Guide to calculations for ChemTRAC reporting:

Commercial bakeries

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 Commercial Bakeries, 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.

City of Toronto, 2012
For more information about ChemTRAC, call 3-1-1 or visit www.toronto.ca/chemtrac

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 41.

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. Commercial Bakeries and Frozen Bakery Product Manufacturers are covered by this bylaw. **Bakeries that solely sell to the public are not covered**.

This guide is designed to help you and other commercial bakery 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 Commercial Bakeries and Frozen Bakery Product Manufacturing sector

The North American Industrial Classification System (NAICS) code 311814 includes all facilities that manufacture bakery products **not for immediate retail sale**. It includes facilities that bake bread, pastries, pretzels, doughnuts, croutons, breadcrumbs, croissants, frozen baked products, and many other baked goods. This guide uses the term “commercial bakeries” to refer to all facilities within the Commercial Bakeries and Frozen Bakery Product Manufacturing Sector. Retail bakeries that only sell to the public are classified as NAICS code 311811 and are not captured by ChemTRAC.

Commercial bakeries are required to report their data every year if they use or release any of the 25 substances above the reporting threshold. The report is due by June 30each 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 commercial bakeries

Figure 1 indicates typical steps taken in a commercial bakery to prepare bakery products. Not all bakeries will follow these steps exactly. However, most bakeries will store, convey, and mix dry ingredients, proof products (for products with yeast), and bake products in an oven.

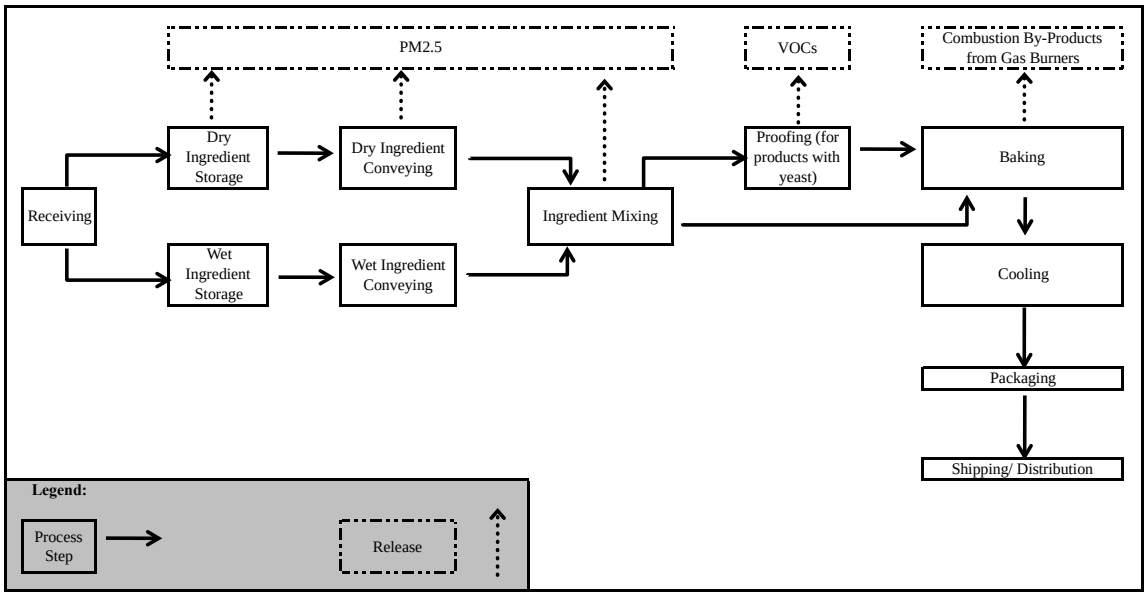

Figure 1.Typical steps taken in a commercial bakery to prepare bakery products

Figure 1 also shows three ChemTRAC priority substances that are released in a typical commercial bakery. These are:

- Particulate Matter 2.5 ($PM_{2.5}$)
- Volatile Organic Compounds (VOCs)
- Combustion by-products from natural gas burners.

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 commercial bakery, $PM_{2.5}$ is released into the air during the storage, conveying and mixing of dry ingredients such as flour, sugar, salt or other powder.

Volatile Organic Substances (VOCs). VOCs are a group of organic chemicals that easily evaporate into the air. You can often smell them. They are created as a by-product of various activities. In a bakery, VOCs form during the proofing stage and when baking with yeast. Ethanol (also known as grain alcohol) is an example of a VOC that can be released from a bakery. VOCs help produce the smell of bread being baked.

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Combustion by-products from natural gas burners. Several substances are released when natural gas is burned (i.e. combusted) to heat the baking oven. When natural gas is combusted to generate heat, it releases ChemTRAC priority substances.

Table 1 lists the ChemTRAC substances that a typical bakery would release from each step in the preparation of bakery products. The ChemTRAC calculator can help you confirm the levels of these substances in your business.

Table 1. ChemTRAC substances released in a typical commercial bakery, and their source of release

ChemTRAC priority substances	Steps in the preparation of bakery products		
	Dry ingredient storage, conveying, mixing *$PM_{2.5}$ is released into the air from flour, sugar, salt or powders*	Proofing *VOCs are released from yeast*	Use of natural gas for bakery ovens/burners *Substances are released in small quantities as combustion by-products*
Benzene			X
Cadmium and its compounds			X
Chromium and its compounds			X
Formaldehyde			X
Lead and its compounds			X
Manganese and its compounds			X
Mercury and its compounds			X
Nickel and its compounds			X
Nitrogen Oxides			X
$PM_{2.5}$	X		X
PAHs			X
VOCs		X	X

Most of the substances listed in Table 1 are released in very small amounts. It is likely that only $PM_{2.5}$, VOCs and NO_x would be released in amounts that could require reporting to the ChemTRAC program.

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

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

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

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

For more information on the health effects of these substances, as well as other ChemTRAC priority substances, visit **http://www.toronto.ca/health/chemtrac/substances.htm**.

Calculating emissions

To help Toronto businesses calculate their emissions and comply with the Environmental Reporting and Disclosure Bylaw, Toronto Public Health developed calculators that are specific to industrial sectors and processes. Access these calculators from the ChemTRAC website at **http://www.toronto.ca/health/chemtrac/tools.htm**.

These calculators help businesses do three things:

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

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

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

In the next section, we will work through worksheets to prepare you to use the ChemTRAC calculators for commercial bakeries.

Worksheets for collecting information

The worksheets found on the next four pages are intended to help you collect all the information needed to use the ChemTRAC calculator for commercial bakeries. Four worksheets are provided:

- Natural gas fired equipment (ovens)
- Silos and hoppers with filters (for dry storage only)
- Dust collectors (for ingredient mixing), and
- Baking with yeast.

A printer-friendly version 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.

Note: if your facility has more processes than are included in the ChemTRAC calculator for Commercial Bakeries, 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 Commercial Bakeries. 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.

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Worksheet 1 – Natural gas fired equipment (ovens)

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

1. **What control technologies are installed on your baking ovens?**
   You can find this information in the operating manuals for each oven. Descriptions of control technologies can be found in 0. If you do not know which control technologies are in place, assume that none are.

Bakery ovens are equipped with (add a checkmark):		
a.	Low NO_x burners only	_____
b.	Low NO_x burners with recirculated flue gas	_____
c.	No control technologies	_____

2. **How much natural gas is used to heat your commercial ovens?**
   This question can be answered using EITHER Option 2A or Option 2B.

