

Guide to calculations for ChemTRAC reporting:

Offset Lithographic, Web Letterpress, Rotogravure, Flexographic, and Digital Printing

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 Printing Facilities, and report substances 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 printing and publishing sectors	2
Identifying ChemTRAC substances in printing facilities	3
Calculating emissions	4
Worksheets for collecting information	5
Using the calculator	11
Interpreting results	30
Reporting to ChemTRAC	31

Part 2: Reducing your facility's environmental impact

Pollution prevention strategies	38
Control technologies for reducing emissions	40
More ways to reduce costs and improve performance	41
Getting started with pollution prevention	42

Additional information

Appendix A. Printer-friendly worksheets	45
Appendix B. Combining the Printing Facility calculator with other sources	46
Appendix C. Reporting Checklist	49

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 4 on page 49.

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. Facilities that use digital lithographic, letterpress, rotogravure and flexographic printing processes are covered by this bylaw.

This guide is designed to help you and other printing 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 printing and publishing sectors

The ChemTRAC calculator for printing facilities covers offset lithographic, web letterpress, rotogravure and flexographic printing processes within sectors with North American Industrial Classification System (NAICS) code 3231, 511 and 313.

- NAICS code 3231 includes all facilities primarily engaged in printing, including commercial screen printing, quick printing, digital printing, and manifold business forms printing, and printing related services.
- NAICS code 511 includes publishing industries (except the internet), including newspaper, periodical, book, mailing list publishers, and others.
- NAICS code 313 includes textile mills, including fibre, yarn, thread and fabric mills, as well as textile fabric finishing and fabric coating.

Facilities that are exclusively in retail sales are exempt from the ChemTRAC program. In other words, they are not required to measure the release of ChemTRAC substances or report any information to the ChemTRAC program.

This guide uses the term “printing facilities” to refer to all facilities within NAICS codes 3231, 511 and 313 that use offset lithographic, web letterpress, rotogravure and flexographic printing processes.

Facilities with NAICS codes 3231 or 511 are included as “Printing and Publishing” facilities within the ChemTRAC program. They are required to report their data every year if they use or release above the reporting threshold. This report is due by June 30 of each year. Annual data that is reported each June should cover the period from January 1 to December 31 of the previous year.

Facilities with NAICS code 313 are included as “Other Sector” facilities within the ChemTRAC program. They are required to report their data every year if they use or release above the reporting threshold. These facilities must begin reporting annual emissions starting by reporting 2012 emissions data by June 30, 2013. This report will be due by June 30 of 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 printing facilities

Volatile organic compounds (VOCs) are typically the only ChemTRAC priority substances released from a printing facility. The ChemTRAC calculator for printing facilities does not quantify the other ChemTRAC priority substances.

VOCs are a group of organic chemicals that easily evaporate into the air. You can often smell them. In a printing facility, VOCs are released from printing inks, fountain solutions and cleaning solutions. VOCs are released from emissions points that include the ink fountains, the dampening system, the plate and blanket cylinders, the dryer, the chill rolls, and from the product itself. VOCs used and released by the printing industry include formaldehyde, isopropyl alcohol, benzene, toluene, xylene, ethanol, methanol, and methyl ethyl ketone, among others.

The amount of VOCs released can be controlled or captured by a number of different control technologies. Control technologies are often ventilation systems that direct emissions to devices that will capture or destroy them. Some captured emissions (such as solvents) can be recycled and re-used. Descriptions of control technologies can be found in the Control technologies for reducing emissions section on page 40.

The health effects of VOCs

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.

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; and
- Determine what they are required to report to the ChemTRAC program.

The release of ChemTRAC priority substances can be calculated using methods other than the ChemTRAC calculators. See <http://www.toronto.ca/health/chemtrac/tools.htm> for a list of alternative methods.

In the next section, we will work through worksheets that will help you use the ChemTRAC calculator for printing facilities.

Worksheets for collecting information

The three worksheets found on pages 6 to 10 of this guide are intended to help you collect all the information needed to use the ChemTRAC calculator for printing facilities. If you complete all relevant sections of the tables found in these worksheets, you will have all the information needed to use the calculator. The three worksheets are:

- **Worksheet 1: Efficiency of VOC control devices**
- **Worksheet 2: Materials/chemicals containing VOCs**
- **Worksheet 3: VOCs transferred during cleaning**

Information for five different processes that are typically found in printing facilities can be collected for the worksheets:

- Offset lithography
- Rotogravure
- Web letterpress
- Flexography
- Cleaning

Information only needs to be collected for the processes that apply to your facility. The others can be skipped and left blank.

If your facility has other processes than the five listed above, you may need to use additional calculators to identify emissions of other ChemTRAC priority substances. 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 B for more details.

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

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

Worksheet 1 –Capture and removal efficiencies of VOC control devices

This worksheet will help you collect information on any control devices that control the VOC emissions from materials/chemicals used in the six processes covered in the ChemTRAC calculator for printing facilities.

You should know the capture efficiency for each of the six processes that apply to your facility. The capture efficiency refers to the amount of emissions that are carried over into the control devices, the remainder of emissions are released fugitively.

You should also know the control device efficiency for each of the six processes that apply to your facility. This efficiency must be recorded as the percentage of VOCs that are removed due to the use of the control device. If multiple control devices are used for a particular process, record the combined efficiency of the control devices.

The VOC removal efficiency of a control device may be found in the device's technical specifications. If this information is unavailable, default values found in Table 1 can be used.

Table 1. Default control device efficiencies

Process	Control device	Default control device removal efficiency
Rotogravure	Carbon Adsorption	75%
	Incineration	65%
	Waterborne Inks	70%
Web letterpress	Incineration	95%
Flexography	Waterborne Inks	60%
	Incineration	60%
Offset lithography	No default values available	N/A
Digital	No default values available	N/A
Cleaning	No default values available	N/A

Complete the **Worksheet 1 Table** below to have the capture and VOC removal efficiencies of control devices needed for the ChemTRAC calculator for printing facilities. They can be the default values found in Table 1 or values specific to your facility. If you do not know if your facility has control devices, assume that it does not.

