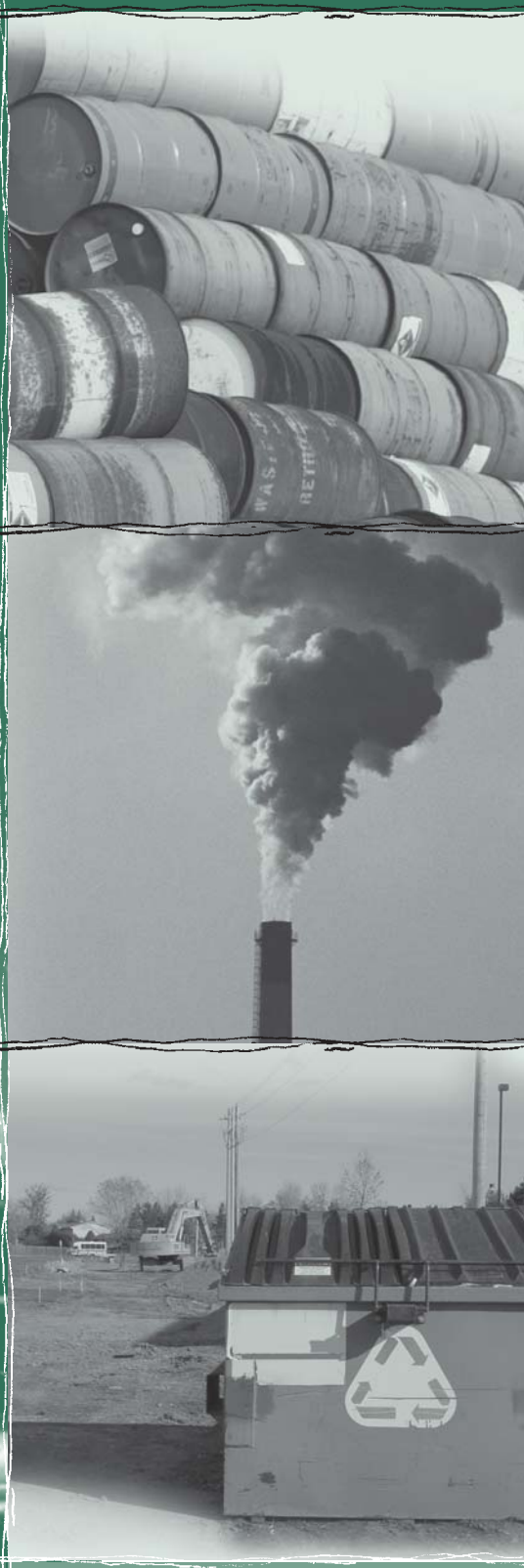
Environment Canada Environnement Canada

# 2003 Guide for Reporting to the National Pollutant Release Inventory

*Canadian Environmental Protection Act, 1999*



www.ec.gc.ca/npri

Canada

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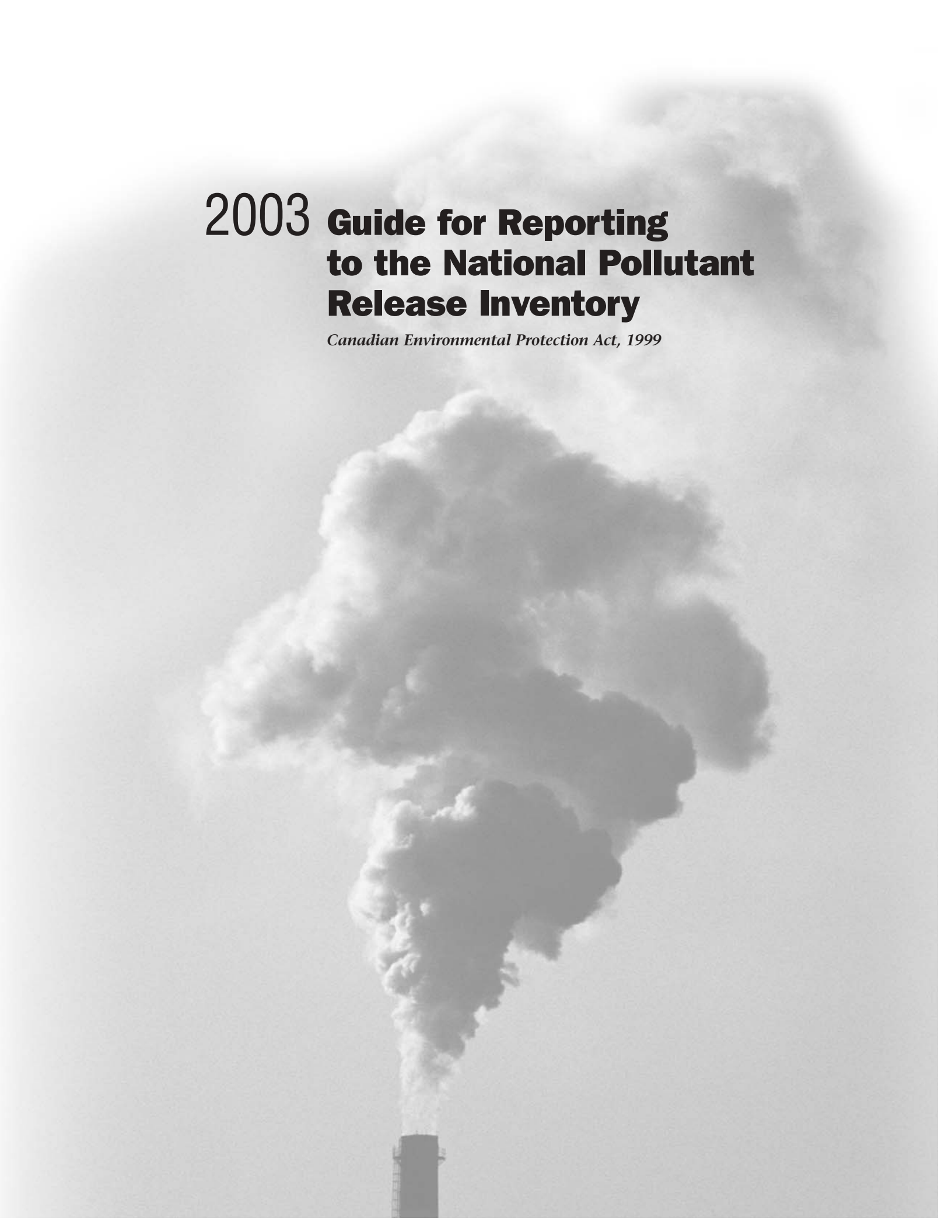

## Acknowledgments

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### National Library of Canada Cataloguing in Publication

National Pollutant Release Inventory (Canada)
Guide for Reporting to the National Pollutant Release Inventory 2003

Issued also in French under title: *Guide de déclaration à l'inventaire national des rejets de polluants 2003*.
ISBN 0-662-36153-9
Cat. no. En40-495/2003E

1. National Pollutant Release Inventory (Canada)
2. Pollutants – Canada.
3. Environmental monitoring – Canada.
I. Canada. Environment Canada.

TD193.N22 2004 363.738'0971

### Disclaimer

Should any inconsistencies be found between this Guide and the official *Canada Gazette* notice and its amendment, the notice published on January 4, 2003 and the amendment published on January 17, 2004, in the *Canada Gazette*, Part I, will prevail.



# Preface


The National Pollutant Release Inventory (NPRI) is at the centre of the Government of Canada's efforts to track toxic substances. It is the only nation-wide, publicly-accessible program of its type in Canada that provides information on pollutant releases to the environment, disposals and transfers for recycling. Since its inception in 1992, the role of the NPRI has expanded to include the collection of information on pollution-prevention activities.