   Option 2A – What is the total amount of natural gas used to heat your ovens? You can get this information from your annual gas bills. Note that the gas bills might include gas used for purposes other than heating ovens, such as heating the bakery itself. You should consider only gas used for oven heating. One way to know how much gas is used to heat your ovens is to compare winter and summer bills. Winter bills will likely include oven heating and bakery heating. Summer months will likely include only oven heating.

   Option 2B – What is the thermal rating of your ovens? This rating (in BTU/hr, or kJ/hr) would be found in your oven's operating manual. You will also need to estimate the average number of hours per day, days per week, and weeks per year that your ovens are used.

Option 2A. Total natural gas used to heat the ovens
Add values in cubic metres **OR** cubic feet: _____ m^3 (cubic metres) or _____ ft^3 (cubic feet)

OR

Option 2B. Thermal rating of the ovens
Add values in British Thermal Units per hour, **OR** in kilojoules per hour: _____ BTU/hr or _____ kJ/hr Also estimate the average time that the ovens are turned on and heating: _____ hours per day and ____ days per week and _____weeks per year

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Worksheet 2 – Silos and hoppers with filters (for dry storage only)

This worksheet will help you collect information on the storage of dry ingredients. You should collect data on your bakery for the period from January 1 to December 31 of a calendar year.

3. What type and quantities of dry ingredients are stored in your bakery?
You can fill out this section of the calculator for both dry ingredients stored in large silos or hoppers (Option 3A) and for dry ingredients stored in smaller quantities such as 20-kilogram bags (Option 3B). You can omit dry ingredients stored in very small quantities. You should enter information for each storage container holding dry ingredients.
One large and small storage container have been filled out as examples.

Option 3A. Storage of dry ingredients in large containers (silos, hoppers, etc.)

Storage container identifier:	What is the container capacity?	Indicate the storage capacity units	What type of dry material is stored in this container?	How often is this storage container refilled per month?
Flour silo 1	36	☐ Lbs ☐ kilograms ☐ tons imperial x tonnes metric ☐ cubic metres	x Flour ☐ Sugar ☐ Salt ☐ Other	4 times

Option 3B. Storage of dry ingredients in smaller storage containers

Storage container identifier:	What is the container capacity?	Indicate the storage capacity units	What type of dry material is stored in this container?	How often is this container refilled or replaced per month?
Flour bags	20 kg bags	☐ Lbs x kilograms ☐ tons imperial ☐ tonnes metric ☐ cubic metres	x Flour ☐ Sugar ☐ Salt ☐ Other	20 times

Worksheet 3 – Dust collectors (for ingredient mixing)

Skip this worksheet if no dust collectors are in operation at your bakery.

This worksheet will help you collect information on any dust collectors at the bakery that help control the amounts of flour, sugar, salt or other dry ingredients released into the air as dust during the mixing of dry ingredients. You should collect data on your bakery for the period from January 1 to December 31 of a calendar year.

4. Are dust collectors in operation at your bakery, and if so, what are the details of their use?

Information is needed on the airflow rate of the dust collector (either in cubic feet per minute, or in cubic metres per second). 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. If multiple dust collectors are found in the bakery, you can enter them as separate entries, or by indicating the number of dust collectors in the 'Number of Dust Collectors' box. You will also need to estimate the amount of time that the dust collectors are removing dry ingredient dust from the air.

Information on a typical dust collector has been filled out as an example.

Dust collector identifier:	Air flow rate	Indicate the airflow rate units	Number of dust collectors	For what amount of time are dust collectors operating?		
				Hours per day	Days per week	Weeks per year
Collector 1	1200	x cfm (cubic feet per minute) OR ☐ m^3/s (cubic metres per second)	1	12	6	50
Etc.						

Worksheet 4 – Baking with yeast

This worksheet will help in the collection of information on the use of yeast in the bakery over the course of the year. You should collect data on your bakery for the period from January 1 to December 31 of a calendar year.

5. How much yeast is used in your bakery over the course of the year?
You should enter the quantity of all products prepared over the course of the year that use yeast as an ingredient. Then, estimate and enter the amount of yeast used (both initial dose and final spike) as a percentage of the total quantity of ingredients used per baking batch. Finally, enter the action time per batch of the initial dose and final spike.

You can calculate the amount of yeast used as a percentage of the total quantity of all ingredients as follows:

_____ weight yeast ÷ _____weight dough × 100 =_____% yeast in the product

For example:

1.5 lbs yeast ÷ 100 lbs dough × 100 = 1.5% yeast in the product

Product	Amount produced in one year	Indicate the units of the amount of product produced in one year	Initial yeast added (%)	Action time in hours	Final spike yeast added (%)	Spike time in hours
Rye bread	10000	x Lbs ☐ kilograms ☐ tons (imperial) ☐ tonnes (metric)	1.5%	1	2%	1.5
_____	_____		_____%	_____	_____%	_____
_____	_____		_____%	_____	_____%	_____
_____	_____		_____%	_____	_____%	_____
_____	_____		_____%	_____	_____%	_____
_____	_____		_____%	_____	_____%	_____
_____	_____		_____%	_____	_____%	_____
_____	_____		_____%	_____	_____%	_____
Etc.						

Using the calculator

This section of the guide provides a step-by-step walkthrough of the main two screens of the calculator. The calculator can be used properly by entering the information from the four 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 ChemTRAC substances released from processes found in your commercial bakery.

Getting started

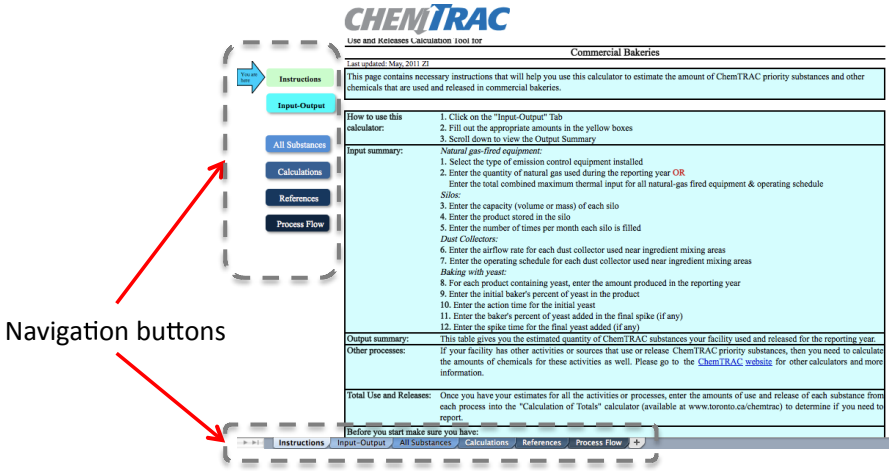
The ChemTRAC calculator for Commercial Bakeries can be read with software such as Microsoft Excel or Open Office. To find a copy of the calculator, go to **http://www.toronto.ca/health/chemtrac/tools.htm** and click on the "Commercial Bakeries" link found under the Food and Beverage Sector.

The calculator consists of six different screens:

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

You only have to enter information into the Input-Output screen. The other four screens are provided in the calculator mainly for reference. No information needs to be entered in these screens.[1] These screens are discussed in Appendix C.

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.