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

Worksheet 1 Table: Capture and VOC removal efficiencies of control devices

Process	Control device(s)	VOC capture efficiency	VOC removal efficiency
Rotogravure	_____	_____%	_____%
Web letterpress	_____	_____%	_____%
Flexography	_____	_____%	_____%
Offset lithography	_____	_____%	_____%
Cleaning	_____	_____%	_____%

Worksheet 2 – Materials/chemicals containing VOCs

This worksheet will help you collect information on the materials/chemicals used in the six processes covered in the ChemTRAC calculator for printing facilities. You should collect data for the period between January 1 and December 31.

Materials/chemicals will include fountain solutions, inks, cleaning chemicals, rags soiled with VOCs, etc. You will need to collect the following information:

- **The quantity of each material/chemical used.** The amount recorded would be for the entire year for which you are reporting. If your facility uses the same material/chemical in multiple processes, ensure that the quantity of material/chemical is accounted for only once.
- **The VOC content of the material/chemical.** This can be found on Material Safety Data Sheets (MSDS) that should be on-hand at your facility for each material/chemical. If the MSDS lists a range, choose the midpoint (e.g., if VOC is listed as 0.4 g/L - 0.6 g/L, choose 0.5 g/L).
- **Emission factors related to each process used at your facility.** Emission factors indicate the percentage of VOCs that are released from materials/chemicals used in each process. This value needs to be collected as a percent of VOCs that are **released** during a particular process, **NOT** the percent of VOCs that remain in the material/chemical. Emission factors may be found in specifications related to the methods used within a particular process. If this information is unavailable, default values found in Table 2 can be used.

Table 2. Default VOC emission factors

Process		Default VOC emission factors
Offset lithography	Heatset ink with a hot air dryer	80%
	Heatset ink with a direct flame dryer	80%
	Non-heatset ink (no dryer)	5%
Rotogravure		95.5%
Web	Heatset ink with a hot air dryer	80%

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

letterpress	Heatset ink with a direct flame dryer	80%
	Non-heatset ink (no dryer)	5%
Flexography		95.5%
Digital		100%
Cleaning		No default factor available

Complete the [Worksheet 2 Table](#) on the following page to have all information on materials/chemicals needed for the ChemTRAC calculator for printing facilities. VOC emission factors can be the default values found in Table 2 or values specific to the processes in your facility.

Values can be written into the [Worksheet 2 Table](#) in any unit (g, kg, lbs, g/L, lbs/gal, etc.). However, they must be entered into the calculator using proper units (**litres** for quantity used in year and **grams per litre** for VOC content). A simple unit converter found in the calculator can help you convert values into the proper units. See page 13 of this guide for more information on unit conversion.

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

Worksheet 3 – VOCs transferred during cleaning

If no cleaning chemicals are transferred from your facility for waste or recycling, you can skip this worksheet.

This worksheet will help you collect information on the quantity of VOCs from cleaning materials that are transferred as waste or recycling. Since these VOCs are transferred from your facility, they are not released into the atmosphere. You should collect transfer data for the period between January 1 and December 31 of a calendar year.

You will need to collect the following information on the cleaning chemicals that are transferred from your facility:

- **The details of the transfer.** This includes the transferred material, its HWIN classification and the name of the offsite transfer company.
- **The volume and VOC content of the transferred waste.** If the transferred waste were a mixture of different chemicals, then the waste would have a VOC content that reflects the mix of these chemicals. The ChemTRAC calculator has a table that can help you calculate the VOC content of a mixture of chemicals.

Complete the **Worksheet 3 Table** below to have all information on VOCs transferred during cleaning needed for the ChemTRAC calculator for printing facilities.

Worksheet 3 Table: Information on VOCs transferred during cleaning

Transfer material	HWIN classification	Offsite transfer company	Volume of transferred waste	VOC content
<i>Example: Degreasing solvent</i>	<i>Aliphatic solvents</i>	<i>Environmental solutions</i>	<i>190 litres</i>	<i>498 grams per litre</i>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Using the calculator

This section of the guide provides a step-by-step walkthrough of the ChemTRAC calculator for printing facilities. The calculator can be used properly by entering the information from the three worksheets found in the previous section of this guide into the appropriate sections of the calculator. The ChemTRAC calculator will then automatically calculate the quantities of VOCs released from processes found in your printing facility.

Getting started

The ChemTRAC calculator for printing facilities 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 "Digital Lithographic, Letter Press, Rotogravure and Flexographic Printing" link found under the Printing Sector.

The calculator consists of eight different screens:

- Instructions
- Offset Lithography
- Rotogravure
- Flexography
- Web Letterpress
- Digital
- Cleaning
- MPO & Release
- References

Information is only entered in the six process screens related to the processes that could exist in your printing facility: the Offset Lithography, Rotogravure, Flexography, Web Letterpress, Digital, and Cleaning screens.

The Instructions screen contains instructions on how to use the calculator. The MPO & Release screen summarises the quantity of VOCs manufactured, processed, otherwise used and released to air from the processes in your facility.¹ No information needs to be entered in these screens.

Navigating the ChemTRAC calculator for printing facilities

You can navigate between screens by clicking on the tabs at the bottom of each screen:



¹ 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

Unit conversions

When entering information into the Offset Lithography, Rotogravure, Flexography, Web Letterpress, Digital and Cleaning screens, **volumes of chemicals/materials used must be entered in Litres, and the VOC content of chemicals/materials used must be entered in Grams per Litre (g/L)**. Grams, litres and grams per litre are known as metric units.

A unit conversion table found in each of the six process screens of the ChemTRAC calculator can help you convert from gallons (gal), pounds per gallon (lb/gal), grams (g), or pounds (lb) into the equivalent metric units. To do so, type the value into the appropriate yellow cell of the unit conversion table. The equivalent metric unit will be automatically displayed. For example, the sample unit conversion table below shows a conversion from 125 lb/gal into the equivalent 14,979 g/L.

Use this table if you need to convert imperial units to metric

Enter number in "INPUT" column

<i>INPUT</i> Imperial			<i>OUTPUT</i> Metric	
1	gal	=	3.785	L
1	lb/gal	=	119.828	g/L
1	g	=	0.001	kg
1	lb	=	0.454	kg

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

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



Calculation Tool for

Digital, Lithographic, Letterpress, Rotogravure and Flexographic Printing

Version: 3.1, Last Update: Dec 18, 2012 by CS, CL & ZI

This page provides you with instructions on how to use this calculator to estimate the amount of priority substances (VOCs) that are manufactured, processed, otherwise used (MPO) and released during **lithographic, rotogravure, letterpress, and flexographic printing**.