All non-confidential information collected through the NPRI is available to the public on Environment Canada's Web site at www.ec.gc.ca/npri in the form of downloadable databases, reports and analyses, and through a query site which allows the user to view information submitted by an individual facility. Environment Canada will release the **unverified** data shortly after the reporting deadlines; reporters are encouraged to frequently check the Web site to review the data.

For the 2003 reporting year, there were 323 substances listed in the NPRI. There were 231 substances listed with the original NPRI reporting criteria (10-tonne, manufacture, process and other use reporting threshold with 1% concentration exemption, except for by-products). Ninety-two substances were listed with alternate reporting criteria – mercury, cadmium, arsenic, lead and their compounds, hexavalent chromium compounds, tetraethyl lead, 17 individual polycyclic aromatic hydrocarbons (PAHs), dioxins and furans, hexachlorobenzene (HCB), seven criteria air contaminants (CACs), and 60 selected volatile organic compound (VOC) species with additional reporting criteria (VOC speciation).

This Guide, together with its companion documents – *NPRI Software Guide*, *NPRI Toolbox*, *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector 2003*, and *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory* – enables facility owners or operators to review the NPRI reporting criteria and determine if they are required to report to the NPRI for the 2003 reporting year. These documents also explain how to complete the reporting form and submit a report to Environment Canada.

Since 2001, Environment Canada has worked with the Ontario Ministry of the Environment (ON MOE) to provide one-window reporting for facilities subject to the NPRI *Canada Gazette* notice and Ontario's O.Reg.127/01. A separate guidance document, *Guide for Reporting under O.Reg.127/01 Using the NPRI Software – 2003*, is available on the NPRI reporting software CD to explain the reporting requirements and the reporting form for those facilities in Ontario required to report under O.Reg.127/01. In addition to Environment Canada's collaboration with the ON MOE and in keeping with the spirit of one-window reporting, the NPRI reporting software also enables reporting to Alberta Environment (AENV) to support its *Environmental Protection and Enhancement Act* (EPEA) approvals. Reporting under other Environment Canada programs is also available, including Environmental Performance Agreements (EPAs). More details on these programs are provided in the *NPRI Software Guide*.

Cette publication est aussi disponible en français sous le titre de « Guide de déclaration à l'Inventaire national des rejets de polluants – 2003 ».

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# 1. Highlights and Important Changes for 2003



## 1.1 Report Due Dates

| *Canada Gazette* Notice | Reporting Year | Reporting Deadline |
|---|---|---|
| January 4, 2003 | 2003 calendar year | June 1, 2004 |

An amendment to the *Canada Gazette* notice for the 2003 NPRI was published on January 17, 2004, to revise or clarify certain provisions for 2003.

## 1.2 Correspondence

Correspondence from Environment Canada will be addressed to the company coordinator. If there is no coordinator identified, correspondence will be sent to the technical contact. Failure to provide correct telephone and facsimile numbers for the contacts could delay receipt of important notices from NPRI offices. For more information on facility contacts refer to the *NPRI Software Guide*.

## 1.3 Process for Reporting to the NPRI

This Guide will assist you in determining if you are required to report and, if so, what you are required to report to the NPRI for 2003. Refer to the *NPRI Toolbox* for guidance on estimating releases, disposals and transfers for recycling. Once you have collected the information required for the NPRI report, refer to the *NPRI Software Guide* for assistance on how to enter your information and submit your report. The reporting process is outlined in Figure 1.

## 1.4 Changes for 2003

The following changes were made to the NPRI for the 2003 reporting year:

### New Substances

- carbonyl sulphide added with 10-tonne and 1% concentration reporting threshold (see 3.4 Reporting Criteria for Part 1A Substances)
- phosphorus (total) added with 10-tonne and 1% concentration reporting threshold (see 3.4 Reporting Criteria for Part 1A Substances). Phosphorus (total) does not include "phosphorus (yellow or white)"; it is listed separately.
- 60 selected volatile organic compound species with additional reporting criteria (VOC speciation) added with 1-tonne reporting threshold (see 3.9 Reporting Criteria for Part 5 Substances). Note that reporting of these substances is only required if the 10-tonne air release threshold for VOC (Part 4) has been met.

### Changes to Substance List

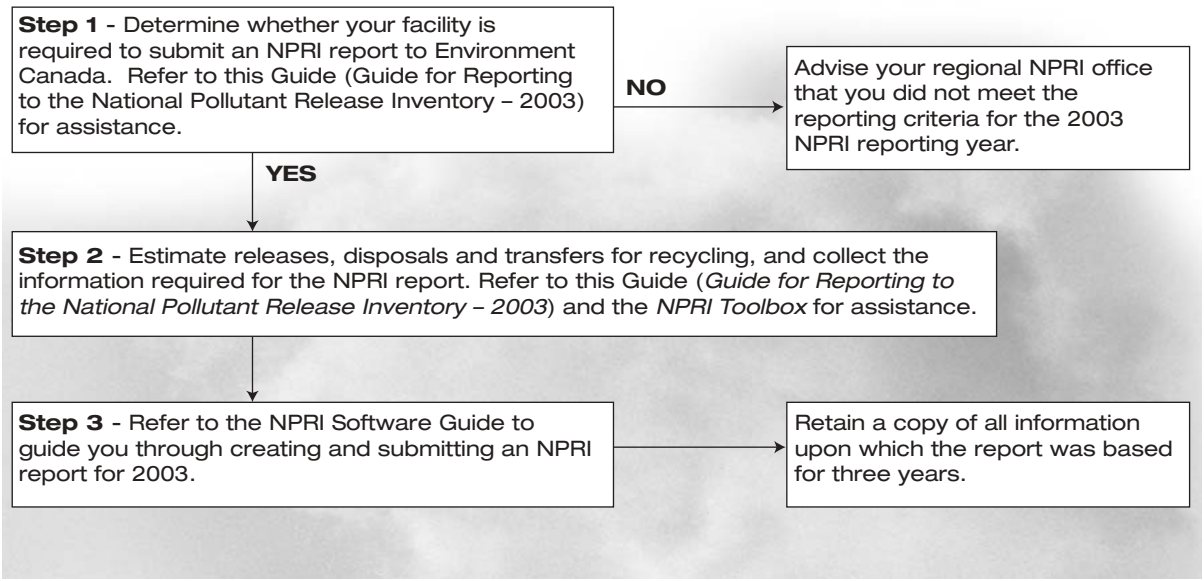
- 13 separately-listed nonylphenols and ethyoxylates replaced with "Nonylphenol and its ethoxylates" (see 3.4 Reporting Criteria for Part 1A Substances)
- 4-*tert*-octylphenol replaced with "Octylphenol and its ethoxylates" (see 3.4 Reporting Criteria for Part 1A Substances)

### Exemption Removal

- exemption for emissions from activities related to the operation of oil and gas wells has been removed
- exemption for emissions from oil and gas facilities with less than 20 000 employee hours has been removed

HIGHLIGHTS

**FIGURE 1 PROCESS FOR REPORTING TO THE NPRI FOR 2003**




#### Basis of Estimate

- Monitoring or Direct Measurements replaced with Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) and Source Testing
- Emission Factors replaced with Site-specific Emission Factor and Published Emission Factor

#### Facility Information

- Business Number (9 digit registration number) is now required. Business Numbers (BNs) can be found on all forms issued to a business by the Canada Customs and Revenue Agency. The first nine digits are the registration number and must be reported to the NPRI. This registration number remains the same no matter how many or what types of accounts a business may have. BNs are issued to Canadian businesses that register for one or more of the following accounts – Corporate Income Tax, Importer/Exporter account number, Payroll (source) deductions (Trust accounts) and Good and Services Tax.
- Definition of facility now includes "offshore installations" (see 3.2 Facility Criteria)

## 1.5 Reporting to Other Inventory Programs

#### Reporting under Environmental Performance Agreements

In June 2001, Environment Canada published the *Policy Framework for Environmental Performance Agreements*. Environmental Performance Agreements (EPAs) are non-legislative agreements, which meet core design criteria, and have been negotiated among parties to achieve specific environmental results. EPAs are voluntary initiatives that stem from Environment Canada's experience with Memoranda of Understanding. To ensure a one-window approach for reporting information to Environment Canada, EPA reporting requirements have been integrated into the NPRI reporting software. For more information on EPAs, visit the Environment Canada's Web site at www.ec.gc.ca/epa-epe.