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

The Input-Output screen

The Input-Output screen is the screen where you will enter all information applicable to your bakery. Information is typed in **yellow boxes** only. Any yellow cells that do not apply to your bakery can be left as is. **Dropdown menus** are also used to input some information. The Input-Output screen can be filled out using the responses to the **five questions** found within **Worksheets 1, 2, 3 and 4** found on pages 8 to 11 of this guide. Values in grey cells are examples only, and do not enter into the calculation of the release of any substances.

Once you input information into the appropriate yellow boxes and dropdown menus, the Output summary found at the bottom of the Input-Output screen indicates the ChemTRAC substances in kilograms that are manufactured, processed, otherwise used and released to air from your bakery.[2] 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 17 for more details.

Figure 2 on the next page shows the Input-Output screen and where to insert the information from each worksheet that was filled out above.

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

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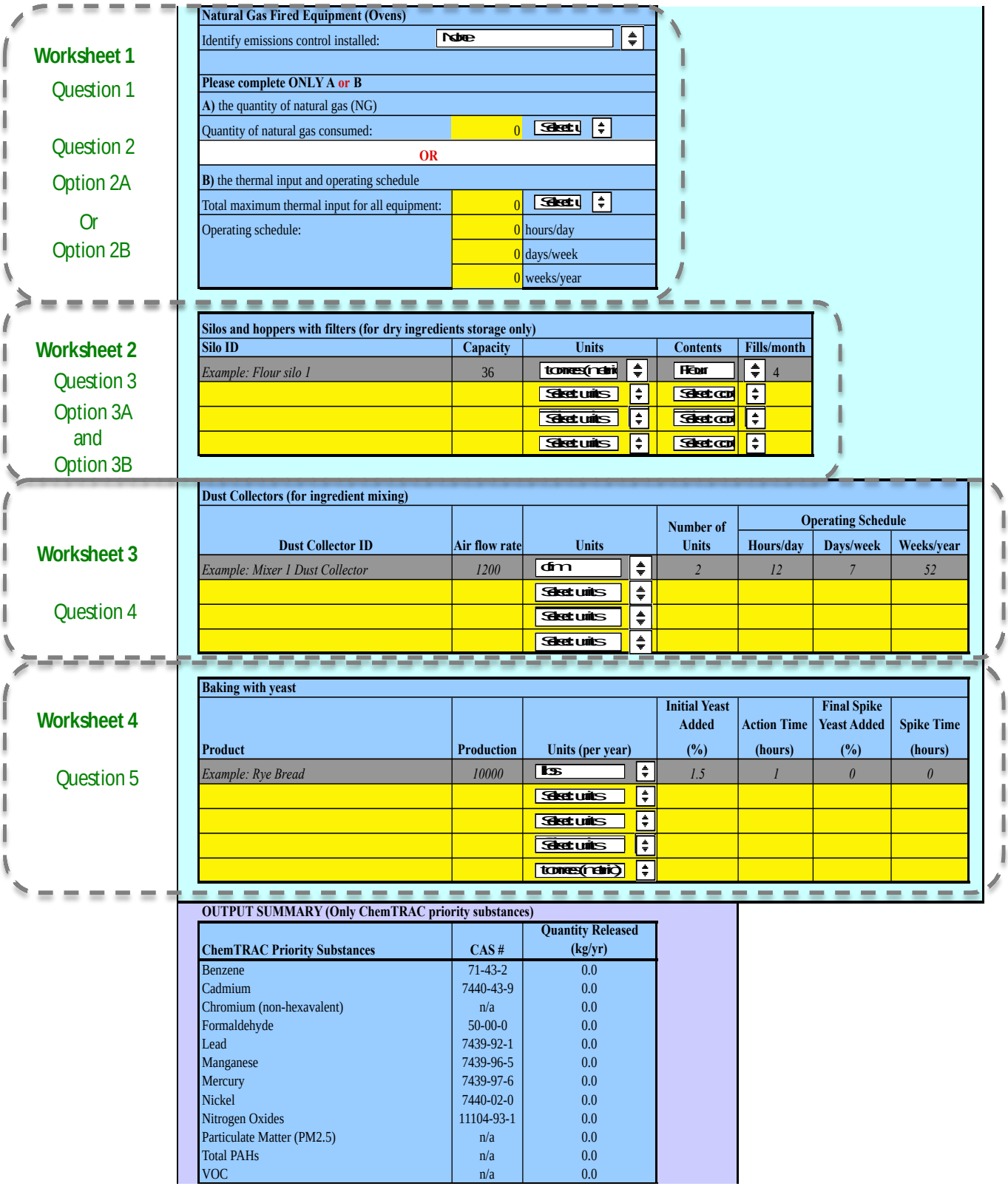

Figure 2. The Input-Output screen

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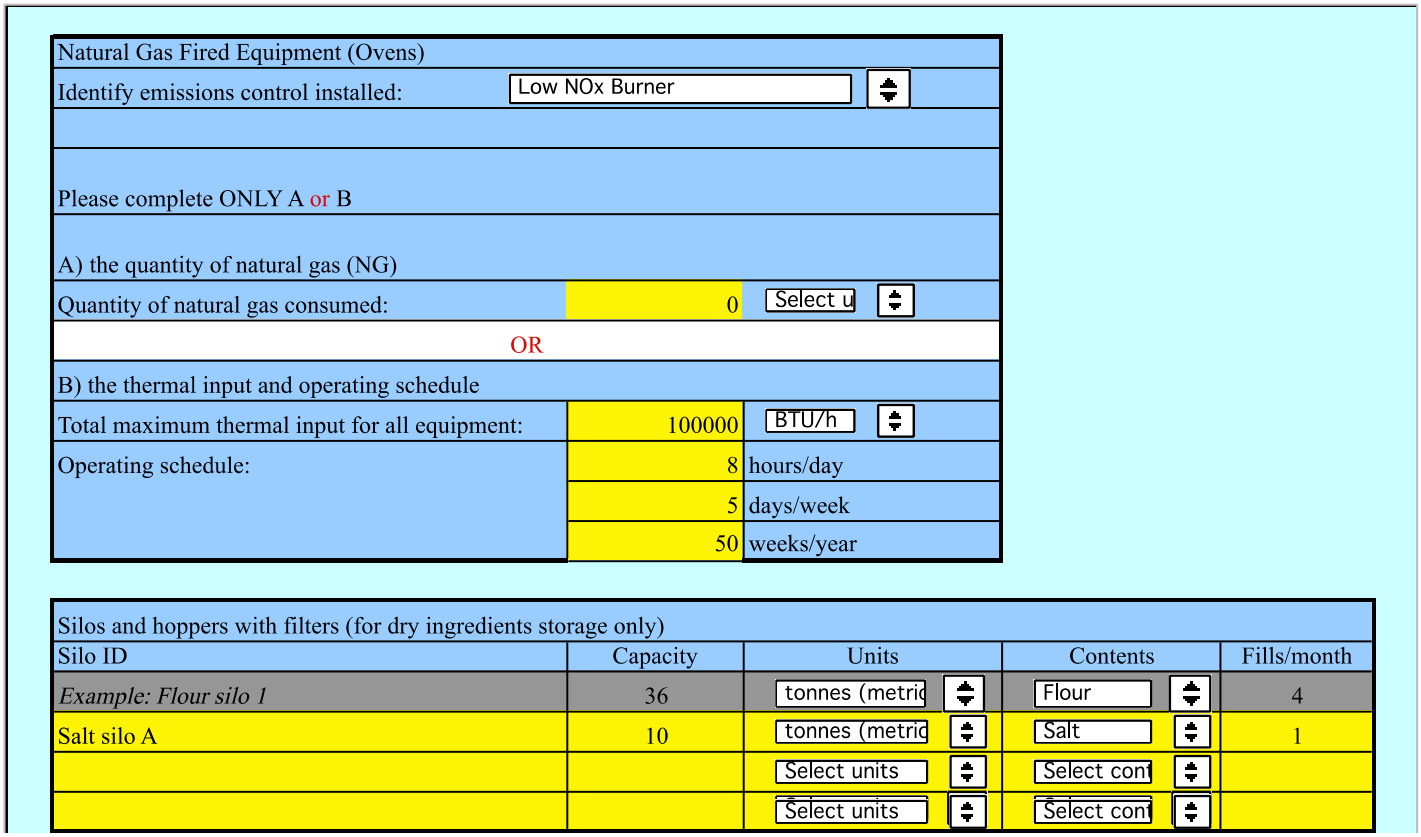
The figure below shows an example of information from Worksheet 1 and Worksheet 2 entered into the Input-Output screen. In this example, a user has indicated that the facility uses Low NO_x Burners as control technologies on all heating equipment. The user has opted for Option 2B and has indicated that the maximum thermal input for all heating equipment is 100,000 BTU/hr. The facility operates for 8 hours per day, 5 days per week, 50 weeks per year. The user has also indicated that the facility has a salt silo with a capacity of 10 metric tonnes that is filled once per month.



