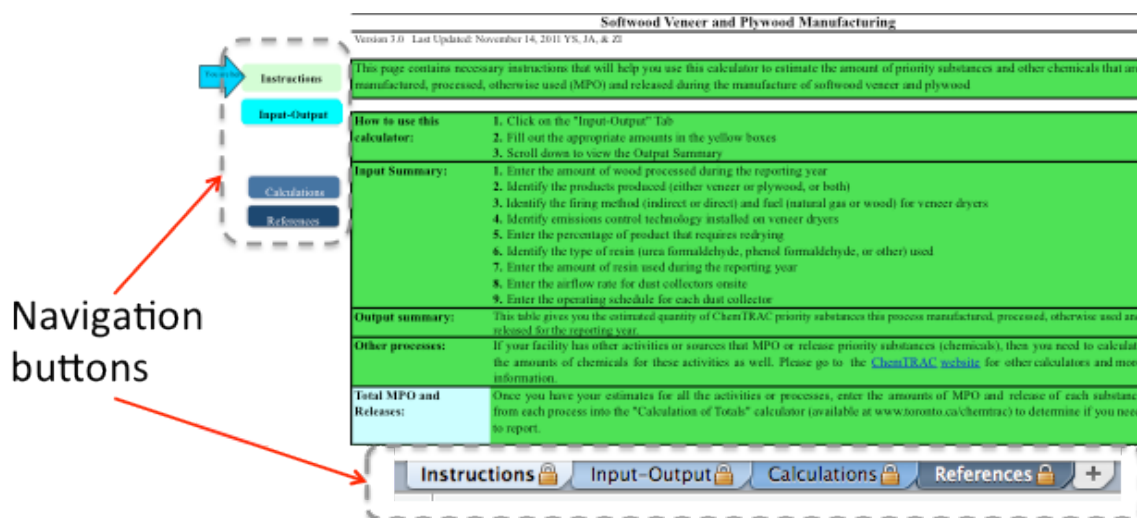
The ChemTRAC calculator for softwood veneer and plywood manufacturers can be read with software such as Microsoft Excel or Open Office. To find a copy of the calculator, go to <http://www.toronto.ca/health/chemtrac/tools.htm> and click on the *Softwood Veneer and Plywood Manufacturing* link found under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

The calculator consists of four different screens:

- Instructions
- Input-Output
- 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:



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.

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

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 facility. It also provides a brief overview of the contents of the calculator. **You do not need to enter any information on this screen.**

CHEMTRAC
Calculation Tool for **Softwood Veneer and Plywood Manufacturing**
Version 3.0 Last Updated: November 14, 2011 YS, JA, & ZI

Instructions

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 the manufacture of softwood veneer and plywood

Input-Output

Calculations

References

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. Enter the amount of wood processed during the reporting year
2. Identify the products produced (either veneer or plywood, or both)
3. Identify the firing method (indirect or direct) and fuel (natural gas or wood) for veneer dryers
4. Identify emissions control technology installed on veneer dryers
5. Enter the percentage of product that requires redrying
6. Identify the type of resin (urea formaldehyde, phenol formaldehyde, or other) used
7. Enter the amount of resin used during the reporting year
8. Enter the airflow rate for dust collectors onsite
9. Enter the operating schedule for each dust collector

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](http://www.toronto.ca/chemtrac) for other calculators and more information.

Total MPO and Releases: Once you have your estimates for all the activities or processes, 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:

- amount of wood processed during the reporting year (cubic metres)
- the type of veneer dryer used (indirect or direct-fired) and its fuel (wood or natural gas)
- the type of emissions control equipment installed on the veneer dryers
- the percentage of product that required redrying during the reporting year
- type and amount of resin used during the reporting year (litres or kilograms)
- dust collector airflow rates (in cubic feet per minute)
- dust collector operating schedule for the reporting year

Note: some of these may not apply to your facility

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** only. 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, 3 and 4** 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 Summary table** found at the bottom of the Input-Output screen. The next pages

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

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

will walk you through the Input-Output screen and Output table. The image on the next page illustrates the different areas of the input-output screen.