### Reporting to the Ontario Ministry of the Environment

In May 2001, the Ontario Ministry of the Environment (ON MOE) issued the *Airborne Contaminant Discharge Monitoring and Reporting Regulation* (O.Reg.127/01) under the authority of the *Ontario Environmental Protection Act*. In response to requests from industry for a one-window approach to reporting to inventories, Environment Canada worked with the ON MOE to include the reporting form for O.Reg.127/01 within the NPRI reporting form. Refer to the *Guide for Reporting under O.Reg.127/01 Using the NPRI Software – 2003* for instructions on how to complete the reporting form for O.Reg.127/01. Reference material for reporting to the ON MOE is also provided on the 2003 NPRI reporting software CD.

### Reporting to Alberta Environment

In 2002, the NPRI started collecting emission information for Criteria Air Contaminants on behalf of Alberta Environment (AENV) to support its *Environmental Protection and Enhancement Act* (EPEA) approvals. A separate guidance document for reporting under the EPEA is available.

### Reporting to the National Emissions Reduction Masterplan

The National Emissions Reduction Masterplan (NERM) is an emissions reporting and reduction initiative of the Canadian Chemical Producers' Association (CCPA). The 2003 NPRI reporting software will continue to collect emission information on behalf of NERM. For more information, refer to the *NPRI Software Guide*.


# 2. Reporting to the National Pollutant Release Inventory for 2003

## 2.1 Introduction

This Guide provides a general overview of the reporting requirements for all NPRI substances. It will help you to determine whether you are required to report and, if so, what you have to report. The *NPRI Toolbox* will assist you with your calculations. Finally, the *NPRI Software Guide* will guide you through preparing and submitting an NPRI report for the 2003 reporting year.

Facilities that met wastewater reporting criteria, or that fell within the wood preservation sector, are advised to consult the following companion documents – *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector 2003 and Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory*.

**This Guide should be consulted first by owners and operators of facilities to determine if they must report for any NPRI substances. Supplementary guides, if applicable, can be consulted following a facility's determination that it must report to Environment Canada for the 2003 NPRI reporting year.**

## 2.2 The Legal Basis for the NPRI – Understanding the *Canada Gazette* Notice

The legal basis for the 2003 NPRI is the "Notice with Respect to Substances in the National Pollutant Release Inventory for 2003" published in the *Canada Gazette*, Part I, on January 4, 2003, and amended on January 17, 2004. The notice was published under the authority of subsection 46(1) of the *Canadian Environmental Protection Act, 1999* (CEPA 1999). This notice specifies that any person who owned or operated a facility during the 2003 calendar year, under the conditions prescribed in the notice, must provide certain information to the Minister of the Environment by no later than **June 1, 2004**.

The *Canada Gazette* notice for the 2003 NPRI encompasses a wide range of substances, reporting criteria and requirements. It is divided into four schedules with several parts in each, as outlined in Table 1 and 2. The contents of the notice and its amendment are explained in this Guide. If you have any difficulties interpreting the requirements of the NPRI notice, contact your regional NPRI office listed inside the front cover of this Guide.


**TABLE 1 OVERVIEW OF THE *CANADA GAZETTE* NOTICE FOR THE 2003 NPRI**

**Schedule 1 – National Pollutant Release Inventory Substances**

Schedule 1 lists all substances in the NPRI, and is broken into five parts according to the reporting criteria for the substances:

- Part 1 lists the 237 substances with a manufacture, process or other use threshold and is divided into four groups according to the threshold quantity
- Part 2 lists 17 individual PAHs
- Part 3 lists dioxins/furans and HCB
- Part 4 lists seven CACs
- Part 5 lists 60 selected volatile organic compounds (VOCs) with additional reporting requirements (speciated VOCs)

**Schedule 2 – Criteria for Reporting**

General – reporting deadline, activities to which the 20 000-hour employee threshold does not apply, exclusions and exemptions

- Part 1 – reporting criteria for substances listed in Schedule 1, Part 1
- Part 2 – reporting criteria for the 17 PAHs listed in Schedule 1, Part 2
- Part 3 – reporting criteria for dioxins/furans and HCB listed in Schedule 1, Part 3
- Part 4 – reporting criteria for CACs listed in Schedule 1, Part 4
- Part 5 – reporting criteria for speciated VOCs listed in Schedule 1, Part 5

**Schedule 3 – Types of Information Subject to Notice and Manner of Reporting**

Schedule 3 outlines the information that must be submitted by facilities which met the reporting criteria defined in Schedule 2:

- Part 1 – facility information to be reported
- Part 2 – substance information to be reported for substances listed in Schedule 1, Parts 1 through 3
- Part 3 – substance information to be reported for CACs listed in Schedule 1, Part 4
- Part 4 – substance information to be reported for speciated VOCs listed in Schedule 1, Part 5

**Schedule 4 – Definitions**

Schedule 4 provides definitions of several terms used in the notice.

**For the purpose of simplifying this reporting Guide:**

- **Schedule 1, Part 1, Group 1 substances will be hereafter collectively referred to as Part 1A substances**
- **Schedule 1, Part 1, Groups 2-4 substances as Part 1B substances**
- **Schedule 1, Part 2 substances as Part 2 substances**
- **Schedule 1, Part 3 substances as Part 3 substances**
- **Schedule 1, Part 4 substances as Part 4 substances, and**
- **Schedule 1, Part 5 substances as Part 5 substances**


**TABLE 2 OVERVIEW OF SUBSTANCES AND THRESHOLDS FOR REPORTING TO THE 2003 NPRI**

| Part No. | Substance | Mass Threshold | Concentration Threshold | Units for Reporting |
|---|---|---|---|---|
| **Threshold based on quantity manufactured, processed, otherwise used** | | | | |
| 1A | 231 core substances | 10 tonnes | 1% | tonnes |
| 1B | Mercury [1] | 5 kg | n/a | kg |
| | Cadmium [1] | 5 kg | 0.1% | kg |
| | Arsenic [1], hexavalent chromium compounds, lead [2], tetraethyl lead | 50 kg | 0.1% | kg |
| **Polycyclic aromatic hydrocarbons (PAHs) – Threshold based on special criteria** | | | | |
| 2 | 17 individual PAHs | incidental manufacture and release, disposal or transfer for recycling of 50 kg total, or any quantity for wood preservation using creosote | n/a | kg |
| **Dioxins/furans and Hexachlorobenzene (HCB) – No threshold. Obligatory reporting for facilities used for or engaged in specific activities** | | | | |
| 3 | Dioxins/furans and HCB | activity-based | n/a | g TEQ [3], g |
| **Criteria Air Contaminants (CACs) – Threshold based on quantity released to air** | | | | |
| 4 | carbon monoxide, oxides of nitrogen, sulphur dioxide, total particulate matter | 20 tonnes | n/a | tonnes |
| | volatile organic compounds | 10 tonnes | n/a | tonnes |
| | $PM_{10}$ | 0.5 tonnes | n/a | tonnes |
| | $PM_{2.5}$ | 0.3 tonnes | n/a | tonnes |
| **Speciated Volatile Organic Compounds (VOCs) – Additional reporting requirements** | | | | |
| 5 | 60 volatile organic compounds including individual substances, isomer groups and other groups and mixtures | 1 tonne if 10-tonne air release threshold for total VOCs has been met | n/a | tonnes |

n/a - not applicable

[1] and its compounds

[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

[3] see 4.8.1 What Are Toxic Equivalents (TEQs) of Dioxins/Furans for an explanation of these units