How to use this calculator:	<ol style="list-style-type: none"> 1. Select the Tab for the printing process taking place in your facility and enter annual MPO information for process related input materials (inks, coatings, fountain solution, diluents, etc.). Use the Cleaning tab to enter annual MPO information for cleaning solvents not used directly in the print process (i.e. for cleaning performed when the press is stopped). 2. After entering all your data, check the "MPO & Release" tab for total amounts of VOCs released in your facility. 3. Please use a guide of this calculator at: http://www.toronto.ca/health/chemtrac/industries/pdf/printing.pdf
Input Summary:	<ol style="list-style-type: none"> 1. List the materials/chemicals manufactured, processed, otherwise used in the reporting year 2. Enter the amount of each material/chemical manufactured, processed, otherwise used 3. Enter the VOC content of each chemical
MPO and Release 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 reportable chemicals, then you need to calculate the amounts of chemicals for these activities as well. Please go to the ChemTRAC website for other calculators and more information.
Total MPO and Releases:	Once you have your estimates for activity(ies) or process(es), enter the amounts of MPO and release of each substance from each process into the "Calculation of Totals" calculator (available at www.toronto.ca/chemtrac) to determine if you need to report.
Before you start make sure you have:	<ul style="list-style-type: none"> - The amount of inks and solvents (ink degrader, degreaser, thinner, etc.) used in any of the following printing processes: <ul style="list-style-type: none"> -Offset Lithography -Rotogravure -Web Letterpress -Flexography -Digital -Washing and degreasing; Misc. - Efficiency of the emission control devices you have, if any. Estimates for some common emission control devices are provided, however.



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

The Offset Lithography screen

The Offset Lithography screen is the screen in which you will enter all information related to offset lithography processes in your printing facility. **If you do not have offset lithography processes, you can skip this screen.**

Information is typed in **yellow boxes** only. Any yellow cells that do not apply to your facility can be left as is. The Offset Lithography screen can be filled out using the information that you collected in [Worksheet Table 1](#) and [Worksheet Table 2](#) that relates to your offset lithography processes.

Filling out the control device efficiency box

The offset lithography control device efficiency and capture efficiency collected in [Worksheet Table 1](#) can be typed into the yellow *Control Device Efficiency box* found on the Offset Lithography screen:

Enter control device efficiency ----->	0%
Enter capture efficiency ----->	0%

The control device efficiency and capture efficiency only apply to those presses which could have control devices, such as heatset web offset lithographic, solvent based flexographic and solvent based gravure operations. If you do not know the efficiencies leave the cells blank.

Filling out the VOCs from Offset Lithography Printing table

The information on Offset Lithography chemicals/materials containing VOCs collected in [Worksheet Table 2](#) can be typed into the yellow boxes of the VOCs from *Offset Lithography Printing* table:

VOCs from Offset Lithography Printing						
Calculating VOC Releases						
(Enter data in columns A, B, C, and E. Columns D, F and G will calculate automatically.)						
A	B	C	D	E	F	G
Materials/ Chemicals	Amount used in the year	VOC content (from MSDS) ¹	VOC usage (B*C)	Emission Factor (See box to the right or input your own)	Uncontrolled VOC release (D*E)	Controlled VOC release [(1-(C8*C9))*F]
	L	g/L	kg	%	kg	kg
*Example: 75% vol. percent solvent paraffin ink	150	8.90	1.34	60.0%	0.80	0.80
60% vol. percent solvent paraffin ink	225	7.9	1.78	40.0	0.71	0.71
			0.00		0.00	0.00
			0.00		0.00	0.00

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

Totals	0	-	0.00	-	0.00	0.00
--------	---	---	------	---	------	------

In the example shown here, a user has entered 225 litres of 60% vol. paraffin ink with a VOC content of 7.9 g/L and an emission factor of 40%. Note that the example in the grey row does not enter into the calculation of the release of any substances.

If the emission factor is unknown, it can be estimated using the emission factor table found on the Offset Lithography screen, as shown below:

Choose the corresponding emission factor or provide your own.

Chemical Used	Heatset or Non Heatset	Conditions	Dryer Used (if applicable)	Emission Factor*
Inks and Varnishes	Heatset		Hot Air Dryer	80%
			Direct Flame Dryer	80%
Inks and Varnishes	Non-Heat Set	Sheet-fed or Web		5%
Carryover (capture) factor for Blanket Wash and Fountain Solution on Heatset Presses				
Automatic Blanket Wash	Heatset	Composite vapor pressure must be less than 10mmHg at 20°C		40%
Fountain Solution	Heatset	Fountain solution must contain alcohol substitutes		70%

*This factor is an estimate of the amount of solvent that is NOT left in the product or destroyed in a dryer

** The vapor pressure for a cleaning solvent can be found in the physical properties section of the product's MSDS (or SDS). If the product is low VOC or contains water or exempt compounds (such as acetone), the vapor pressure on a product's MSDS may include non-VOC components such as water. If you are not sure if the supplied vapor pressure includes other components, or if your MSDS does not include any vapor pressure information, contact your supplier.

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

If the VOC content of your materials/chemicals is known as a percent or if you need to convert from mass to volume, this can be done using the VOC concentration conversion table found on the Offset Lithography screen. This conversion table is available on all input screens

Use this table if your MSDS lists the VOC Content as a Percent OR if you need to convert from Mass to Volume				
Enter number in "INPUT" column				
INPUT			OUTPUT	
Concentration in % w/w to g/L				
Percent Weight ²	Specific Gravity	=	VOC Content	
1	1	=	10.000	g/L
Mass to volume using density				
Mass (kg)	Density (g/ml)	=	Volume	
1	1	=	1.000	L

²If the percentage is based on volume or if it is not specified on the MSDS, please contact supplier for concentration in g/L

Once you input information into the appropriate yellow boxes, the uncontrolled and controlled releases of VOCs are automatically calculated and displayed in the grey columns of the *VOCs from Offset Lithography Printing* table. These amounts also appear as part of the Totals columns found on the MPO & Release screen. See page 27 of this guide for more details on the MPO & Release screen.

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

The Rotogravure screen

The Rotogravure screen is the screen in which you will enter all information related to rotogravure processes in your printing facility. **If you do not have rotogravure processes, you can skip this screen.**

Information is typed in **yellow boxes** only. Any yellow cells that do not apply to your facility can be left as is. The Rotogravure screen can be filled out using the information that you collected in [Worksheet Table 1](#) and [Worksheet Table 2](#) that relates to your rotogravure processes.