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

Please complete the INPUT tables below

INPUT

Quantity of wood processed: 142 m³/year

Product produced: Veneer Only

Are veneer dryers indirect-heated or direct-fired? Direct Natural Gas Fired

Identify any emissions control technology installed on veneer dryers: None

Percentage of veneers requiring redrying: 25 %

What type of resin is used? Urea Formaldehyde resin

Quantity of resin used? 600 kg

Dust collectors associated with chippers, sanders, saws

Process Area	Number of Units	Volume (cfm)	Operating hours (hours/day)	Operating days (days/week)	Operating time (weeks/year)
Example: Plywood sawing area	2	2000	5	5	50
	1	2000	5	7	50

Conversion Table

1 cubic metres (m ³)	=	0.028317 m ³
1 board foot	=	141.5842 m ³
	=	1000 L
	=	3.785431 L
1 pounds	=	0.4536 kg
1 ounces	=	0.02835 kg
1 grams	=	0.001 kg
1 tons (US)	=	907.1847 kg
1 tons (UK)	=	1016.047 kg
1 tonnes (metric)	=	1000 kg
1 cubic metres per second	=	2118.88 cfm
1 litres per minute	=	0.035315 cfm
1 litres per second	=	2.11888 cfm
1 cubic metres per hour	=	0.588578 cfm

OUTPUT SUMMARY (Only ChemTRAC¹ priority substances)

ChemTRAC Priority Substances	Quantity (kg/yr)			
	Manufactured ¹	Processed ¹	Otherwise Used ¹	Released to Air ¹
Formaldehyde	5	0	0	5
Acetaldehyde	5	0	0	5
Acrolein	1	0	0	1
Nitrogen Oxides (NOx)	1	0	0	1
Benzene	0	0	0	0
Volatile Organic Compounds (VOCs)	185	0	300	485
Particulate Matter 2.5 (PM2.5)	74	0	0	74

¹ Definitions available in References tab

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

Entering information from Worksheet 1: Quantity of wood processed

The image below displays the area of the Input-Output screen where you enter information from Worksheet 1 on quantity of wood processed and type of wood products manufactured. The sample information from Worksheet 1 is entered into the appropriate areas of the screen.

Worksheet 1, Question 1: Enter the TOTAL quantity of wood processed by your facility in m³/year. The sample quantity of 60,000 board feet converts to “142” m³/year. This value is entered into the yellow box.

If your quantity of wood processed is in units *other than m³/year*, you will need to use the Unit Conversion Table tool at the right hand side of the input-output screen. This is described under *Unit Conversion Table* below.

Worksheet 1, Question 2: “**Both veneer and plywood**” is selected from the dropdown menu.

Quantity of wood processed:	142	m ³ /year
Product produced:	Both Veneer and Plywood	

Entering information from Worksheet 2: Veneer drying

The image below displays the area of the Input-Output screen where you enter information from Worksheet 2 on veneer drying equipment. The sample information from Worksheet 2 is entered into the appropriate areas of the screen.

Worksheet 2, Question 3: “**Direct natural gas fired**” is selected from the dropdown menu for type of veneer drying equipment used.

Worksheet 2, Question 4: “**None**” is selected from the dropdown menu for VOC control technology installed on veneer dryers.

Worksheet 2, Question 5: “**65**” is typed into the yellow box as the **percentage** of veneers requiring redrying.

Are veneer dryers indirect-heated or direct-fired?	Direct Natural Gas Fired
Identify any emissions control technology installed on veneer dryers	None
Percentage of veneers requiring redrying:	65 %

Entering information from Worksheet 3: Resins

The image on the next page displays the area of the Input-Output screen where you enter information from Worksheet 3 on resins. The sample information from Worksheet 3 is entered into the appropriate areas of the screen.

Worksheet 3, Question 6: “**Urea formaldehyde resin**” is selected from the dropdown menu for type of resin used.

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

Worksheet 3, Question 7: “600” is typed into the yellow box and “kg” is selected from the dropdown menu for quantity of resin used.

What type of resin is used?	Urea Formaldehyde Resin	⬆
Quantity of resin used?	600	kg ⬆

Entering information from Worksheet 4: Dust collectors

The image below displays the area of the Input-Output screen where you enter information from Worksheet 4 on dust collectors associated with chippers, sanders and saws. The sample information from Worksheet 4 is entered into the appropriate areas of the screen.

Worksheet 4, Question 8: “**Plywood sanding**” is entered in the first row. The number of units is “1”. An airflow rate of “**2,000**” cfm is entered into the yellow box. Finally, the operating schedule of **8** hours per day, **5** days per week, and **50** weeks per year is entered.

Dust collectors associated with chippers, sanders, saws					
Process Area	Number of Units	Airflow Rate (cfm)	Operating Schedule		
			(hours/day)	(days/week)	(weeks/year)
Example: Plywood sawing area	2	2000	5	5	50
Plywood sanding	1	2000	8	5	50

If your flow rate is in units *other than cfm*, you will need to use the Unit Conversion Table tool at the right hand side of the input-output screen. This is described under *Unit Conversion Table* below.