Natural Gas Fired Equipment (Ovens)		
Identify emissions control installed:	Low NOx Burner	
Please complete ONLY A or B		
A) the quantity of natural gas (NG)		
Quantity of natural gas consumed:	0	Select u
OR		
B) the thermal input and operating schedule		
Total maximum thermal input for all equipment:	100000	BTU/h
Operating schedule:	8	hours/day
	5	days/week
	50	weeks/year

Silos and hoppers with filters (for dry ingredients storage only)				
Silo ID	Capacity	Units	Contents	Fills/month
Example: Flour silo 1	36	tonnes (metric	Flour	4
Salt silo A	10	tonnes (metric	Salt	1
		Select units	Select cont	
		Select units	Select cont	

The figure on the next page shows an example of information from Worksheet 3 and Worksheet 4 entered into the Input-Output screen. In this example, the user has indicated that one dust collector is used that has an air flow rate of 1,000 cubic feet per minute (cfm) and operates 8 hours per day, 5 days per week, and 50 weeks per year. The use has also indicated that the facility produces 5,000 pounds of wheat bread with an with 1% yeast, an action time of 1 hour, and a final spike of 2% and spike time of 1 hour.

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Dust Collectors (for ingredient mixing)						
				Operating Schedule		
Dust Collector ID	Air flow rate	Units	Number of Units	Hours/day	Days/week	Weeks/year
Example: Mixer 1 Dust Collector	*1200*	cfm	*2*	*12*	*7*	*52*
Collecter 1	1000	cfm	1	8	5	50
		Select units				
		Select units				

Baking with yeast						
Product	Production	Units (per year)	Initial Yeast Added (%)	Action Time (hours)	Final Spike Yeast Added (%)	Spike Time (hours)
Example: Rye Bread	*10000*	lbs	*1.5*	*1*	*0*	*0*
Wheat bread	5000	lbs	1	1	2	1
		Select units				
		tonnes (metric)				

Using these examples, 68 kg of $PM_{2.5}$, 4.4 kg of nitrogen oxides, and 1.8 kg of VOCs are released per year.

OUTPUT SUMMARY (Only ChemTRAC priority substances)

ChemTRAC Priority Substances	CAS #	Quantity Released (kg/yr)
Benzene	71-43-2	0.0
Cadmium	7440-43-9	0.0
Chromium (non-hexavalent)	n/a	0.0
Formaldehyde	50-00-0	0.0
Lead	7439-92-1	0.0
Manganese	7439-96-5	0.0
Mercury	7439-97-6	0.0
Nickel	7440-02-0	0.0
Nitrogen Oxides	11104-93-1	4.4
Particulate Matter (PM2.5)	n/a	68.1
Total PAHs	n/a	0.0
VOC	n/a	1.8

Interpreting results

Compare results to thresholds. Once the amounts of ChemTRAC substances manufactured, processed, otherwise used and released to air 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.

Combining multiple calculation methods. Some facilities may need to add results of the ChemTRAC calculator for Commercial Bakeries with emissions from other processes that happen in the facility. This is further 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. 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?**
Benzene	0.0	0.0	0.0	0.0	100	No
Cadmium and its compounds	0.0	0.0	0.0	0.0	1	No
Chromium (non-hexavalent) and its compounds	0.0	0.0	0.0	0.0	100	No
Formaldehyde	0.0	0.0	0.0	0.0	100	No
Lead and its compounds	0.0	0.0	0.0	0.0	10	No
Manganese and its compounds	0.0	0.0	0.0	0.0	10	No
Mercury and its compounds	0.0	0.0	0.0	0.0	1	No
Nickel and its compounds	0.0	0.0	0.0	0.0	100	No
Nitrogen Oxides	0.5	0.0	0.0	0.5	200	No
Particulate Matter ($PM_{2.5}$)	**500.2**	0.0	0.0	**500.2**	**30**	**YES**
Total PAHs	0.0	0.0	0.0	0.0	10	No
VOC	4.3	0.0	0.0	4.3	100	No

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

If results exceed thresholds you must report. If a ChemTRAC priority substance exceeds or is equal to its ChemTRAC reporting threshold, then you would need to report that substance and the quantity released to air.

In the Table 2 example, only nitrogen oxides, $PM_{2.5}$ and VOCs are manufactured, processed, or otherwise used in quantities large enough to appear as greater than zero in the calculator. When comparing quantities to the ChemTRAC reporting thresholds, only $PM_{2.5}$ is greater than its reporting threshold. Therefore, in this example, the manufacturing of $PM_{2.5}$ and its release to air would need to be reported to the ChemTRAC program.

Reporting to ChemTRAC

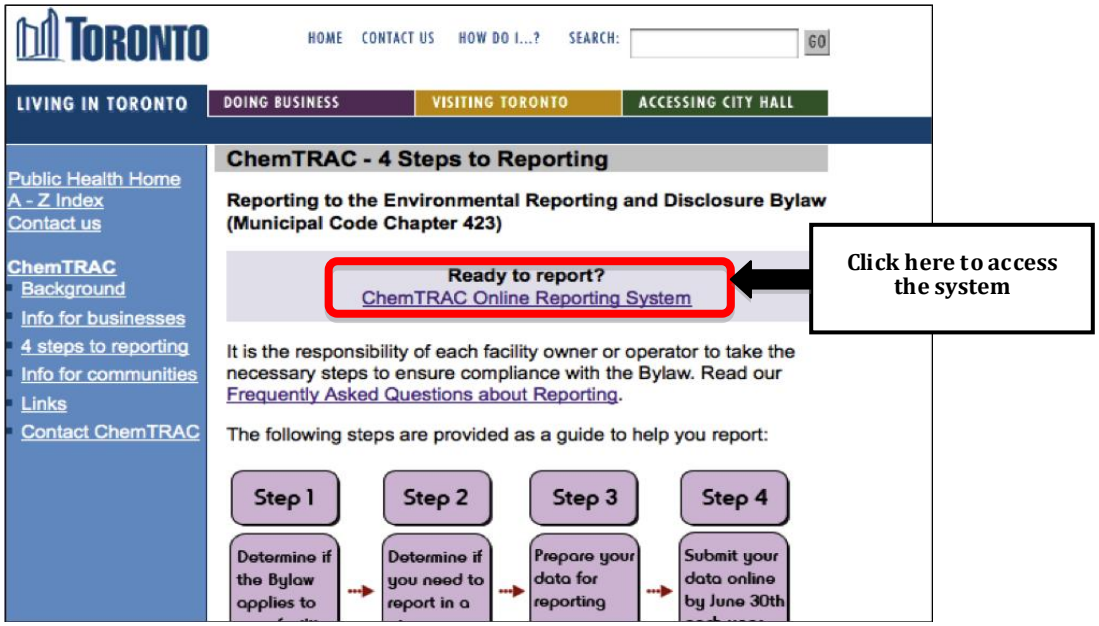
You are only required to report to ChemTRAC if you meet or exceed reporting thresholds for one or more priority substances.