Filling out the control device and capture efficiency boxes

The rotogravure control device efficiency and capture efficiency collected in [Worksheet Table 1](#) can be typed into the yellow *Control Device Efficiency and Capture Efficiency boxes* found on the Rotogravure screen:

Enter control device efficiency ----->	0%
Enter capture efficiency ----->	0%

Filling out the VOCs from Rotogravure Printing table

The information on Rotogravure chemicals/materials containing VOCs collected in [Worksheet Table 2](#) can be typed into the yellow boxes of the *VOCs from Rotogravure Printing* table:

VOCs from Rotogravure Printing						
Calculating VOC Releases						
(Enter data in columns A, B ,C, and E. Columns D , F and G will calculate automatically.)						
A	B	C	D	E	F	G
Materials/ Chemicals	Amount used in the year	VOC content (from MSDS) ¹	VOC usage (B*C)	Emission Factor (See box to the right or input your own)	Uncontrolled VOC release (D*E)	Controlled VOC release [(1-(C8*C9))*F]
	L	g/L	kg	%	kg	kg
*Example: 75% vol. percent solvent paraffin ink	150	8.90	1.34	60.0%	0.80	0.80
45% vol. percent solvent paraffin ink	95	8.30	0.79	95.5%	0.79	0.79
			0.00		0.00	0.00
			0.00		0.00	0.00
			0.00		0.00	0.00
Totals	0	-	0.00	-	0.00	0.00

In the example shown in the table above, a user has entered 95 litres of 45% vol. paraffin ink with a VOC content of 8.3 g/L and an emission factor of 95.5%. Note that the example in the grey row does not enter into the calculation of the release of any substances.

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

Once you input information into the appropriate yellow boxes, the uncontrolled and controlled releases of VOCs are automatically calculated and displayed in the grey columns of the *VOCs from Rotogravure Printing* table. These amounts also appear as part of the Totals columns found on the MPO & Release screen. See page 27 of this guide for more details on the MPO & Release screen.

If the emission factor is unknown it can be estimated using the emission factor table found on the Rotogravure screen, as shown below:

VOC Emission Factor*	95.5%
----------------------	-------

The Flexography screen

The Flexography screen is the screen in which you will enter all information related to flexography processes in your printing facility. **If you do not have flexography processes, you can skip this screen.**

Information is typed in **yellow boxes** only. Any yellow cells that do not apply to your facility can be left as is. The Flexography screen can be filled out using the information that you collected in [Worksheet Table 1](#) and [Worksheet Table 2](#) that relates to your flexography processes.

Filling out the control device and capture efficiency boxes

The flexography control device efficiency and capture efficiency collected in [Worksheet Table 1](#) can be typed into the yellow *Control Device Efficiency and Capture Efficiency* boxes found on the Flexography screen:

Enter control device efficiency ----->	0%
Enter capture efficiency ----->	0%

Filling out the VOCs from Flexography Printing table

The information on Flexography chemicals/materials containing VOCs collected in [Worksheet Table 2](#) can be typed into the yellow boxes of the *VOCs from Flexography Printing* table:

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

VOCs from Flexography Printing						
Calculating VOC Releases						
(Enter data in columns A, B, C, and E. Columns D, F and G will calculate automatically.)						
A	B	C	D	E	F	G
Materials/ Chemicals	Amount used in the year	VOC content (from MSDS)¹	VOC usage (B*C)	Emission Factor (See box to the right or input your own)	Uncontrolled VOC release (D*E)	Controlled VOC release [(1-(C8*C9))*F]
	L	g/L	kg	%	kg	kg
<i>*Example: Alcohol-based ink</i>	150	4.3	0.65	95.5%	0.62	0.62
Alcohol-based ink	200	5.1	1.02	95.5%	0.97	0.97
			0.00		0.00	0.00
			0.00		0.00	0.00
			0.00		0.00	0.00
Totals	0	-	0.00	-	0.00	0.00

In the example shown in the table above, a user has entered 200 litres of alcohol-based ink with a VOC content of 5.1 g/L and an emission factor of 95.5%. Note that the example in the grey row does not enter into the calculation of the release of any substances.

Once you input information into the appropriate yellow boxes, the uncontrolled and controlled releases of VOCs are automatically calculated and displayed in the grey columns of the *VOCs from Flexography Printing* table. These amounts also appear as part of the Totals columns found on the MPO & Release screen. See page 27 of this guide for more details on the MPO & Release screen.

If the emission factor is unknown it can be estimated using the emission factor table found on the Flexography screen, as shown below:

VOC Emission Factor*	95.5%
----------------------	-------

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

The Web Letterpress screen

The Web Letterpress screen is the screen in which you will enter all information related to web letterpress processes in your printing facility. **If you do not have web letterpress processes, you can skip this screen.**

Information is typed in **yellow boxes** only. Any yellow cells that do not apply to your facility can be left as is. The Web Letterpress screen can be filled out using the information that you collected in [Worksheet Table 1](#) and [Worksheet Table 2](#) that relates to your web letterpress processes.

Filling out the control device and capture efficiency boxes

The web letterpress control device efficiency and capture efficiency collected in [Worksheet Table 1](#) can be typed into the yellow *Control Device Efficiency and Capture Efficiency boxes* found on the Web Letterpress screen:

Enter control device efficiency ----->	0%
Enter capture efficiency ----->	0%

Filling out the VOCs from Web Letterpress Printing table

The information on Web Letterpress chemicals/materials containing VOCs collected in [Worksheet Table 2](#) can be typed into the yellow boxes of the VOCs from Web Letterpress Printing table:

VOCs from Web Letterpress Printing						
Calculating VOC Releases						
(Enter data in columns A, B ,C, and E. Columns D , F and G will calculate automatically.)						
A	B	C	D	E	F	G
Materials/ Chemicals	Amount used in the year	VOC content (from MSDS) ¹	VOC usage (B*C)	Emission Factor (See box to the right or input your own)	Uncontrolled VOC release (D*E)	Controlled VOC release [(1-(C8*C9))*F]
	L	g/L	kg	%	kg	kg
<i>*Example: Non-waterbased inks</i>	150	8.9	1.34	60%	0.80	0.80
Non-waterbased inks	75	8.0	0.06	60%	0.04	0.04
			0.00		0.00	0.00
			0.00		0.00	0.00
			0.00		0.00	0.00
Totals	0	-	0.00	-	0.00	0.00

In the example shown in the table above, a user has entered 75 litres of non-water-based inks with a VOC content of 8.0 g/L and an emission factor of 60%. Note that the example in the grey row does not enter into the calculation of the release of any substances.