# 3. Step 1 – Determine whether a report is required for your facility


The first step is to determine whether your facility is required to report to the NPRI for any of the listed substances. This section outlines the reporting criteria for all substances listed in the NPRI for 2003. If you are required to report, refer to Section 4 for details on where to find guidance and information on how to estimate releases, disposals and transfers for recycling of the substances listed in the NPRI.

## 3.1 Overview of Reporting Criteria

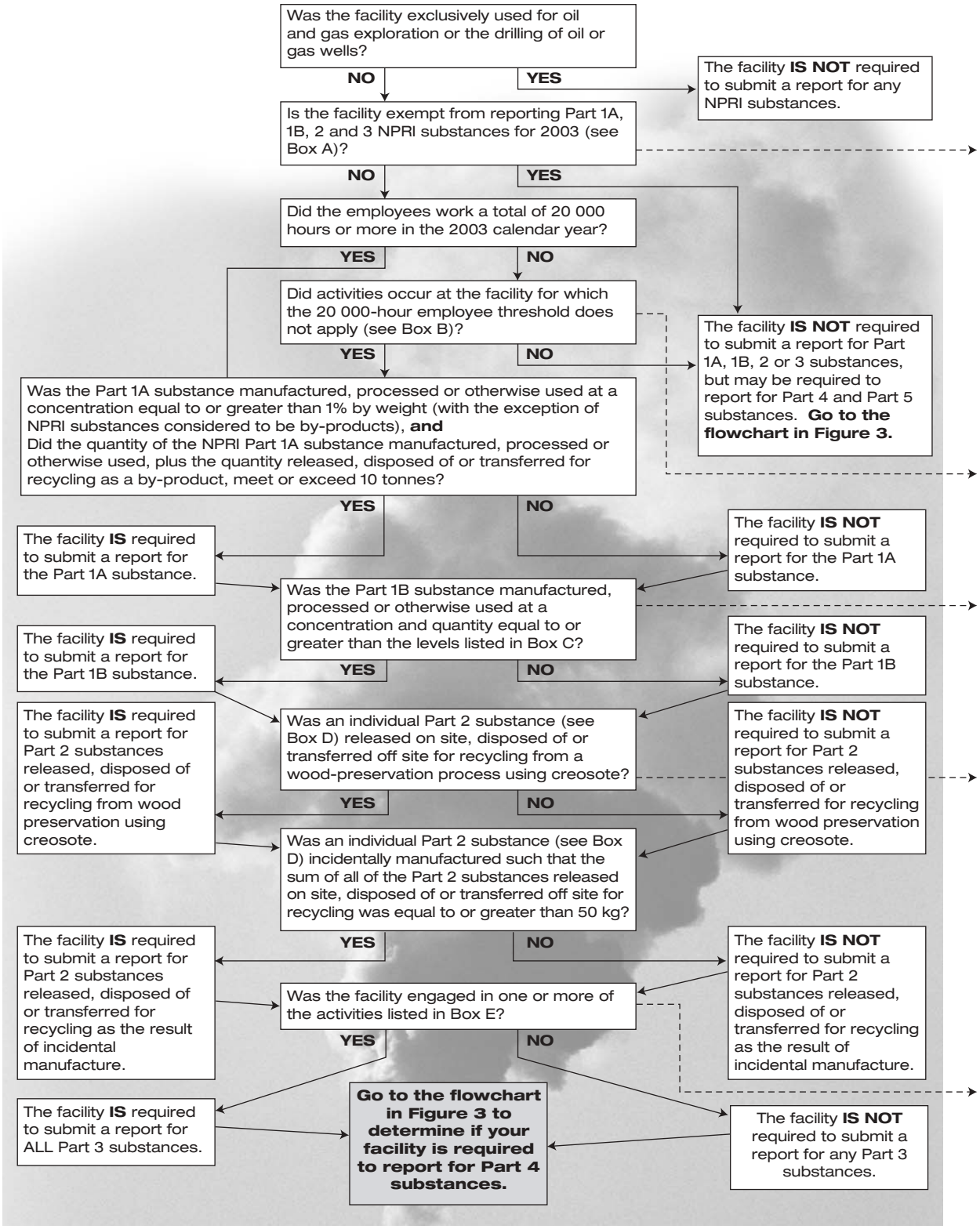
The substances listed in the 2003 NPRI are divided into five groups, according to their differing sets of reporting criteria. The complete list of NPRI substances is provided in Appendix 1, and is shown subdivided into these five parts.

**It is the facility's obligation to review the NPRI reporting criteria and requirements annually as they are subject to change.**

Figure 2 provides an overview of the reporting criteria for the 2003 NPRI. Detailed explanations of the reporting criteria and requirements for each group of substances follow the figure.

STEP 1

**FIGURE 2 CRITERIA FOR REPORTING TO THE NPRI FOR 2003**



## FIGURE 2 CRITERIA FOR REPORTING TO THE NPRI FOR 2003 (CONTD.)

**BOX A**

**A facility is exempt from reporting a substance listed in Parts 1A through 3 if the only source or use of that NPRI substance at the facility is from one or more of the activities listed below:**

- educating or training students, such as at universities, colleges and schools
- research or testing
- maintaining and repairing transportation vehicles, such as automobiles, trucks, locomotives, ships or aircraft, except painting and stripping of vehicles and their components, or the rebuilding or remanufacturing of vehicle components
- distribution, storage or retail sale of fuels, **except** as part of the terminal operations
- wholesale or retail sale of articles or products, if the substance is not released to the environment during normal use at the facility
- retail sale of the substance
- growing, harvesting or managing renewable natural resources, such as fisheries, forestry or agriculture, **but not** the processing or other use of renewable natural resources
- mining, but not the further processing or other use of mined materials
- the practice of dentistry.

**BOX B**

**Was the facility used for any of the following activities to which the 20 000-hour employee threshold does not apply?**

- non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners
- biomedical or hospital waste incineration of 26 tonnes or more of waste per year
- hazardous waste incineration
- sewage sludge incineration
- wood preservation
- terminal operations
- discharge of treated or untreated wastewater from a wastewater collection system with an annual average discharge of 10 000 $m^3$/day or more, into surface waters.