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

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.

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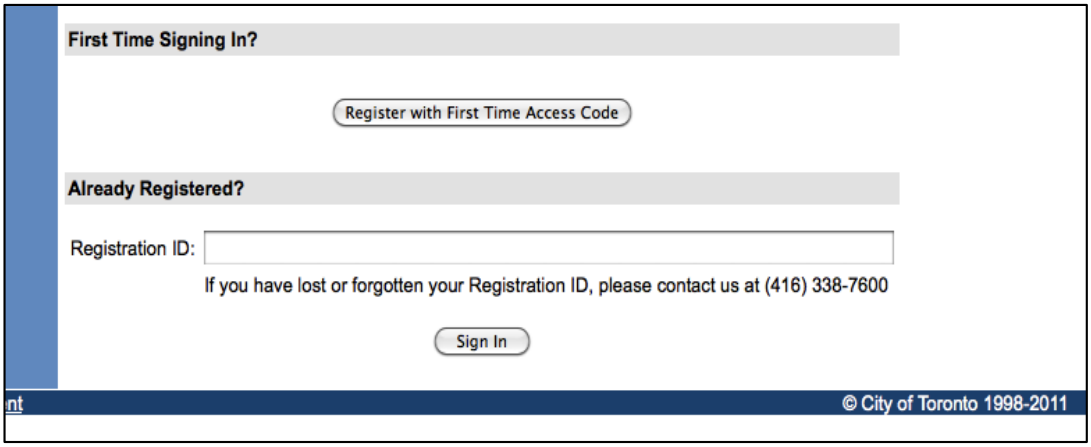
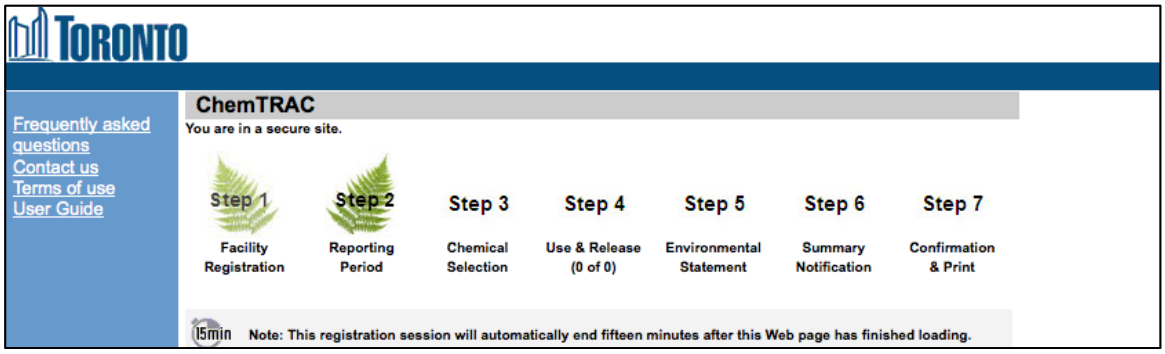


Once you have entered the online reporting system

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.



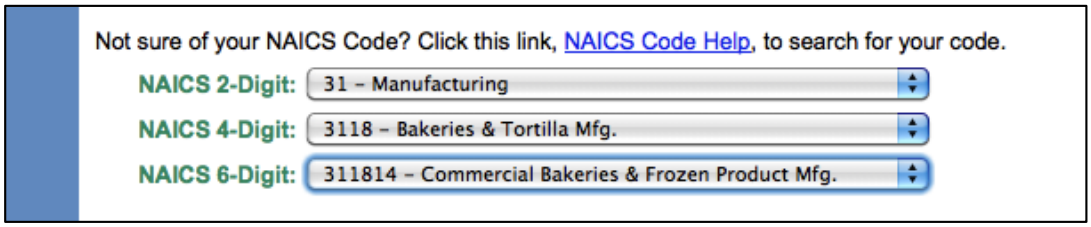
To move to the next step, you must enter all the required information on the screen and click the "Next" button at the bottom of the screen. You can use the "Back" button to change the information you provided in previous steps.

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 bakeries, this will be "31 – Manufacturing".

Then, you can select the appropriate 4-digit code (3118), and finally, the 6 digit code (311814).



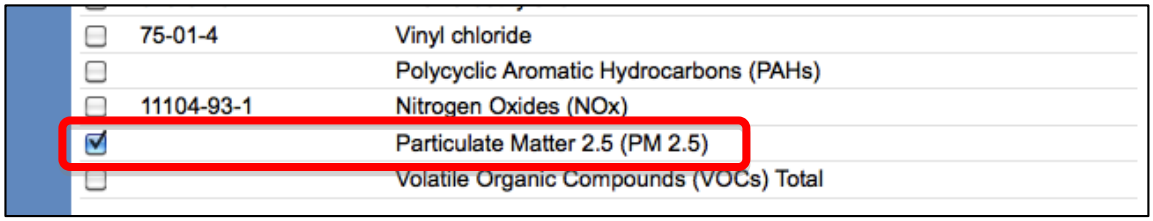
Step 2. Reporting period

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 was the only substance that exceeded thresholds.



Step 4. Use and release

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

For commercial bakeries, all substances are "manufactured" and "released to air".

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

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

Select "ChemTRAC calculator" if you have used the ChemTRAC calculator.

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

Particulate Matter 2.5 (PM 2.5)
(Reporting Threshold = 30.0 kg)

	Quantity (kg)	Estimation Method
	If you used more than one method to estimate data, please choose the main one	
Manufactured:	500	ChemTRAC calculator
Processed:		- Select Estimation Method From List -
Otherwise Used:		- Select Estimation Method From List -
Total Use:	500	
Release to Air:	500	ChemTRAC calculator
Release to Land:		- Select Estimation Method From List -
Release to Surface Water:		- Select Estimation Method From List -
Total Release:	500	

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 0. 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 bakeries 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 ovens and boilers in good operating condition. Well-maintained equipment uses less gas, saves money, and reduces NO_x emissions.

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 low NOx burners in gas-fired ovens. These burners cut the nitrogen oxide emissions of gas-fired ovens in half.

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

   For example: Switch to water-based biodegradable cleaners. Though not discussed in the guide, caustic or acidic cleaners emit VOCs.

Control technologies for reducing emissions

Control technologies can reduce, but not eliminate, the quantity of ChemTRAC substances that are released from commercial bakeries. Control technologies can be used to reduce the quantity of substances released during the mixing process, and during the baking process.

Mixing process control technologies: Dust collectors

Recall that particulate matter ($PM_{2.5}$) in the form of flour, sugar, salt, or other powdery material, is released into the air during the mixing of dry materials.