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

Once you input information into the appropriate yellow boxes, the uncontrolled and controlled releases of VOCs are automatically calculated and displayed in the grey columns of the *VOCs from Web Letterpress Printing* table. These amounts also appear as part of the Totals columns found on the MPO & Release screen. See page 27 of this guide for more details on the MPO & Release screen.

If the emission factor is unknown, it can be estimated using the emission factor table found on the Offset Lithography screen, as shown below:

Choose the corresponding emission factor or provide your own.

Chemical Used	Heatset or Non Heatset	Dryer Used (if applicable)	Emission Factor*
Inks and Varnishes	Heatset	Hot Air Dryer	80%
		Direct Flame Dryer	80%
Inks and Varnishes	Non-Heat Set		5%

*This factor is an estimate of the amount of solvent that is NOT left in the product or destroyed in a dryer.

The Digital screen

The Digital screen is the screen in which you will enter all information related to digital printing processes in your printing facility. **If you do not have digital printing processes, you can skip this screen.**

Information is typed in **yellow boxes** only. Any yellow cells that do not apply to your facility can be left as is. The Digital screen can be filled out using the information that you collected in [Worksheet Table 2](#) that relates to your digital processes.

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

Filling out the VOCs from Digital Printing table

The information on Web Letterpress chemicals/materials containing VOCs collected in [Worksheet Table 2](#) can be typed into the yellow boxes of the VOCs from Web Letterpress Printing table:

VOCs from Digital Printing					
Calculating VOC Releases					
(Enter data in columns A, B, C, and E. Columns D, F and G will calculate automatically.)					
A	B	C	D	E	F
Materials/ Chemicals	Amount used in the year	VOC content (from MSDS)¹	VOC usage (B*C)	Emission Factor (See box to the right or input your own)	Uncontrolled VOC release (D*E)
	L	g/L	kg	%	kg
<i>*Example: Ink</i>	150	4.3	0.65	100.0%	0.65
Ink	100	4.3	0.43	60.0%	0.26
			0.00		0.00
			0.00		0.00
			0.00		0.00
Totals	0	-	0.00	-	0.00

In the example shown in the table above, a user has entered 100 litres of ink with a VOC content of 4.3 g/L and an emission factor of 60%. Note that the example in the grey row does not enter into the calculation of the release of any substances.

Once you input information into the appropriate yellow boxes, the releases of VOCs are automatically calculated and displayed in the grey columns of the *VOCs from Digital Printing* table. These amounts also appear as part of the Totals columns found on the MPO & Release screen. See page 27 of this guide for more details on the MPO & Release screen.

If the emission factor is unknown, it can be estimated using the emission factor table found on the Digital screen, as shown below:

Choose the corresponding emission factor or provide your own.

VOC Emissions Factor* [^]	100.0%
------------------------------------	--------

*This factor is an estimate of the amount of solvent that is NOT left in the product or destroyed in a dryer.

[^]This value is the average of two values given in Reference 1

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

The Cleaning screen

The Cleaning screen is the screen in which you will enter all information related to cleaning processes in your printing facility. **If you do not have cleaning processes, you can skip this screen.**

Information is typed in **yellow boxes** only. Any yellow cells that do not apply to your facility can be left as is. The Cleaning screen can be filled out using the information that you collected in [Worksheet Table 1](#) and [Worksheet Table 2](#) that relates to your cleaning processes.

Filling out the VOCs from Cleaning Chemicals table

The information on cleaning chemicals/materials containing VOCs collected in [Worksheet Table 2](#) can be typed into the yellow boxes of the *VOCs from Cleaning Chemicals* table:

VOCs released from Cleaning Chemicals					
Calculating VOC Releases					
(Enter data in columns B, C, and D. Columns E, F, and G will calculate automatically.)					
A	B	C	D	E	G
Materials/ Chemicals	Amount used in the year in litres	VOC content in grams per litre (from MSDS) ¹	VOC usage in kg (C*D)/1000	Emissions Control Technology Efficiency (0% if no emissions control)	Uncontrolled VOC release in kg (D*E)
	L	g/L	kg		kg
<i>*Example: Ink remover/ cleaner</i>	300	10	3.00	50%	<i>*Example: Ink remover/ cleaner</i>
Ink remover/ cleaner	250	7	1.75	85%	1.49
Totals			1.75		1.49

In the example shown in the table above, a user has entered 250 litres of ink remover/cleaner with a VOC content of 7 g/L and an emission factor of 85%. Note that the examples in the grey rows do not enter into the calculation of the release of any substances.

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

Filling out the VOCs Transferred during Cleaning table

The information on VOCs transferred during cleaning collected in [Worksheet Table 3](#) can be typed into the yellow boxes of the *VOCs Transferred during Cleaning* table:

VOCs from Cleaning Materials Calculating VOC Transferred During Cleaning (Enter data in columns A, B, C, D, E and Column F will calculate automatically) (If you do not know the VOC Content of your transferred material use the table on the right)					
A	B	C	D	E	F
Transferred Material	HWIN Classification	Offsite Transfer Company	Volume of Transferred Waste	VOC Content	VOC Transferred
			L	g/L	kg
<i>*Example: Degreasing Solvent</i>	<i>Aliphatic Solvents</i>	<i>Environmental Solutions</i>	190	4.98	0.95
Degreasing solvents mixture	Aliphatic Solvents	Enviro Solutions	170.0	6.3	1.07
					0.00
Totals			170		1.07

In the example shown in the table above, a user has indicated that 170 litres of degreasing solvents classified as Aliphatic Solvents with a VOC content of 6.3 g/L was transferred to Enviro Solutions.

If the transferred waste material were a mixture of different chemicals, then the waste would have a VOC content that that reflects the mix of these chemicals. The table below, which is found on the Cleaning screen, can help you calculate an average VOC content for a mixture of chemicals.

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

Please use the table below to calculate the VOC content of your transferred waste if you cannot obtain the VOC content from your waste hauler.