Unit Conversion Table

The blue and yellow box on the right side of the calculator allows you to convert:

Quantity of wood processed into m³ (cubic metres). Enter the quantity of wood in cubic feet or board feet. The tool will automatically calculate the quantity in cubic metres in the blue column at the right of the table. This value (in m³) can be entered into the *Quantity of wood processed* box in the calculator (*m³/year*).

As an example in the illustration on the next page, “**60,000**” board feet is converted to “**141.5842**” m³. This is entered into the calculator as 142 m³/year.

Dust collectors airflow rates into cfm (cubic feet per metre). Enter the flow rate in cubic metres per second (cms), litres per minute, litres per second or litres per hour in the appropriate yellow box at the left side of the table.

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

Resin quantity into kg (kilograms) or litres (L). Enter the quantity of resin used in gallons, pounds, ounces, grams, tons (US), tons (UK), or tonnes (metric) in the appropriate yellow box at the left side of the table.

Unit Conversion Table				
1	cubic feet (m ³)	=	0.028317	m ³
60000	board feet	=	141.5842	m ³
1	m ³	=	1000	L
1	gallons (US)	=	3.785431	L
1	pounds	=	0.4536	kg
1	ounces	=	0.02835	kg
1	grams	=	0.001	kg
1	tons (US)	=	907.1847	kg
1	tons (UK)	=	1016.047	kg
1	tonnes (metric)	=	1000	kg
1	cubic metres per second	=	2118.88	cfm
1	litres per minute	=	0.035315	cfm
1	litres per second	=	2.11888	cfm
1	cubic metres per hour	=	0.588578	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, based on the inputs entered into the calculator.

The Output summary illustrated below was created using the sample inputs from Worksheets 1, 2, 3 and 4.

OUTPUT SUMMARY (Only ChemTRAC priority substances)				
ChemTRAC Priority Substances	Quantity (kg/yr)			
	Manufactured ¹	Processed ¹	Otherwise Used ¹	Released to Air ¹
Formaldehyde	5	0	0	5
Acetaldehyde	5	0	0	5
Acrolein	1	0	0	1
Nitrogen Oxides (NOx)	1	0	0	1
Benzene	0	0	0	0
Volatile Organic Compounds (VOCs)	197	0	300	497
Particulate Matter 2.5 (PM2.5)	83	0	0	83

¹ Definitions available in References tab

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

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 21 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 Softwood Veneer and Plywood Manufacturing 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. See an example in Table 2.

Table 2 compares the Output table from the section above to ChemTRAC thresholds. This example uses the values from Worksheets 1, 2, 3 and 4.

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

Output Summary table from the ChemTRAC calculator					Comparison to thresholds	
ChemTRAC Priority Substances	Manufactured (kg/yr)	Processed (kg/yr)	Otherwise used (kg/yr)	Released to Air (kg/yr)	ChemTRAC reporting threshold (kg/yr)	Is reporting required?
Formaldehyde	5	0	0	5	100	No
Acetaldehyde	5	0	0	5	100	No
Acrolein	1	0	0	1	100	No
Nitrogen oxides (NOx)	1	0	0	1	200	No
Benzene	0	0	0	0	100	No
Volatile Organic Compounds (VOCs)	197	0	300	497	100	YES
Particulate matter (PM_{2.5})	83	0	0	83	30	YES

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

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

Therefore, in this example, the manufacturing, use, and release to air of VOCs would need to be reported to the ChemTRAC program. The manufacturing and release to air of PM_{2.5} would also need to be reported to ChemTRAC.

Reporting to ChemTRAC

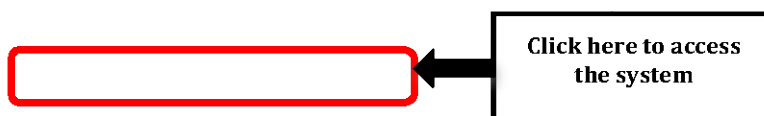
You are only required to report to ChemTRAC if you meet or exceed reporting thresholds for one or more priority substances.

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).



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

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[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.