Dust collectors. A dust collector (also known as a baghouse) is a control technology that can help reduce the amount of $PM_{2.5}$ that is released during the mixing of dry materials. A dust collector takes in air with a high abundance of $PM_{2.5}$, collects much of the $PM_{2.5}$ within filter bags, and releases the air with a reduced amount of $PM_{2.5}$. No matter what amount of $PM_{2.5}$ is entering the dust collector, the dust collector can reduce $PM_{2.5}$ quantities down to about one particle per three cubic metres of air.

Baking process control technologies: Low NO_x burners, recirculated flue gas

There are two common control technologies that can help decrease the amount of combustion by-products released from natural gas used to heat baking ovens. They are known as low NO_x burners and recirculated flue gas. Both of these control technologies specifically reduce the amount of NO_x that is released as a combustion by-product.[4] These control technologies generally are not considered to reduce the amounts of other combustion by-products.

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

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

Without changing any of the other values entered in the Input-Output screen, select "low NO_x burner" as a control for gas ovens. Check the new level of nitrogen oxides in the output table. It should be half the original number.

[4] NO_x refers to total amounts of nitric oxide (NO) and nitrogen dioxide (NO_2).

Part 2: Reducing your facility's environmental impact

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

Figure 3 summarizes the common control technologies in commercial bakeries.

Figure 3. Control technologies found in commercial bakeries

Bakery step	Control technology	ChemTRAC substance being controlled	Reduction ability of the control technology
Mixing of dry ingredients (flour, sugar, salt, other)	Dust Collector	Particulate matter ($PM_{2.5}$)	Reduces the release of $PM_{2.5}$ down to about 1 grain of $PM_{2.5}$ dust per 3 cubic metres of air
Use of natural gas in the baking process	Low NO_x burners	Nitrogen oxides (NO_x)	Reduces NO_x creation by about 50%
Use of natural gas in the baking process	Recirculated flue gas with low NO_x burners	Nitrogen oxides (NO_x)	Reduces NO_x creation by about 70%

More ways to reduce costs and improve performance

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

1. **Reduce energy use**. By reducing energy use, bakeries 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 oven heat.

2. **Reduce water use.** Bakeries traditionally use over 1 gallon of water to produce 1 pound of muffins or cakes, and use 0.2 gallons of water per loaf of bread. This amounts to over 10,000 gallons of water each day for a small bakery.[5] Working to reduce water use can save money and provide environmental benefits. Bakeries can do a number of things to reduce water use.

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

   - Sweeping floors and machines instead of hosing them down with water
   - Posting signs near sinks and hoses to encourage employees to use less water
   - Purchasing high pressure, low volume cleaning equipment. High-pressure washers cost about $200 and can generate savings of over $1,000 per year[6]
   - Purchasing water sprayers with automatic shut-off nozzles.

[5] Small Business Environmental Homepage. Environmental Management Best Practices – Bakery. www.smallbiz-enviroweb.org/Industry/bmpfiles/BMP_Bakery-1.pdf

[6] North Carolina Cooperative Extension Service, Water Quality and Waste Management, Liquid Assets for Your Bakery, http://www.p2pays.org/ref/01/00029.htm

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 commercial bakeries include:

- Louisiana Department of Environmental Quality, Breweries, Wineries, Distilleries, & Bakeries. **www.deq.state.la.us/assistance/sbap/regs/brew-win-dist-bak.htm**
- North Carolina Cooperative Extension Service, Water Quality and Waste Management, Liquid Assets for Your Bakery. **www.p2pays.org/ref/01/00029.htm**
- North Carolina Cooperative Extension Service, Water Quality and Waste Management, Cut Waste To Reduce Your Wastewater Surcharges for your Bakery. **www.p2pays.org/ref/01/00459.htm**
- Oestfold Research Foundation Institute for Pollution Prevention. 1998. Manufacture of food products and beverages #29: Cleaner production in a bakery. **www.p2pays.org/ref/10/09473.htm**
- Small Business Environmental Homepage. Environmental Management Best Practices – Bakery. **www.smallbiz-enviroweb.org/Industry/bmpfiles/BMP_Bakery-1.pdf**
- Toronto Public Health, ChemTRAC. December 2010. Resource for Greening Food and Beverage Manufacturing: Pollution Prevention Information. **www.toronto.ca/health/chemtrac/pdf/GreenFoodBev.pdf**
- U.S. EPA, Area Source Category Method Abstract, **www.epa.gov/ttn/chief/eiip/techreport/volume03/bakeries.pdf**

Appendices

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

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

Appendix B. Additional material related to the ChemTRAC calculator.

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

Appendix C. Combining the ChemTRAC calculator with other sources:
How to combine the ChemTRAC calculator for Commercial Bakeries 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 – Natural gas fired equipment (ovens)

1. What control technologies are installed on your baking ovens?

My bakery ovens are equipped with (add a checkmark):	
a. Low NO_x burners only	_____
b. Low NO_x burners with recirculated flue gas	_____
c. No control technologies	_____

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

Option 2A. Total natural gas used to heat the ovens
Add values in cubic metres **OR** cubic feet: _____ m^3 (cubic metres) or _____ ft^3 (cubic feet)

OR

Option 2B. Thermal rating of the ovens
Add values in British Thermal Units per hour, **OR** in kilojoules per hour: _____ BTU/hr or _____ kJ/hr Also estimate the average time that the ovens are turned on and heating: _____ hours per day and ____ days per week and _____weeks per year

Additional Material

Worksheet 2 – Silos and hoppers with filters (for dry storage only)

3. What type and quantities of dry ingredients are stored in your bakery?

Option 3A. Storage of dry ingredients in large containers (silos, hoppers, etc.)				
Storage container identifier:	**What is the container capacity?**	**Indicate the storage capacity units**	**What type of dry material is stored in this container?**	**How often is this storage container refilled per month?**
Flour silo 1	36	☐ Lbs ☐ kilograms ☐ tons imperial x tonnes metric ☐ cubic metres	x Flour ☐ Sugar ☐ Salt ☐ Other	4 times

Option 3B. Storage of dry ingredients in smaller storage containers				
Storage container identifier:	**What is the container capacity?**	**Indicate the storage capacity units**	**What type of dry material is stored in this container?**	**How often is this container refilled or replaced per month?**
Flour bags	20 kg bags	☐ Lbs x kilograms ☐ tons imperial ☐ tonnes metric ☐ cubic metres	x Flour ☐ Sugar ☐ Salt ☐ Other	20 times

Worksheet 3 – Dust collectors (for ingredient mixing)

4. Are dust collectors in operation at your bakery, and if so, what are the details of their use?

Dust collector identifier:	Air flow rate	Indicate the airflow rate units	Number of dust collectors	For what amount of time are dust collectors operating?		
				Hours per day	Days per week	Weeks per year
Collector 1	1200	x cfm (cubic feet per minute) OR ☐ m^3/s (cubic metres per second)	1	12	6	50
Etc.						

Worksheet 4 – Baking with yeast

5. How much yeast is used in your bakery over the course of the year?

You can calculate the amount of yeast used as a percentage of the total quantity of all ingredients as follows:

_____ weight yeast ÷ _____weight dough × 100 =_____% yeast in the product

Product	Amount produced in one year	Indicate the units of the amount of product produced in one year	Initial yeast added (%)	Action time in hours	Final spike yeast added (%)	Spike time in hours
Rye bread	10000	x Lbs ☐ kilograms ☐ tons (imperial) ☐ tonnes (metric)	1.5%	1	2%	1.5
			%		%	
			%		%	
			%		%	
			%		%	
			%		%	
Etc.						