- 1.) Enter the **amount used** of each material that has been transferred and the corresponding VOC Content in the table below.
- 2.) The table will automatically calculate the weighted average VOC content of all the transferred material and will be displayed in the "Weighted Average VOC Content" cell below.
- 3.) Please enter this value into the table on the left in the "VOC Content" column.

Transferred Material	Amount used in the year	VOC Content
	L	g/L
Degreasing Solvent A	100	4.5
Degreasing Solvent B	25	3
Degreasing Solvent C	45	7

Weighted Average VOC Content* (g/L)
6.3

In the example shown in the table above, the degreasing solvent mixture containing Degreasing Solvents A, B and C has an average VOC content of 6.3 g/L. This mixture can be entered as one entry into the *VOCs transferred during cleaning table*.

Once you input information into the appropriate yellow boxes of the *VOCs from Cleaning Chemicals table* and the *VOCs Transferred during Cleaning table*, the uncontrolled and controlled releases of VOCs from Cleaning are automatically calculated. These amounts appear in the *Total VOCs released from cleaning processes table*. The example *Total VOCs released from cleaning processes table* below shows the VOC quantities used, transferred and released that correspond to the examples that have been provided in this section of the guide:

Total VOCs released from cleaning processes			
ChemTRAC Priority Substances	Quantity Used (kg/yr)	Quantity Transferred (kg/yr)	Uncontrolled Quantity Released (kg/yr)
Total VOCs	1.75	1.07	0.68

- The **Quantity used box** refers to the total quantity of VOCs used as calculated from the *VOCs from Cleaning Chemicals table*.
- The **Quantity Transferred** refers to the total quantity of VOCs transferred as calculated from the *VOCs Transferred during Cleaning table*.
- The **Uncontrolled Quantity Released** is the difference between the Quantity Used and the Quantity Transferred boxes.

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

All of these amounts also appear as part of the Totals columns found on the MPO & Release screen. See page 27 of this guide for more details on the MPO & Release screen.

The MPO & Release screen

The MPO & Release screen consists of a Totals table and an Output Summary table. It is the information in the Output Summary table that must be compared to the ChemTRAC reporting thresholds listed in the Environmental Reporting and Disclosure Bylaw.²

All information on the MPO & Release screen is calculated from the information that you have input in the Offset Lithography, Rotogravure, Web Letterpress, Flexography, Digital and Cleaning screens of the ChemTRAC calculator. You do not need to enter any new information on this screen.

The Totals table

The Totals table reports the total VOC usage and releases (uncontrolled and controlled) from your printing facility. In the sample Totals table below, the information was calculated from the examples that were provided as part of the explanations of the Offset Lithography, Rotogravure, Web Letterpress, Flexography, Digital, and Cleaning screens:

² 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

Printing process	TOTAL VOC MPO (in kg) (from VOC calculation spreadsheets)	TOTAL Uncontrolled VOC release (in kg) (from VOC calculation spreadsheets)	TOTAL Controlled VOC release (in kg) (from VOC calculation spreadsheets)
Offset Lithography	1.78	0.71	0.71
Rotogravure	0.79	0.75	0.75
Web Letterpress	0.60	0.36	0.36
Flexography	1.02	0.97	0.97
Digital	0.43	0.68	0.26
Cleaning	1.75	0.68	0.68
Total	6.37	4.15	3.73

- The **TOTAL VOC usage (in kg)** is calculated from the Total VOC Usage columns in each of the six processes.
- The **TOTAL Uncontrolled VOC release (in kg)** is calculated from the Uncontrolled VOC release columns in each of the six processes. This information considers the quantity of each material/chemical used, its VOC content and its emission factor. It does NOT consider the efficiency of the VOC control device.
- The **TOTAL Controlled VOC release (in kg)** is calculated from the Controlled VOC release columns in each of the six processes. This information considers the quantity of each material/chemical used, its VOC content and its emission factor, and it DOES consider the efficiency of the VOC control device. It also accounts for the quantity of cleaning material VOCs that are transferred from your facility without being released to air. In the sample Totals table above, the uncontrolled and controlled VOC releases are the same since no control device efficiency information was entered in any of the calculator screens for the six processes.

The Output Summary table

The Output Summary table provides the quantities of VOCs that are Manufactured, Processed, Otherwise Used, and Released to Air³ from your facility. In the sample Output summary table below, the information was calculated from the examples that were provided as part of the explanations of the Offset Lithography, Rotogravure, Web Letterpress, Flexography, Digital and Cleaning screens:

³ The complete 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

Output Summary				
ChemTRAC priority substances	Quantity (kg/yr)			
	Manufactured ¹	Processed ¹	Otherwise Used ¹	Released to Air ¹
Total Volatile Organic Compounds (VOCs)	0	4.19	1.75	3.48

- The **Manufactured** box indicates the quantity of VOCs that are produced or prepared by your facility. The processes included in the ChemTRAC calculator for printing facilities do not produce or prepare any VOCs. This box will always remain as zero.
- The **Processed** box indicates the quantity of VOCs that are used as part of your facility's printing processes. Processed VOCs are those that are used in your Offset Lithography, Rotogravure, Web Letterpress, Flexography, and Digital processes, but NOT in your Cleaning processes.
- The **Otherwise Used** box indicates the quantity of VOCs that are used at your facility but are not part of your printing processes. VOCs that are Otherwise Used are those used in your Cleaning processes.
- The **Released to Air** box indicates the quantity of VOCs that are released into the atmosphere as a result of all materials/chemicals used at your printing facility. The calculation considers the capture and VOC removal efficiencies of all control devices. The calculation does not include the quantity of VOCs that are transferred from your facility without being released to air.

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.⁴ These thresholds are also listed in Appendix B 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 its quantity released to air.

Combining multiple calculation methods

Some facilities may need to add results of the ChemTRAC calculator for Printing Facilities with emissions from other processes that happen in the facility. This is discussed in Appendix B. **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 3.