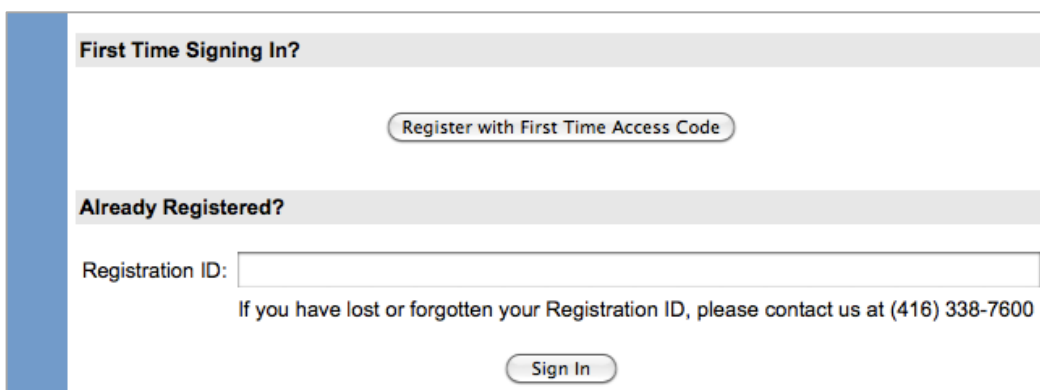
First Time Access Code for new users

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

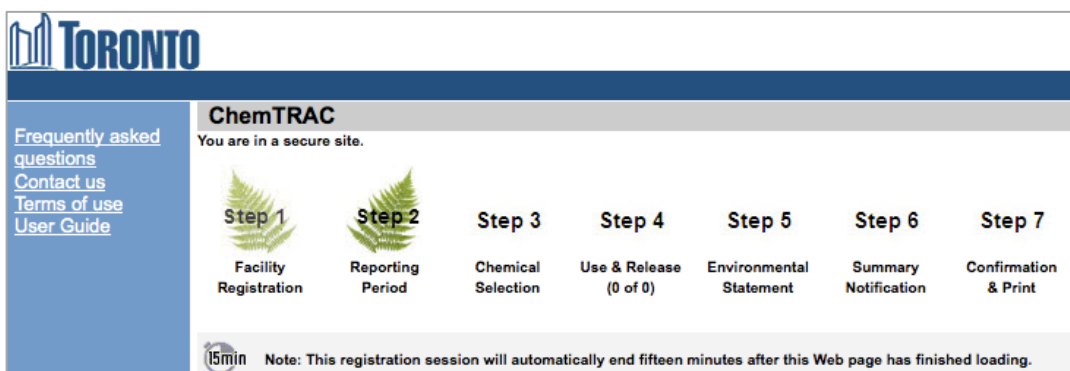
If you have already reported in the online system, you have been issued a Registration ID. This ID number is to be used for future visits to the ChemTRAC reporting system. If you have lost your Registration ID, please call 416-338-7600.

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 softwood veneer and plywood manufacturers, this will be “32 – Manufacturing”. Then, you can select the appropriate 4-digit code (3212), and finally, the 6 digit code (321212).

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

NAICS 2-Digit:	32 - Manufacturing
NAICS 4-Digit:	3212 - Veneer, Plywood & Engineered Wood Product Mfg
NAICS 6-Digit:	321212 - Softwood Veneer & Plywood Mills

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.

<input type="checkbox"/>	75-01-4	Vinyl chloride
<input type="checkbox"/>		Polycyclic Aromatic Hydrocarbons (PAHs)
<input type="checkbox"/>	11104-93-1	Nitrogen Oxides (NOx)
<input checked="" 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 softwood veneer and plywood manufacturers, PM_{2.5} are “manufactured” and “released to air”. VOCs are “manufactured”, “otherwise used”, 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.

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

The example on the next page 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)		
	Quantity (kg)	Estimation Method
USE		
Manufactured:	83	ChemTRAC calculator
Processed:		- Select Estimation Method From List -
Otherwise Used:		- Select Estimation Method From List -
RELEASE		
To Air:	83	ChemTRAC calculator
To Land:		- Select Estimation Method From List -
To Surface Water:		- Select Estimation Method From List -

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 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 softwood veneer and plywood 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: Keep resin containers closed when not in use. If starting from powdered resins, only mix the amount that you need and use it all.
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 VOC control equipment to reduce emissions from veneer drying.
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 resins with lower VOC and formaldehyde emissions.

Control technologies for reducing emissions

Control technologies can reduce the quantity of ChemTRAC substances that are released from softwood veneer and plywood manufacturers. Control technologies can limit emissions from veneer drying, from resins, as well as from chipping sawing, and sanding.

Technology for reducing emissions from veneer drying

Recall that ChemTRAC substances including volatile organic compounds (VOCs) are released from veneer drying. Manufacturers can do a number of things to reduce these emissions including: using alternative drying equipment, installing VOC control technology, and switching to high moisture resins.

1. **VOC control equipment.** VOC emissions control equipment can dramatically reduce VOC emissions.
 - Regenerative catalytic oxidizers (RCOs) can achieve relatively high VOC destruction at low temperatures. They are compact, lightweight systems that have low operating costs and low capital costs.
 - Regenerative thermal oxidizers (RTOs) are higher capacity systems that can achieve 99% VOC destruction efficiency. They operate at high temperatures but can recover and reuse up to 95% of the heat they generate.