**BOX C**

**Part 1B substances - specific metals and their compounds, and organometals at reduced thresholds:**

| Substance | Mass Threshold | Concentration Threshold |
|---|---|---|
| • Mercury (and its compounds) | 5 kg | n/a |
| • Cadmium (and its compounds) | 5 kg | 0.1% |
| • Arsenic (and its compounds) | 50 kg | 0.1% |
| • Hexavalent chromium compounds | 50 kg | 0.1% |
| • Lead (and its compounds) | 50 kg | 0.1% |
| • Tetraethyl lead (CAS No. 78-00-2) | 50 kg | 0.1% |

**BOX D**

**Part 2 substances - 17 individual PAHs:**

| | | | |
|---|---|---|---|
| • Benzo(a)anthracene | (CAS No. 56-55-3) | • Dibenzo(a,h)anthracene | (53-70-3) |
| • Benzo(a)phenanthrene | (218-01-9) | • Dibenzo(a,i)pyrene | (189-55-9) |
| • Benzo(a)pyrene | (50-32-8) | • 7H-Dibenzo(c,g)carbazole | (194-59-2) |
| • Benzo(b)fluoranthene | (205-99-2) | • Fluoranthene | (206-44-0) |
| • Benzo(e)pyrene | (192-97-2) | • Indeno(1,2,3-c,d)pyrene | (193-39-5) |
| • Benzo(g,h,i)perylene | (191-24-2) | • Perylene | (198-55-0) |
| • Benzo(j)fluoranthene | (205-82-3) | • Phenanthrene | (85-01-8) |
| • Benzo(k)fluoranthene | (207-08-9) | • Pyrene | (129-00-0) |
| • Dibenz(a,j)acridine | (224-42-0) | | |

**BOX E**

**Was the facility engaged in one or more of the following activities?**

- non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners
- biomedical or hospital waste incineration of 26 tonnes or more of waste per year
- hazardous waste incineration
- sewage sludge incineration
- base metals smelting (copper, lead, nickel and zinc)
- smelting of secondary aluminum
- smelting of secondary lead
- manufacturing of iron using a sintering process
- operation of electric arc furnaces in steel foundries
- operation of electric arc furnaces in steel manufacturing
- production of magnesium
- manufacturing of portland cement
- production of chlorinated organic solvents or chlorinated monomers
- combustion of fossil fuel in a boiler unit with a nameplate capacity of 25 megawatts or greater of electricity, for the purpose of producing steam for the production of electricity
- combustion of hog fuel originating from logs that were transported or stored in salt water in the pulp and paper sector
- combustion of fuel in kraft liquor boilers used in the pulp and paper sector
- wood preservation using pentachlorophenol.

STEP 1

**FIGURE 3 CRITERIA FOR REPORTING PART 4 SUBSTANCES (CACS) TO THE NPRI FOR 2003**

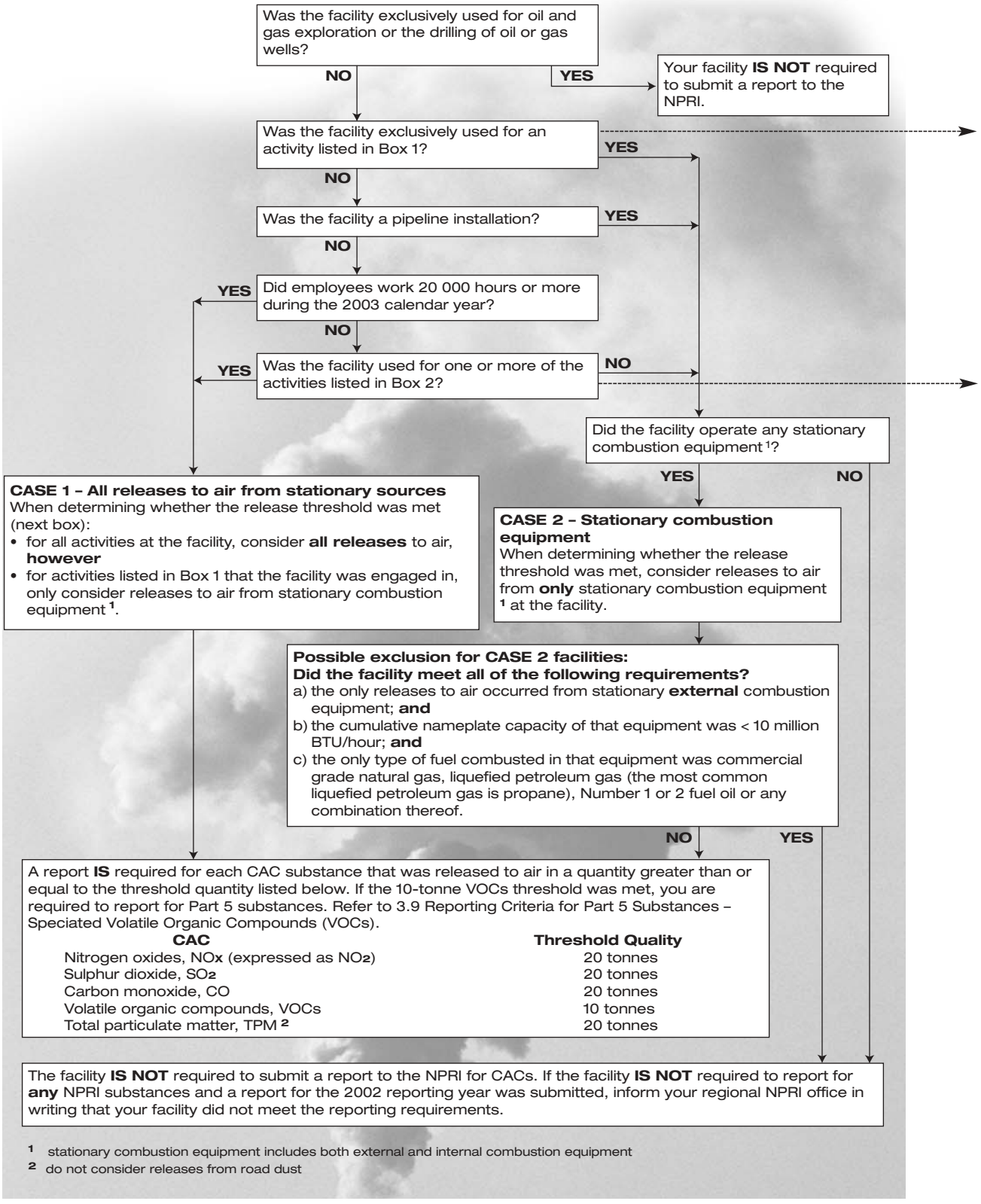



**FIGURE 3 CRITERIA FOR REPORTING PART 4 SUBSTANCES (CACS) TO THE NPRI FOR 2003 (CONTD.)**

**Box 1**
**Activities where only CAC emissions from stationary combustion equipment are considered:**

- education or training of students, such as at universities, colleges and schools
- research or testing
- maintaining and repairing of transportation vehicles, such as automobiles, trucks, locomotives, ships or aircraft, **except** painting and stripping of vehicles or their components, or the rebuilding or remanufacturing of vehicle components
- distribution, storage or retail sale of fuels, **except** as part of the terminal operations
- wholesale or retail sale of articles or products, if the substance is not released to the environment during normal use at the facility
- retail sale of the substance
- growing, harvesting or managing renewable natural resources, such as fisheries, forestry or agriculture, **but not** the processing or other use of renewable natural resources
- mining, **but not** the further processing or other use of mined materials
- the practice of dentistry

**Box 2**

- non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners
- biomedical or hospital waste incineration of 26 tonnes or more of waste per year
- hazardous waste incineration
- sewage sludge incineration
- wood preservation
- terminal operations
- discharge of treated or untreated wastewater from a wastewater collection system with an annual average discharge of 10 000 $m^3$/day or more, into surface waters


## 3.2 Facility Criteria

In 2002, there were two different facility types – "contiguous facility" and "pipeline installation". With the removal of the oil and gas sector exemptions from the NPRI, a third facility type, "offshore installation", was added to the facility definition to level the playing field between offshore and onshore oil and gas operations. As such, the term "facility", as defined in the *Canada Gazette* notice, now refers to "contiguous facilities", "offshore installations" and "pipeline installations". Definitions are provided below.