Table 3. Comparison of results from the ChemTRAC calculator and reporting thresholds

Output Summary table from the ChemTRAC calculator					Comparison to thresholds	
ChemTRAC Priority Substance	Manufactured (kg/yr)	Processed (kg/yr)	Otherwise used (kg/yr)	Released to Air (kg/yr)	ChemTRAC reporting threshold (kg/yr)	Is reporting required?
VOCs	0.0	150.0	60	105	100 kg released to air	YES

In the

Table 3 example, VOCs are released to air in a quantity greater than its reporting threshold of 100 kg/yr released to air. Therefore, in this example, 100 kg/yr of VOCs released to air would have to be reported to the ChemTRAC program, as would the 150 kg/yr processed and the 60 kg/yr otherwise used.

⁴ The full by-law can be found at <http://www.toronto.ca/health/chemtrac/report.htm>.

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).

CHEMTRAC

Overview For Business For Communities Disclosure Reports Links Contact Us E-news

4 steps to reporting Reporting exemptions Reporting FAQ Business FAQ

4 Steps to Reporting

Reporting to the Environmental Reporting and Disclosure Bylaw ([Municipal Code Chapter 423](#))

The following steps are provided as a guide to help you report:

- Step 1**
Determine if the Bylaw applies to your facility
- Step 2**
Determine if you need to report in a given year.
- Step 3**
Prepare your data for reporting
- Step 4**
Submit your data online by June 30th each year

Ready to report?
ChemTRAC Online Reporting

See reported data
ChemTRAC Data Map

The deadline for reporting 2011 data has passed. If you missed the deadline and still need to report, please [contact us](#) immediately.

Click here to access the online reporting system

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

ChemTRAC
You are in a secure site.

CHEMTRAC

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.

Click "I agree" to enter the online reporting system

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

First Time Signing In?

Register with First Time Access Code

Already Registered?

Registration ID:

If you have lost or forgotten your Registration ID, please contact us at (416) 338-7600

Sign In

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.

TORONTO

ChemTRAC
You are in a secure site.

Frequently asked questions
Contact us
Terms of use
User Guide

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
Step 7 Confirmation & Print

15min 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. Facilities for which the ChemTRAC calculator for Printing Facilities was intended

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

are those with two digit NAICS codes 31, 32, and 51. Four digit NAICS codes are then the following types of facilities:

- NAICS code 3231 includes all facilities primarily engaged in printing, including commercial screen printing, quick printing, digital printing, and manifold business forms printing, and printing related services.
- NAICS code 511 includes publishing industries (except the internet), including newspaper, periodical, book, mailing list publishers, and others.
- NAICS code 313 includes textile mills, including fibre, yarn, thread and fabric mills, as well as textile fabric finishing and fabric coating.

The example below would be for a Commercial Screen Printing facility with six-digit NAICS code 323113:

Type of Facility

Please indicate your main type of business by providing the North American Industry Classification System (NAICS) code that best applies to your facility. If more than one code applies to your facility, select one and proceed.

Not sure of your NAICS Code? Click this link, [NAICS Code Help](#), to search for your code.

NAICS 2-Digit: 32 - Manufacturing

NAICS 4-Digit: 3231 - Printing & Related Support Activities

NAICS 6-Digit: 323113 - Commercial Screen Printing

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 above reporting thresholds. The example below builds off of

Table 3 in this guide. Recall that VOCs was the only substance that exceeded thresholds.

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

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

Step 4. Use and release

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

For printing facilities, all substances are “Processed”, “Otherwise used” and “Released to air”.

You will then enter the quantity of the substance that your facility released in kilograms, without decimal places.

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

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

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

The example below illustrates how to complete Step 4 for VOCs using information from information from

Table 3 of this guide.

Volatile Organic Compounds (VOCs) Total (Reporting Threshold = 100.0 kg)		
Quantity (kg)	Estimation Method	
If you used more than one method to estimate data, please choose the main one		
Manufactured: 	<input type="text"/>	- Select Estimation Method From List -
Processed: 	<input type="text" value="150"/>	ChemTRAC calculator
Otherwise Used: 	<input type="text" value="60"/>	ChemTRAC calculator
Total Use:	<input type="text" value="210"/>	
Release to Air: 	<input type="text" value="105"/>	ChemTRAC calculator
Release to Land: 	<input type="text"/>	- Select Estimation Method From List -
Release to Surface Water: 	<input type="text"/>	- Select Estimation Method From List -
Total Release:	<input type="text" value="105"/>	

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

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 38 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 your facility's environmental impact

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 printing facilities 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.
For example: Order ink in containers sized for minimum storage time to reduce waste from expired inks.
2. **Install control technologies or equipment.** New control technologies, special inks and equipment can reduce the release of harmful chemicals and save money by improving operating efficiency.
For example: Install carbon adsorption devices or use incineration to help reduce the release of VOCs from your processes.
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 the most environmentally responsible products available, and increase the VOC waste transferred from your facility.

Part 2: Reducing your facility's environmental impact

A complete guide on pollution prevention specific to the printing and publishing industry can be found under the "Printing and Publishing sector" section found at <http://www.toronto.ca/health/chemtrac/gogreen.htm>.

Control technologies for reducing emissions

Control technologies can reduce, but not eliminate, the quantity of VOCs that are released from printing facilities. Control technologies can be used to reduce the quantity of VOCs released from offset lithography, web letterpress, rotogravure, flexography and cleaning processes.

VOC incinerators

VOC incinerators can help destroy VOCs emitted as part of the various processes within your printing facility.

Thermal or catalytic incinerators can reduce VOC emissions from web letterpress operations by 95%. A thermal incinerator can also be coupled with a heat exchanger that can capture waste heat.

Fume incinerators can reduce VOC releases from rotogravure ink fountain and chill rolls by 75%. Some smaller rotogravure operations, such as those that print and coat packaging materials, use water-soluble solvents, whose emissions can be controlled using thermal incineration. In addition to thermal incinerators, pebble bed incinerators are also available. Pebble bed incinerators combine the functions of a heat exchanger and a combustion device, and can achieve a heat recovery efficiency of 85%.

In flexography processes, fume incinerators can minimize VOC releases around the ink fountain and at the chill rolls by 60%.

Carbon Adsorption

Rotogravure plants with carbon adsorption use a single water-immiscible solvent (toluene) or a simple mixture that can be recovered in approximately the proportions used in the ink. VOC recoveries of up to 75% can be expected.

Waterborne inks

Using low-solvent inks can also reduce VOC emissions. Waterborne inks, in which the volatile portion contains up to 20 volume percent water soluble organic compounds, are used extensively in rotogravure printing of multiwall bags, corrugated paperboard, and other packaging products, although water absorption into the paper limits the amount of waterborne ink that can be printed on thin stock before the web is seriously weakened.