The ChemTRAC calculator can be used to estimate a control technology's emission reduction potential - for example, installing an RTO (regenerative thermal oxidizer).

Without changing any other inputs in the ChemTRAC calculator, select "RTO" from the dropdown menu as the emissions control technology for veneer dryers.

Check the Output summary table to see how this would affect your facility's annual VOC emissions. If you do not yet have any control technology, your VOC emissions should be dramatically lower – up to 9 times lower! If you already have an RCO (regenerative catalytic oxidizer), you should still see a small decrease in your facility's VOC emissions.

2. **High moisture resins / adhesives.** Some adhesives eliminate the need to dry wood to low moisture content. By switching to an adhesive that is capable of bonding to a higher moisture wood product, manufacturers can dramatically reduce drying emissions and costs. Less water must be removed, so less drying is required.

Part 2: Reducing your facility's environmental impact

3. **Alternative drying equipment.** Manufacturers may be able to reduce their ChemTRAC emissions with alternative drying equipment. For example:
- **Jet dryers** that direct high velocity air at the surface of veneers are more efficient than longitudinal dryers that circulate air parallel to the veneer.
 - **Rotary drum dryers** such as the three-pass high velocity (3PHV) rotary drum dryer have the potential to reduce VOC emissions significantly⁴.

Technology for reducing emissions from resins

Recall that volatile organic compounds (VOCs), formaldehyde, and other ChemTRAC substances can be released from resins. Manufacturers can reduce these emissions by replacing existing resins with less harmful adhesive products.

Alternative resins / adhesives. Manufacturers can reduce their VOC and formaldehyde emissions by using hot melt, heat seal, aqueous-based or PVA adhesives. For example:

- **Phenol formaldehyde resins** generally have lower formaldehyde emissions than urea formaldehyde resins.
- **MDI adhesives** have lower VOC contents and formaldehyde contents than urea- and phenol-formaldehyde resins. They are also capable of bonding wood with higher moisture content and can reduce the need for veneer drying.
- **Lignin adhesives, furfuryl alcohol resins and polyvinyl acetate (PVA) adhesives** may also be used as alternatives to formaldehyde resins.

Technology for reducing PM_{2.5} from chipping, sawing and sanding

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

Dust collection systems. Effective dust collection systems can reduce the amount of PM_{2.5} that is released from chipping, 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.

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).

Table 3 on the next page summarizes control technologies discussed above.

⁴ U.S. EPA. 2003.

Part 2: Reducing your facility's environmental impact

Table 3. Control technologies for plywood and veneer manufacturing

Process or product	Control technology	ChemTRAC substance being controlled
Veneer drying	RTOs, RCOs, high moisture resins, alternative dryers	Volatile organic compounds
Resins	Alternative adhesives	Volatile organic compounds (VOCs), Formaldehyde
Chipping, sawing and sanding	Dust Collection systems: fabric filters, bag houses, cyclones, etc.	Particulate matter (PM _{2.5})

More ways to reduce costs and improve performance

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

1. **Reduce energy use.** By reducing energy use, 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 softwood veneer and plywood manufacturers include:

- Kansas Small Business Environmental Assistance Program. 1999. Pollution Prevention for the Wood Manufacturing and Finishing Industry. www.sbeap.org/publications/pp4woodandfinish.pdf
- New Hampshire Department of Environmental Services. 2008. Pollution Prevention in the Wood Finishing Industry. <http://des.nh.gov/organization/commissioner/p2au/pps/ppwfip/categories/overview.htm>
- 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. 1995. Profile of the Lumber and Wood Products Industry, Chapter V – Pollution Prevention Opportunities. <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/lmbrwdsn.pdf>

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 Softwood veneer and plywood 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 – Quantity of wood processed

1. How much wood did you process last year?

Type of wood product	Shipments per year	Size of shipment	Units	Quantity processed
Total quantity of wood processed:				

2. What type of wood products do you manufacture?

What type of wood products do you produce?	<input type="checkbox"/> Veneer only <input type="checkbox"/> Plywood only <input type="checkbox"/> Both veneer and plywood
--	---

Additional Material

Worksheet 2 - Veneer drying

If you do not operate any veneer drying equipment, you can select “not applicable” in the table below or leave this section of the worksheet blank.

3. What type of veneer drying equipment do you have?
4. What type of emissions control technology is associated with your veneer drying equipment?
5. What percentage of veneers requires re-drying?