**Contiguous Facility**
A "contiguous facility" means all buildings, equipment, structures and stationary items that are located on a single site or on contiguous or adjacent sites and that are owned or operated by the same person and that functions as a single integrated site and also includes wastewater collection systems that discharge treated or untreated wastewater into surface waters.

**Pipeline Installation**
A "pipeline installation" is defined as a collection of equipment situated at a single site, used in the operation of a natural gas transmission or distribution pipeline. Pipeline installations are subject **only** to the reporting criteria for CACs (Part 4 substances) and speciated VOCs (Part 5 substances) and not other NPRI substances.

"Pipeline installations" are spaced approximately 80-160 kilometres (50-100 miles) apart along a pipeline from a gas supply area to the market area. This definition includes pipeline compressor and storage stations along pipelines used to transport both raw and processed natural gas.

**Offshore Installation**
An "offshore installation" is defined as an offshore drilling unit, production platform or ship, or subsea installation attached to or anchored to the continental shelf of Canada in connection with the exploration of oil or gas.

### *3.2.1 Exempt Facilities*

A facility exclusively used for oil and gas exploration **or** the drilling of oil and gas wells is exempt from reporting to the NPRI. This is the only type of oil and gas facility exempt from reporting releases, disposals and transfers for recycling of all Parts 1-5 NPRI substances.

### *3.2.2 Facilities Exempt from Reporting Parts 1A, 1B, 2 and 3 Substances*

A facility is exempt from reporting Parts 1A through 3 substances to the NPRI if the **only source or use** of that NPRI substance at the facility was from one or more of the activities listed in Table 3. In cases where a facility met the reporting criteria for a substance based on sources **other than** those listed in Table 3, it should not include the quantity of that same substance from any exempt activities (listed in Table 3) when reporting releases, disposals or transfers for recycling to the NPRI.

The exemption for the maintenance and repair of transportation vehicles was modified in 2002 to make a distinction between activities associated with maintaining/repairing and activities related to painting/rebuilding of transportation vehicles, vessels and aircraft. Substances used for activities involving routine, scheduled and preventative maintenance continue to be exempt (e.g., repair, cleaning, replacement of lubricants/fluids). However, substances used in the painting or stripping of vehicles or vehicle components now are subject to reporting. Additionally, there is no exemption for activities that involve the removal, breakdown and total reconstruction of vehicle components (e.g., engines, landing gear, traction motors) using recovered or new parts, such that the rebuilt component is reinstalled or sold as an 'as new' replacement.

The distribution, storage or sale of fuels exemption was also revised in 2002 to exclude terminal operations. Terminal operations are important sources of VOCs. To capture reporting from these sources, the 20 000-hour employee threshold was removed, since these facilities often employ few workers.


**TABLE 3 ACTIVITIES NOT CONSIDERED WHEN REPORTING PARTS 1A, 1B, 2 AND 3 SUBSTANCES TO THE NPRI**

- educating or training students, such as at universities, colleges and schools
- research or testing
- maintaining and repairing transportation vehicles, such as automobiles, trucks, locomotives, ships or aircraft, except painting and stripping of vehicles or their components, or rebuilding or remanufacturing of vehicle components
- distribution, storage or retail sale of fuels, **except** as part of terminal operations
- wholesale or retail sale of articles or products which contain NPRI substances, if the substance is not released to the environment during normal use at the facility
- the retail sale of NPRI substances
- growing, harvesting or managing renewable natural resources, such as fisheries, forestry or agriculture, **but not** the processing or other use of renewable natural resources
- mining, **but not** the further processing or other use of mined materials
- the practice of dentistry

Note: Activities in Table 3 are not exempt from reporting for Part 4 or Part 5 substances.

### *3.2.3 Exclusions*

A facility should not include the quantity of a substance from any sources listed in Table 4 when calculating the reporting thresholds or when reporting releases, disposals or transfers for recycling to the NPRI.

In addition to the sources listed in Table 4, vehicle emissions should not be considered when calculating the substance threshold or when reporting the amount released.

## 3.3 Employee Criteria

Before determining whether the facility met the substance-specific threshold for any substances listed in the NPRI, the facility must determine if it met the employee criteria. A facility is not required to report Part 1A, 1B, 2 or 3 substances to the NPRI if, during the 2003 calendar year:

- the total number of hours worked by all employees was less than 20 000 hours, **and**
- the facility **was not** used mainly or exclusively for any of the activities in Table 5.

A facility that did not meet the employee criteria and was not used exclusively for any of the activities in Table 5 is still subject to reporting Part 4 and Part 5 substance emissions from stationary combustion equipment if the Part 4 and Part 5 release thresholds are met.

The 20 000-hour employee threshold and activities to which the employee threshold does not apply are further explained below.

### *3.3.1 20 000-hour Employee Threshold*

This threshold depends specifically on the number of hours worked by all employees at the facility during the calendar year and not on the number of persons working. To determine if your facility met the 20 000-hour employee threshold, include all hours worked by:

- persons employed at the facility, including students, part-time and term employees
- owner(s) who performed work on site at the facility, and
- persons who performed work on site at the facility on a routine basis related to the normal operation of the facility, for the period of time the person performed that work, such as contractors.

The total number of hours worked includes paid vacation and sick leave.


**TABLE 4 SOURCES NOT CONSIDERED WHEN REPORTING TO THE NPRI**

- **articles that are processed or otherwise used**[1]
- **materials used as structural components of the facility** – The exclusion of structural components of the facility from the reporting threshold is limited to buildings and other fixed structures but does not include process equipment.
- **materials used in routine janitorial or facility grounds maintenance** – This includes NPRI substances contained in fertilizers and pesticides used for grounds maintenance and cleaning agents, floor waxes, etc., used for maintaining facility cleanliness. The maintenance of processing equipment is not considered "routine janitorial" or "facility grounds" maintenance. For example, if manufacturing or processing equipment is cleaned with a solvent, the amount of the NPRI substance(s) contained in the solvent should be included in the threshold calculation.
- **materials used for personal use by employees or other persons**
- **materials used for the purpose of maintaining motor vehicles operated by the facility**
- **intake water or intake air** – This refers to water used for process cooling or air used either as compressed air or for combustion.
- **road dust**

[1] See 3.4.5 Nature of Activities for explanation of "article".

### *3.3.2 Activities to which the 20 000-hour Employee Threshold Does Not Apply*

If your facility was used mainly or exclusively for one or more of the activities listed in Table 5, you must submit a report for any NPRI substance that met its respective reporting criteria, regardless of the number of hours worked by employees. The employee threshold does not apply because facilities used for these activities are known to release significant quantities of NPRI pollutants to the environment, but often were not required to report to the NPRI since they did not meet the 20 000-hour employee threshold.

Complete descriptions of these activities are provided below.

#### Waste Incineration Activities

The first four activities listed in Table 5 are forms of waste incineration. *Waste incineration*, for the purposes of the NPRI, only includes incineration that takes place in a waste incinerator. Waste incineration does not include open burning of wastes.

A *waste incinerator* is a device, mechanism or structure constructed primarily to thermally treat (e.g., combust or pyrolyze) a waste for the purpose of reducing its volume, destroying a hazardous chemical present in the waste, or destroying pathogens present in the waste. This includes facilities where waste heat is recovered as a by-product from the exhaust gases from an incinerator (e.g., energy-from-waste incinerators). This also includes conical burners and beehive burners. This does not include industrial processes where fuel derived from waste is fired as an energy source, such as industrial boilers. For example, if bark, wood chips or other wood waste is used as fuel to fire a boiler, these activities are not considered energy-from-waste incinerators.