Appendix B. Additional material related to the ChemTRAC calculator

This appendix describes the remaining four screens of the ChemTRAC calculator. You do not need to enter any information into these screens. However, if site-specific emission factors and dry ingredient densities are known, they can be entered manually in the Calculations screen.

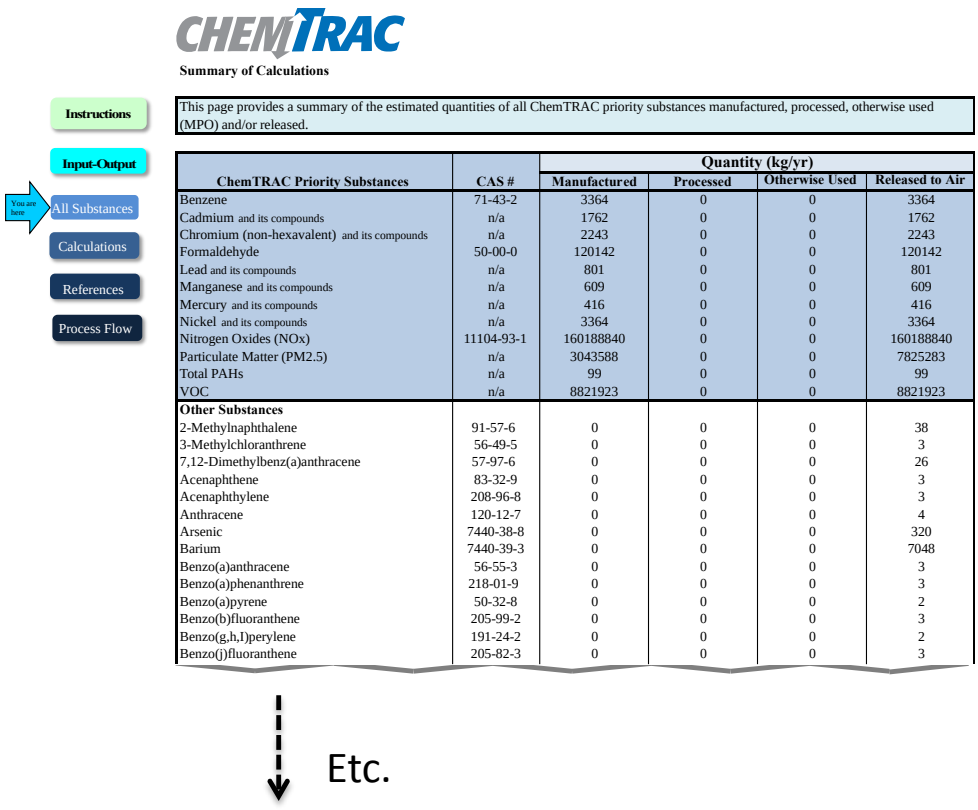
This appendix also describes emission factors and how the ChemTRAC calculator makes use of them.

The ChemTRAC calculator All Substances screen

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

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

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



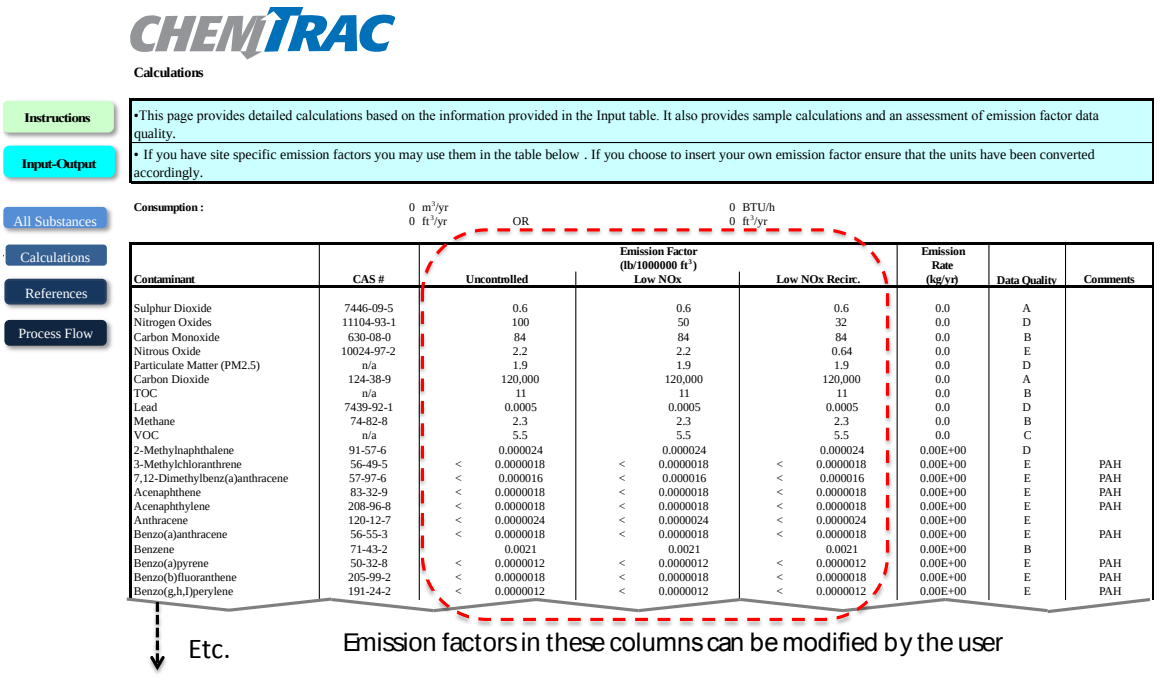
Additional Material

The ChemTRAC calculator Calculations screen

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

While you do not need to enter any information on this screen, some variables can be modified if site-specific information is available. Only emission factors and dry ingredient densities can 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.

You can modify the emission factors for any of the substances listed in the Contaminant table on the Calculation screen, and for any of uncontrolled, low NO_x and low NO_x with recirculated flue gas scenarios. If emission factors are modified, be sure that they are entered in pounds per million cubic feet (lbs/1,000,000 ft^3). Modifying emission factors in this table can modify the calculation of substances released from dry ingredient storage/mixing, proofing and baking steps.



Dry ingredient densities can be modified for flour, sugar, salt and other dry ingredients. If densities are modified, be sure that they are entered in kilograms per cubic metre (kg/m^3). Modifying densities will alter the quantity of $PM_{2.5}$ released from the storage of dry ingredients only.