Veneer drying equipment	
Type	<input type="checkbox"/> <i>Not applicable</i> <input type="checkbox"/> <i>Indirect heated</i> <input type="checkbox"/> <i>Direct natural gas fired</i> <input type="checkbox"/> <i>Direct wood fired</i>
Emissions control technology	<input type="checkbox"/> <i>None</i> <input type="checkbox"/> <i>RTO</i> <input type="checkbox"/> <i>RCO</i>
Percentage of veneers requiring redrying	_____

Additional Material

Worksheet 3 – Resins

6. What type of resins do you use?

Type of resin
<input type="checkbox"/> Urea formaldehyde resin <input type="checkbox"/> Phenol formaldehyde resin <input type="checkbox"/> Other

7. How much resin do you use?

Quantity of resin		
Containers per year	Size of containers	Total quantity used
_____	_____ <input type="checkbox"/> L _____ <input type="checkbox"/> kg	_____

Worksheet 4 – Dust collectors (sawing, sanding, chipping)

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

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

Process area	Number of units	Air flow rate	Airflow rate units	How often are dust collectors operating?		
				Hours per day	Days per week	Weeks per year
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____

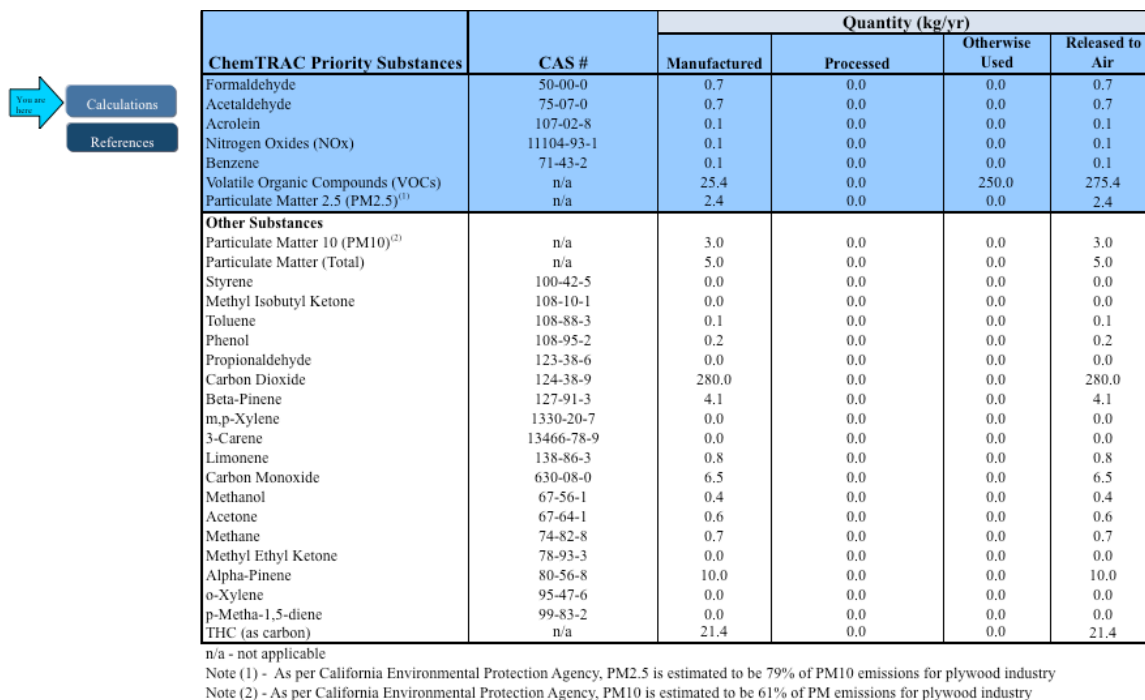
Appendix B. Additional material related to the ChemTRAC calculator

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 Calculations screen

The Calculations screen lists your facility's emissions of substances other than ChemTRAC priority substances in the table illustrated below.