To maintain consistency with Canada-wide Standards for Dioxins and Furans, in 2002, the throughput for non-hazardous and biomedical/hospital waste incinerators was reduced from 100 tonnes to 26 tonnes/year.

***a) Non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners***

Non-hazardous solid waste means any waste, regardless of origin, which might normally be disposed of in a non-secure manner, such as at a sanitary landfill site, if not incinerated. It includes clean wood waste, i.e., waste from woodworking or forest product operations, including bark, where the wood waste has not been


**TABLE 5 ACTIVITIES TO WHICH THE 20 000-HOUR EMPLOYEE THRESHOLD DOES NOT APPLY**

| |
|---|
| **Waste Incineration Activities** |
| a) non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners |
| b) biomedical or hospital waste incineration of 26 tonnes or more of waste per year |
| c) hazardous waste incineration |
| d) sewage sludge incineration |
| **Wood Preservation Activities** |
| e) wood preservation (using heat or pressure treatment, or both) |
| **Terminal Operation Activities** |
| f) terminal operations related to fuels |
| **Wastewater Systems** |
| g) wastewater collection systems discharging 10 000 $m^3$ or more per day, into surface waters |

treated with preservative chemicals (e.g., pentachlorophenol) or decorative coatings. Non-hazardous solid waste incineration includes incineration of residential and other municipal wastes in conical burners, and clean wood waste in beehive burners.

**A facility used for the incineration of 26 tonnes or more of non-hazardous solid waste per year is required to report to the NPRI if it met the substance criteria, regardless of the number of hours worked by employees.**

***b) Biomedical or hospital waste incineration of 26 tonnes or more of waste per year***
Biomedical waste is fully defined in Appendix 3. Biomedical or hospital waste refers to waste that is generated by:

- human or animal health-care facilities
- medical or veterinary research and testing establishments
- health-care teaching establishments
- clinical testing or research laboratories, and
- facilities involved in the production or testing of vaccines.

Biomedical or hospital waste includes human anatomical waste and animal waste. It also includes microbiology laboratory waste, human blood and body fluid waste, and waste sharps that have not been disinfected or decontaminated. It does not include waste from animal husbandry, or waste that is controlled in accordance with the *Health of Animals Act* (Canada).

Wastes that are household in origin or that are generated in the food production, general building maintenance and office administration activities of those facilities to which this definition applies, are not considered to be biomedical or hospital waste but rather to be non-hazardous solid waste.

**A facility used for biomedical or hospital waste incineration of 26 tonnes or more of waste per year is required to report to the NPRI if it met the substance criteria, regardless of the number of hours worked by employees.**


***c) Hazardous waste incineration***

Hazardous waste is fully defined in Appendix 4. Hazardous waste includes those wastes that are potentially hazardous to human health and/or the environment because of their nature and quantity, and that require special handling techniques. Hazardous waste incinerators must be licensed or authorized by the responsible jurisdiction. Hazardous waste incinerated in a mobile incinerator temporarily located at your facility must be included as part of this activity.

**A facility used for the incineration of hazardous waste is required to report to the NPRI if it met the substance criteria, regardless of the number of hours worked by employees or the quantities incinerated.**

***d) Sewage sludge incineration***

Sludge means a semi-liquid mass removed from a liquid flow of wastes. Sewage sludge means sludge from a facility treating wastewater from a sanitary sewer system. The drying of sludge to reduce water content is part of the incineration stage.

**A facility used for the incineration of sewage sludge is required to report to the NPRI if it met the substance criteria, regardless of the number of hours worked by employees or the quantities incinerated.**

#### Wood Preservation Activities

***e) Wood Preservation (using heat or pressure treatment, or both)***

Wood preservation means the use of a preservative for the preservation of wood by means of heat or pressure treatment, or both, and includes the manufacture, blending or reformulation of wood preservatives for that purpose.

**A facility used for wood preservation is required to report to the NPRI for Part 1A and 1B substances if it met the substance criteria, regardless of the number of hours worked by employees.**

#### Wood Preservation Using Creosote

**A facility used for wood preservation must report for any of the 17 individual PAHs released on site, disposed of or transferred off site for recycling from a wood-preservation process using creosote, regardless of the number of hours worked by employees.**

#### Wood Preservation Using Pentachlorophenol

**A facility used for wood preservation using pentachlorophenol must report for dioxins/furans and HCB, regardless of the number of hours worked by employees or the quantities of dioxins/furans and HCB released on site, disposed of or transferred off site for recycling.**

For more detailed information regarding wood preservation and NPRI reporting, operators of wood-preservation facilities can consult the supplementary document, *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory* (Environment Canada, 2003). This technical guide is available on the NPRI Web site www.ec.gc.ca/npri/.

#### Terminal Operation Activities

***f) Terminal operations related to fuel***

For the purposes of reporting, terminal operations refer to either i) the use of storage tanks and associated equipment at a site used to store or transfer crude oil, artificial crude or intermediates of fuel products into or out of a pipeline, or ii) the operating activities of a primary distribution installation normally equipped with floating roof tanks that receives gasoline by pipeline, railcar, marine vessel or directly from a refinery. The definition of terminal operations does not include bulk plants or service stations.

**A facility used for terminal operations is required to report to the NPRI if it met any substance criteria, regardless of the number of hours worked by employees.**


**Wastewater Systems**

***g) Wastewater collection systems discharging 10 000 m³ or more per day, into surface waters***

A wastewater facility is defined for the NPRI as wastewater collection systems that discharge treated or untreated wastewater into surface waters with an annual average discharge of 10 000 cubic metres or more per day. Therefore, a wastewater system for NPRI reporting purposes includes both the treatment and collection components.

A *Wastewater Collection System* is the system of sewers and/or ditches that convey sanitary or combined sewage for a community. The volume of sewage released to surface waters from the collection system must be included in the calculation of annual average discharge per day from the wastewater facility. Potential effluent volumes of importance to include in the calculation of the annual average discharge per day from the collection system include:

- direct discharge of sewage from a main outfall where no treatment exists
- sanitary sewer system overflows
- combined sewer system overflows
- pumping station overflows, and
- bypass flows (for repair and maintenance activities or for emergency response activities).

A collection system includes adjacent service areas or adjoining sewage sheds that function as a single integrated system for a community. Discharges to the environment from all components of the system must be considered when determining whether your facility met the flow threshold and substance reporting criteria. Where no treatment facilities exist, the wastewater facility consists of the entire collection system, and may require NPRI reporting if it met the basic reporting requirements.

Communities whose collection systems discharge into another community's collection system do not have to report to the NPRI. Reporting may be required by the receiving community if it met the basic reporting requirements.

A *Wastewater Treatment System* means a plant or process location that accepts collection system flows of a community for the purposes of removing substances from the wastewater. The volume of both treated and untreated sewage released from the wastewater treatment system must be included in the calculation of annual average discharge per day from the wastewater facility. Potential effluent volumes of importance to include in the calculation of the annual average discharge per day from the wastewater treatment system include:

- process flow
- sludge treatment discharges (biosolids/sludges)
- backwash and filter discharges released to surface waters (i.e., not including process waste recycled back into the wastewater treatment system)
- tank drainage released to surface waters (i.e., not including process waste recycled back into the wastewater treatment system), and
- bypass flows released to surface waters (untreated or partially treated) for repair and maintenance activities, or from hydraulic overloads.