Additional Material

Sample Calculations:

Uncontrolled NOx Emission Rate = Consumption (ft^3/yr) X Emission Factor ($lb/10^6 ft^3$) X 0.4536 kg/lb
= 0 ft^3/yr X 100 $lb/10^6 ft^3$ X 0.4536 kg/lb
NOx Emission Rate = 0.0 kg/yr

Material	Density (kg/m^3)
Flour	770
Sugar	700
Salt	1280
Other	917*

* if you have a density for other products stored in silos, you may enter it here

Densities in these columns can be modified by the user

Silo ID	Capacity	Units	Units Code	Contents	Contents Code	Fills/month	Density (kg/m^3)	Capacity (kg)	Capacity (m^3)	Fill Rate (m^3/yr)	Emission Factor (mg/m^3)	Emission Rate (kg/yr)
0	0	Select units	1	Select contents	1	0	0	0			20	
0	0	Select units	1	Select contents	1	0	0	0			20	
0	0	Select units	1	Select contents	1	0	0	0			20	
0	0	Select units	1	Select contents	1	0	0	0			20	
0	0	Select units	1	Select contents	1	0	0	0			20	
Total												0.00E+00

Sample Calculations:
For a silo with 36000 kg of flour , filled 4 times a month:
PM2.5 Emission Rate = Capacity (kg) / Density (kg/m^3) X Fills/month X 12 months/year X Emission Factor (mg/m^3) X 1 kg/1000000 mg
= 36000 kg / 770 kg/m^3 X 4 fills/month X 12 months X 20 mg/m^3 X 1 kg / 1000000 mg
= 0.04 kg/yr

Dust Collector ID	Air flow rate	Units	Units Code	Operating Schedule			Emission Factor (mg/m^3)	Emission Rate (kg/yr)
				h/day	days/ week	weeks/year		
0	0	Select uni	1	0	0	0	20	0.00
0	0	Select uni	1	0	0	0	20	0.00
0	0	Select uni	1	0	0	0	20	0.00
0	0	Select uni	1	0	0	0	20	0.00
0	0	Select uni	1	0	0	0	20	0.00
Total								0.00

All other data and tables should not be modified

Sample Calculations:
PM2.5 Emission Rate = Air flow rate (m^3/s) X 3600 s/h X Operating Schedule (h/d X d/w X w/y) X Emission Factor (mg/m^3) / 1000000 mg/kg
= 0 cfm / 2118.88 cfm/m3/s 0 h/d 0 d/w X 0 w/y X 20 mg/m^3 / 1000000 mg/kg
= 0.00 kg/yr

The ChemTRAC calculator Reference screen

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

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

CHEMTRAC

References

Instructions

Input-Output

All Substances

Calculations

You are here → References

Process Flow

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

Emission factors and an assessment of their data quality are provided in the US EP A AP-42 "Natural Gas Combustion", Section 1.4, 1998
http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf
"Bread Baking", Section 9.9.6, 1997
http://www.epa.gov/ttn/chief/ap42/ch09/final/c9s09-6.pdf
and the National Pollutant Inventory "Emission Estimation Techniques Manual for Bread Manufacturing", Version 1.1, June 2003
http://www.npi.gov.au/publications/emission-estimation-technique/pubs/bakery.pdf
Bulk Density of dry materials estimated using Powder and Bulk - Bulk Density Chart
http://www.powderandbulk.com/resources/bulk_density/material_bulk_density_chart_a.htm
Dust collector emission factors are provided in the Ontario Ministry of the Environment publication "Procedure for Preparing and ESDM Report" PIBS #3614e03, March 2009
http://www.ene.gov.on.ca/envision/gp/3614e03.pdf

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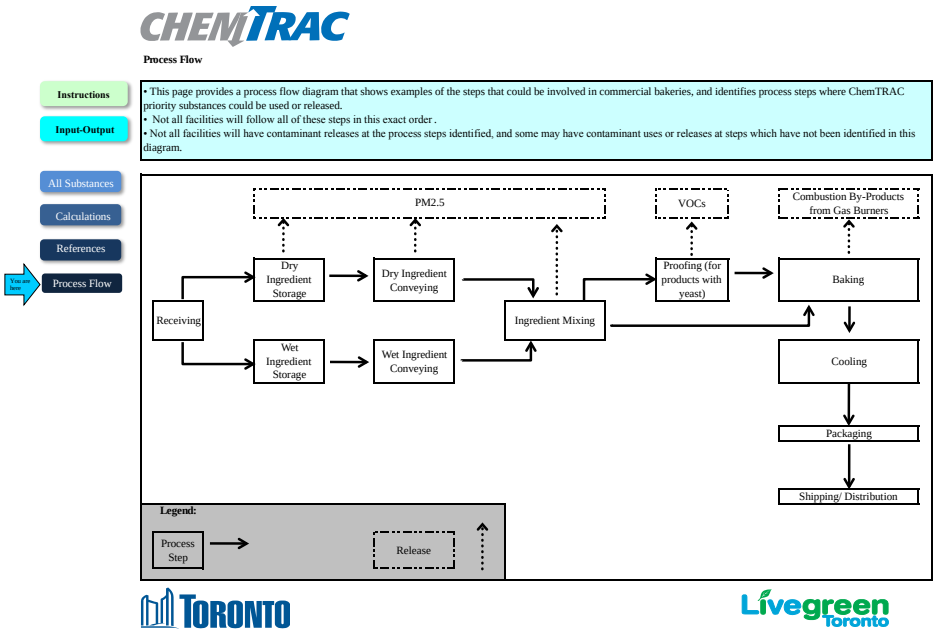
Additional Material

The ChemTRAC calculator Process Flow screen

The Process Flow screen provides a diagram that shows examples of the steps that could be involved in commercial bakeries, and identifies process steps where ChemTRAC priority substances could be used or released. This diagram is the same as Figure 1 in this guide. Not all facilities will follow all of these steps in this exact order. Also, not all facilities will have substance releases at the process steps identified, and some may have substance uses or releases at steps that have not been identified in the diagram. You do not need to enter any information on this screen.



Additional Material

Emission factors for commercial bakeries

The ChemTRAC calculators are all 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. nitrogen oxides) emitted by a specific activity (e.g. burning one cubic metre of natural gas).

The ChemTRAC calculator uses the emission factors listed in Table 3 to estimate emissions of particulate matter, volatile organic compounds, and nitrogen oxides from commercial bakeries. If site-specific emission factors are available for the facility or processes, they can be entered in the Calculations sheet of the calculator. This is detailed in the discussion of the calculator's Calculations screen.

Table 3. Emission factors for $PM_{2.5}$, VOCs and nitrogen oxides

Source	Substance	Emission Factor
Silos	Particulate matter ($PM_{2.5}$)	20 mg/m^3
Dust collectors	Particulate matter ($PM_{2.5}$)	20 mg/m^3
Baking with yeast	VOCs	Depends on yeast concentration
Natural gas fired ovens – no control	Nitrogen oxides	160.18 kg / 100,000 m^3
Natural gas fired ovens – low NOx burner	Nitrogen oxides	80.09 kg / 100,000 m^3
Natural gas fired ovens – low NOx burner & recirc. flue gas	Nitrogen oxides	51.26 kg / 100,000 m^3

Example: Using emission factors to estimate NO_x emissions from ovens

Table 3 shows that 160.18 kg of NO_x is emitted for every 100,000 m^3 of natural gas burned in ovens without any control technologies.

Assume the facility used 1,000,000 m^3 of natural gas in 2011.

Total emissions of NO_x for 2011 from natural gas-fired ovens

= Emissions per unit of natural gas * Volume of natural gas used in 2011

= 160.18 kg / 100,000 m^3 * 1,000,000 m^3

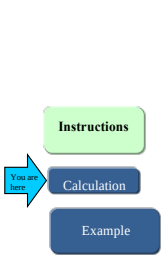
= 1601.80 kg of NO_x

Appendix C. Combining the Commercial Bakery calculator with other sources

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

The total combined release of substances (whether from the ChemTRAC Poultry processing 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 4 on the last page of the guide.

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



CHEMTRAC

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

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

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

Etc…

Additional Material

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[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:

a. N/A = not applicable
b. The concentration threshold % w/w is not relevant to the emissions quantified using the ChemTRAC calculator for Poultry processing

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*.