ChemTRAC Priority Substances	CAS #	Quantity (kg/yr)			
		Manufactured	Processed	Otherwise Used	Released to Air
Formaldehyde	50-00-0	0.7	0.0	0.0	0.7
Acetaldehyde	75-07-0	0.7	0.0	0.0	0.7
Acrolein	107-02-8	0.1	0.0	0.0	0.1
Nitrogen Oxides (NOx)	11104-93-1	0.1	0.0	0.0	0.1
Benzene	71-43-2	0.1	0.0	0.0	0.1
Volatile Organic Compounds (VOCs)	n/a	25.4	0.0	250.0	275.4
Particulate Matter 2.5 (PM2.5) ⁽¹⁾	n/a	2.4	0.0	0.0	2.4
Other Substances					
Particulate Matter 10 (PM10) ⁽²⁾	n/a	3.0	0.0	0.0	3.0
Particulate Matter (Total)	n/a	5.0	0.0	0.0	5.0
Styrene	100-42-5	0.0	0.0	0.0	0.0
Methyl Isobutyl Ketone	108-10-1	0.0	0.0	0.0	0.0
Toluene	108-88-3	0.1	0.0	0.0	0.1
Phenol	108-95-2	0.2	0.0	0.0	0.2
Propionaldehyde	123-38-6	0.0	0.0	0.0	0.0
Carbon Dioxide	124-38-9	280.0	0.0	0.0	280.0
Beta-Pinene	127-91-3	4.1	0.0	0.0	4.1
m,p-Xylene	1330-20-7	0.0	0.0	0.0	0.0
3-Carene	13466-78-9	0.0	0.0	0.0	0.0
Limonene	138-86-3	0.8	0.0	0.0	0.8
Carbon Monoxide	630-08-0	6.5	0.0	0.0	6.5
Methanol	67-56-1	0.4	0.0	0.0	0.4
Acetone	67-64-1	0.6	0.0	0.0	0.6
Methane	74-82-8	0.7	0.0	0.0	0.7
Methyl Ethyl Ketone	78-93-3	0.0	0.0	0.0	0.0
Alpha-Pinene	80-56-8	10.0	0.0	0.0	10.0
o-Xylene	95-47-6	0.0	0.0	0.0	0.0
p-Metha-1,5-diene	99-83-2	0.0	0.0	0.0	0.0
THC (as carbon)	n/a	21.4	0.0	0.0	21.4

n/a - not applicable
 Note (1) - As per California Environmental Protection Agency, PM2.5 is estimated to be 79% of PM10 emissions for plywood industry
 Note (2) - As per California Environmental Protection Agency, PM10 is estimated to be 61% of PM emissions for plywood industry

The Calculations screen also includes the formulas and assumptions to calculate emissions based on the information provided in the Input-Output screen. You do not need to enter any information on this screen.

However, some variables can be modified if site-specific information is available. For example, if you have site-specific data on the emissions factors from the veneer dryers used in your facility, you can enter them in the column entitled "Emission Factor" for your type of equipment, as highlighted on the next page.

Only emission factors should be modified. All other data, sample calculations and information presented in the Calculations screen are for reference only. They should not be modified in any way.

Additional Material

Process	Contaminant	CAS #	Emission Factor (lb/1000 ft ³)	Emission Factor (kg/m ³)	Annual Emissions (kg/yr)	Data Quality
Radio frequency-heated redryer	PM	n/a	0.011	0.0055	0.0	E
	THC (as carbon)	n/a	0.023	0.0115	0.0	D
	VOC	n/a	0.28	0.14	0.0	E
	Acetaldehyde	75-07-0	0.0015	0.00075	0.0	D
	Acetone	67-64-1	0.00089	0.000445	0.0	D
	Alpha-Pinene	80-56-8	0.17	0.085	0.0	D
	Beta-Pinene	127-91-3	0.056	0.028	0.0	D
	Formaldehyde	50-00-00	0.00035	0.000175	0.0	D
	Limonene	138-86-3	0.004	0.002	0.0	D
	Methanol	67-56-1	0.0027	0.00135	0.0	D
Veneer dryer, indirect heated, heated zones, uncontrolled	PM	n/a	1.35	0.675	0.0	D
	THC (as carbon)	n/a	1.5	0.75	0.0	B
	VOC (as propane)	n/a	1.8	0.9	0.0	C
	Carbon Monoxide	630-08-0	0.028	0.014	0.0	E
	3-Carene	13466-78-9	0.04	0.02	0.0	C
	Acetaldehyde	75-07-0	0.017	0.0085	0.0	C
	Acetone	67-64-1	0.013	0.0065	0.0	C
	Acrolein	107-02-8	0.0013	0.00065	0.0	C
	Alpha-Pinene	80-56-8	0.96	0.48	0.0	C
	Benzene	71-43-2	0.00059	0.000295	0.0	C
	Beta-Pinene	127-91-3	0.27	0.135	0.0	C
	Formaldehyde	50-00-0	0.014	0.007	0.0	C
	Limonene	138-86-3	0.08	0.04	0.0	C
	Methanol	67-56-1	0.039	0.0195	0.0	C
	Methyl isobutyl ketone	108-10-1	0.0015	0.00075	0.0	C
	m,p-Xylene	1330-20-7	0.00075	0.000375	0.0	C
	p-Metha-1,5-diene	99-83-2	0.017	0.0085	0.0	C
	Phenol	108-95-2	0.0034	0.0017	0.0	C
	Propionaldehyde	123-38-6	0.0024	0.0012	0.0	C
	Toluene	108-88-3	0.0011	0.00055	0.0	C

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.