More ways to reduce costs and improve performance

Minimizing the use and release of harmful substances is one aspect of improving environmental performance. Printing facilities can also take other steps to improve their economic and environmental sustainability reducing energy use is one such step. By reducing energy use, printing facilities 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 motors and heating units with more efficient equipment
- Installing a programmable thermostat to control heating and cooling
- Purchasing a heat exchanger system to recycle wasted heat.

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 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**, **free training workshops** and additional resources to help businesses create 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 printing facilities include:

1. Alberta Environment. 1997. Waste Minimization Manual: Printing and Publishing Industry. <http://environment.gov.ab.ca/info/library/6263.pdf>
 - Waste minimization suggestions for printing and publishing companies.
2. City of Toronto. 2010. Resource for Greening Printing and Publishing Pollution Prevention Information. <http://www.toronto.ca/health/chemtrac/pdf/GreenPrintPublish.pdf>.
 - Printing and publishing process details and pollution prevention strategies.
3. CleanPrint Canada. 1999. Checksheet for Printers. http://www.envisioncompliance.com/pdf/CleanPrint_Check.pdf
 - A tool to be used by printers to help implement a pollution prevention program.
4. Eco-Efficiency Centre. Fact Sheet: Eco-Efficiency in the Printing Industry. http://eco-efficiency.management.dal.ca/Files/Business_Fact_Sheets/Microsoft_Word_-_printing_fs.doc.pdf
 - Suggestions for changes in printing workplace practices, behaviours and technologies to improve a business's environmental and economic performance.

Part 2: Reducing your facility's environmental impact

5. Northeast Waste Management Officials' Association (NEMWOA). 2006. Pollution Prevention Technology Profile: Computer-to-Plate Lithographic Printing.
<http://www.newmoa.org/prevention/p2tech/DirectToPlateProfile.pdf>
 - An overview of computer-to-plate (CTP) lithographic printing technologies, focusing on the environmental issues related to CTP and potential benefits.
6. Pollution Prevention Assistance Division, Georgia Department of Natural Resources. Sector Assessments: An Analysis of Pollution Prevention Opportunities and Impediments in the Printing and Publishing Industry Sector in Georgia. http://www.p2ad.org/documents/ma_printing.html
 - An Analysis of Pollution Prevention Opportunities and Impediments in the Printing and Publishing Industry Sector in Georgia.
7. OCETA. Toronto Region Sustainability Program (TRSP) - Case Studies. <http://www.oceta.on.ca/TORSUS/>
 - Ten case studies are provided on the TRSP website. Each case study highlights one printing company that has undergone a pollution prevention assessment. Assessment findings and P2 recommendations are included.
8. U.S. EPA. 1995. Profile of the Printing Industry – Sector Handbook. <http://www.epa.gov/Compliance/resources/publications/assistance/sectors/notebooks/printing.html>
 - A detailed description of the printing industry, including an industrial process description, chemical release and transfer information, and pollution prevention opportunities.
9. U.S. EPA. 1990. Guides to Pollution Prevention: The Commercial Printing Industry. http://www.epa.gov/ttn/chief/old/ap42/ch04/s09/reference/bref11_c04s09_ch2_1995.pdf
 - Identification and analysis of waste minimization methodologies for commercial printers. A detailed technical guide with some dated information.

Additional Material

Appendices

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

Appendix A. Printer-friendly versions of the three worksheets.

Appendix B. Combining the ChemTRAC calculator with other sources:

How to combine the ChemTRAC calculator for Printing Facilities with emissions data from other sources.

Additional Material

Appendix A. Printer-friendly worksheets

These worksheet tables can be printed and completed by hand so that all information can be readily available for entry into the ChemTRAC calculator. The Worksheet 2 Table is found on the next page.

Worksheet 1 Table: Capture and VOC removal efficiencies of control devices

Process	Control device(s)	VOC capture efficiency	VOC removal efficiency
Rotogravure	_____	_____ %	_____ %
Web letterpress	_____	_____ %	_____ %
Flexography	_____	_____ %	_____ %
Offset lithography	_____	_____ %	_____ %
Cleaning	_____	_____ %	_____ %

Worksheet 3 Table: Information on VOCs transferred during cleaning

Transfer material	HWIN classification	Offsite transfer company	Volume of transferred waste	VOC content
<i>Example: Degreasing solvent</i>	<i>Aliphatic solvents</i>	<i>Environmental solutions</i>	<i>190 litres</i>	<i>498 grams per litre</i>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Appendix B. Combining the Printing Facility 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.

The following page provides a screenshot of the main screen of the "Calculation of Totals" calculator.

⁵ The Calculation of Totals calculator can be found under the Totals bullet at <http://www.toronto.ca/health/chemtrac/tools.htm>.

Additional Material

Group	Chemical Name	Quantity (kg/yr)				Quantity (kg/yr)				Totals to be compared with the threshold (kg/yr)	Mass Reporting Threshold (kg/yr)	Reportable?
		Manufactured	Processed	Otherwise Used	Released to Air	Manufactured	Processed	Otherwise Used	Released to Air			
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 of your first calculator here				Enter values from the output summary of your second calculator here				0	100	No
	Dichloromethane (Methylene chloride)									0	100	No
	Formaldehyde*									0	100	No
	Manganese ¹									0	10	No
	Nickel ¹									0	100	No
	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
C	Nitrogen oxides (NOx)									0	200	No
	Particulate matter 2.5 (PM _{2.5})									0	30	No
	Total Volatile organic compounds (VOCs) ²									0	100	No

ETC

Additional Material

The total combined release of substances (whether from the ChemTRAC calculator for Printing Facilities 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 4.

Table 4. 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 ^a % 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 (NOx)	200	N/A ^b
Particulate Matter 2.5 (PM _{2.5})	30	N/A
Polycyclic Aromatic Hydrocarbons (PAHs)	10	N/A
Tetrachloroethylene (Perchloroethylene)	100	1
Trichloroethylene	100	1
Vinyl chloride	100	1
Volatile Organic Compounds (VOCs) total	100	N/A

Notes:

- a. Only emissions of priority substances that are equal to or exceed the given % w/w concentration threshold should be considered when comparing emissions to the ChemTRAC reporting thresholds.
- b. N/A = not applicable

Appendix C. 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.