References

Version 3.0 Last Updated: November 14, 2011 YS, JA, & ZI

Instructions

Input-Output

Calculations

References



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

VOC and organic compound emission factors and an assessment of their data quality are provided in and the US EPA AP-42 "Plywood Manufacturing", Section 10.5, 2002

<http://www.epa.gov/ttn/chief/ap42/ch10/final/c10s05.pdf>

Particulate matter emission factors from dust collectors are provided in MOE Publication #3614e03 "Procedure for Preparing an ESDM Report", 2009

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

An assessment of resin compositions is based on MSDSs provided by Arclin Performance Applied

<http://www.arclin.com/products/ourProducts.html>

Chimplast

<http://www.ucp.ru/en/customers/products/himprir/fenolsmola/>

Exim Corporation

<http://www.eximcorp.com/v2/1024x768/homepage.htm>

Conversion factors for PM10 and PM2.5 are estimated using data from the California Environmental Protection Agency

http://www.arb.ca.gov/app/emsinv/emseic_query.php?F_YR=2008&F_DIV=-4&F_SEASON=A&SP=2009&SPN=2009_Almanac&F_AREA=CA&F_EICSUM=450

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](#).

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Additional Material

Emission factors for softwood veneer and plywood 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 select emission factors used in the Softwood Veneer and Plywood Manufacturing ChemTRAC calculator.

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

Table 4. Emission factors for select ChemTRAC substances from the ChemTRAC calculator

Source	Substance	Emission Factor
Veneer drying – indirect-heated	Volatile organic compounds	0.927 kg/m ³
	Particulate Matter 2.5	0.325 kg/m ³
Veneer drying – direct, natural gas	Volatile organic compounds	1.272 kg/m ³
	Particulate Matter 2.5	0.120 kg/m ³
Veneer drying – direct, wood-fired	Volatile organic compounds	0.55 kg/m ³
	Particulate Matter 2.5	0.482 kg/m ³
	Nitrogen oxides	0.085 kg/m ³
Veneer redrying	Volatile organic compounds	0.14 kg/m ³
	Particulate Matter 2.5	0.027 kg/m ³
Plywood press – UF resin	Volatile organic compounds	0.0235 kg/m ³
	Formaldehyde	0.0047
Plywood press – PF resin	Volatile organic compounds	0.125 kg/m ³
	Formaldehyde	0.0019
Resins – urea formaldehyde	Volatile organic compounds	0.5
Resins – phenol formaldehyde	Volatile organic compounds	0.5
Resins – other	Volatile organic compounds	0.5
Dust collectors	Particulate Matter 2.5	9.64 mg/m ³

Additional Material

Example: Using emission factors to estimate VOC emissions from urea formaldehyde resin

In Part 1, we used 600 kg of urea formaldehyde resin.

The emissions factor for urea formaldehyde resin is 0.5 (50% is emitted as VOCs).

Total emissions of VOCs for 2011 from resin

= 600 kg resin * 0.5

= 300 kg of VOCs

Appendix C. Combining the Softwood veneer and plywood manufacturing 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.⁵ 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.

⁵ 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

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

Group	Chemical	Daily (kg)				Daily (kg)				Totals to be compared with 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									0	100	No	---	---	---	---
	Dichloromethane (Methylene chloride)										0	100	No	---	---	---	---
	Formaldehyde*										0	100	No	---	---	---	---
	Manganese ¹										0	10	No	---	---	---	---
	Nickel ¹										0	100	No	---	---	---	---
	Tetrachloroethylene (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	---	---	---	---	

The total combined release of substances (whether from the ChemTRAC Softwood Veneer and Plywood 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.

Additional Material

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
Group A: report if sum of quantity manufactured, processed and otherwise used exceeds thresholds		
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
Tetrachloroethylene (Perchloroethylene)	100	1
Trichloroethylene	100	1
Vinyl chloride	100	1
Group B: report if sum of quantity released, disposed and transferred exceeds thresholds		
Polycyclic Aromatic Hydrocarbons (PAHs)	10	N/A ^b
Group C: report if quantity released to air exceeds thresholds		
Nitrogen Oxides (NO _x)	200	N/A
Particulate Matter 2.5 (PM _{2.5})	30	N/A
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 Softwood Veneer and Plywood 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.