**A wastewater collection system with an annual average discharge of greater than or equal to 10 000 m³/day of untreated or treated water to surface water is required to report to the NPRI if it met any substance criteria, regardless of the number of hours worked by employees.**

For more detailed information regarding the wastewater sector and NPRI reporting, operators of wastewater collection or treatment facilities can consult the supplementary document, *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector 2003* (Environment Canada, 2004).


## 3.4 Reporting Criteria for Part 1A Substances

### *3.4.1 Overview*

Part 1A lists substances of concern, most of which have been on the NPRI since its inception. These compounds are commonly referred to as the "core" substances and comprise the majority of the NPRI substance list.

### *3.4.2 Substances*

Changes to the NPRI list of substances for 2003, Part 1A, include:

**New Substances**

- **carbonyl sulphide added with 10 tonne and 1% concentration threshold**
- **phosphorus (total) added with 10 tonne and 1% concentration threshold**. Phosphorus (total) does not include "phosphorus (yellow or white)" since it is listed separately.

**Change to Substance List**

- 13 separately-listed nonlyphenols and ethoxylates replaced with "Nonylphenol and its ethoxylates"
- 4-*tert*-octylphenol replaced with "Octylphenol and its ethoxylates"

You must confirm if one or more of the 231 substances listed in Part 1A were manufactured, processed or otherwise used at your facility. The NPRI substances are listed in alphabetical order in Appendix 1. Most of the substances have CAS numbers associated with them. The NPRI substances are listed by CAS number in Appendix 2. Substances that do not have a unique CAS number are noted with an asterisk (*).

Some groups of substances and individual substances are qualified in terms of their specific physical or chemical form, state or particle size. These qualifiers will determine whether your facility will be required to report for a given substance:

- **fume or dust**

This qualifier for aluminum refers to solids with particle diameters of 0.001 to 1 micron for fumes and 1 to 100 microns for dust particles.

- **fibrous forms**

This qualifier, applied to aluminum oxide, includes the form of aluminum oxide found in brake linings but excludes the more common granular, powdered or fumed forms of alumina.

- **salts**

Weak acids and bases are listed with this qualifier. Although the CAS number that appears on the NPRI list is specific to the acid or base, all salts of these listed substances must be reported as an equivalent weight of the acid or base.

- **compounds**

Nine NPRI Part 1A elements have this qualifier – antimony, chromium, cobalt, copper, manganese, nickel, selenium, silver and zinc. The pure element and any substance, alloy or mixture must be reported as the equivalent weight of the element itself. No CAS number is provided for these substances. For example, a galvanizing facility that uses zinc chloride ($ZnCl_2$) should only consider the mass contribution of Zn by itself when determining whether it met the reporting threshold for zinc and calculating releases, disposals and transfers for recycling of zinc.

Note that chromium appears on the Part 1A list with the following qualifier "and its compounds, except for hexavalent chromium compounds". This is because hexavalent chromium compounds are reported separately (see 3.5 Reporting Criteria for Part 1B Substances). When calculating the mass threshold for chromium and


its compounds, exclude the contribution from hexavalent chromium compounds in the calculation. Separate reports must be submitted for the Part 1A listing, "chromium (and its compounds)" and the Part 1B listing, "hexavalent chromium compounds".

- **(except when in an alloy) and its compounds**

This qualifier applies only to vanadium. The pure element and any substance or mixture must be reported as the equivalent weight of the element. No CAS number is provided for these substances. Do not include vanadium contained in an alloy. An alloy includes metal products containing two or more elements as a solid solution, intermetallic compounds and/or mixtures of metallic phases.

This change to the qualifier for vanadium was made in 2001 to capture all forms of vanadium and its compounds released from the combustion of fuel.

- **friable form**

Asbestos is the general name for several fibrous minerals and products. Only asbestos that is brittle and readily crumbled should be reported.

- **mixed isomers**

This qualifier is used for mixtures of isomers which have the same chemical formula but different chemical structures. The substances with this qualifier are dinitrotoluene and toluenediisocyanate. Substances with this qualifier are usually found as mixtures. The total quantity of all isomers must be used in calculating the 10-tonne threshold quantity. Do not apply the 10-tonne reporting threshold to each individual isomer unless the pure isomer alone is manufactured, processed, otherwise used or is an NPRI by-product.

- **all isomers**

This qualifier is applied to cresol, xylene and three hydrochlorofluorocarbons (HCFC-122, HCFC-123 and HCFC-124). Each of these substances should be reported as an aggregate of the individual isomers that have the same chemical formula but different chemical structures. The total quantity of all isomers must be used in calculating the 10-tonne threshold. Refer to Appendices 1 and 2.

- **ionic**

This qualifier, applied to cyanides, includes the salts of hydrogen cyanide but excludes organocyanides, nitriles and organometallic cyanide compounds such as ferrocyanide. In the mining industry, ionic cyanide is equivalent to "weak acid dissociable" cyanide.

- **total**

For aqueous solutions of ammonia, this means both $NH_3$ and $NH_4^+$ expressed as ammonia.
For phosphorus, do not include "phosphorus (yellow or white)".

- **yellow or white**

This qualifier is the general description for the common allotropes of elemental phosphorus.

- **in solution at a pH of 6.0 or greater**

This distinguishes nitrate ion in neutral or basic solution from nitric acid (pH of less than 6.0). If nitric acid is neutralized to a pH of 6.0 or greater, you must submit a report for both "nitric acid" and for "nitrate ion in solution". Your release, disposal or transfer for recycling of nitric acid would be "zero" and your release, disposal or transfer for recycling of nitrate ion would reflect the quantity of neutralized nitric acid reported as nitrate ion in solution at a pH of 6.0 or greater.


In most cases, consider only the substances and the CAS numbers listed. For example, "styrene" is listed with its corresponding CAS number "100-42-5". The chemical description which corresponds to this CAS number does not include "polystyrene". There are no polymers on the NPRI list, only monomers.

Material Safety Data Sheets (MSDSs) are an important source of information on the composition of purchased products. Suppliers of hazardous materials are required, as part of the Workplace Hazardous Material Information System (WHMIS), to supply MSDSs on request.

### *3.4.3 Units*

The reporting unit for NPRI Part 1A substances is tonnes.

### *3.4.4 Reporting Criteria*

In general, any person who owns or operates a facility must submit a report to the NPRI for a Part 1A substance **only** if **all** of the following criteria are met:

- employees worked a total of 20 000 hours or more or the facility was used for an activity to which the 20 000-hour employee threshold does not apply (see Table 5)
- the facility manufactured, processed or otherwise used 10 tonnes (10 000 kg) or more of an NPRI Part 1A substance in the 2003 calendar year,

**AND**

- the NPRI Part 1A substance was manufactured, processed or otherwise used at a concentration greater than or equal to 1% by weight, with the exception of NPRI substances considered to be by-products. The total weight of by-products at any concentration must also be included in the calculation of the 10-tonne threshold for each NPRI Part 1A substance.

Figure 4 illustrates the steps to follow in determining if your facility is required to submit a report to the NPRI for a given NPRI Part 1A substance. A facility must meet **all the reporting criteria** before it is required to report on-site releases, disposals or off-site transfers for recycling of the Part 1A substance.

**Once you have determined that your facility is required to submit a report for an NPRI Part 1A substance, all on-site releases, disposals and off-site transfers for recycling of that substance are reportable, regardless of their concentration or quantity (including "zero" releases, disposals and transfers for recycling).**

For guidance on estimating releases, disposals and transfers for recycling, refer to the *NPRI Toolbox*.

### *3.4.5 Nature of Activities*

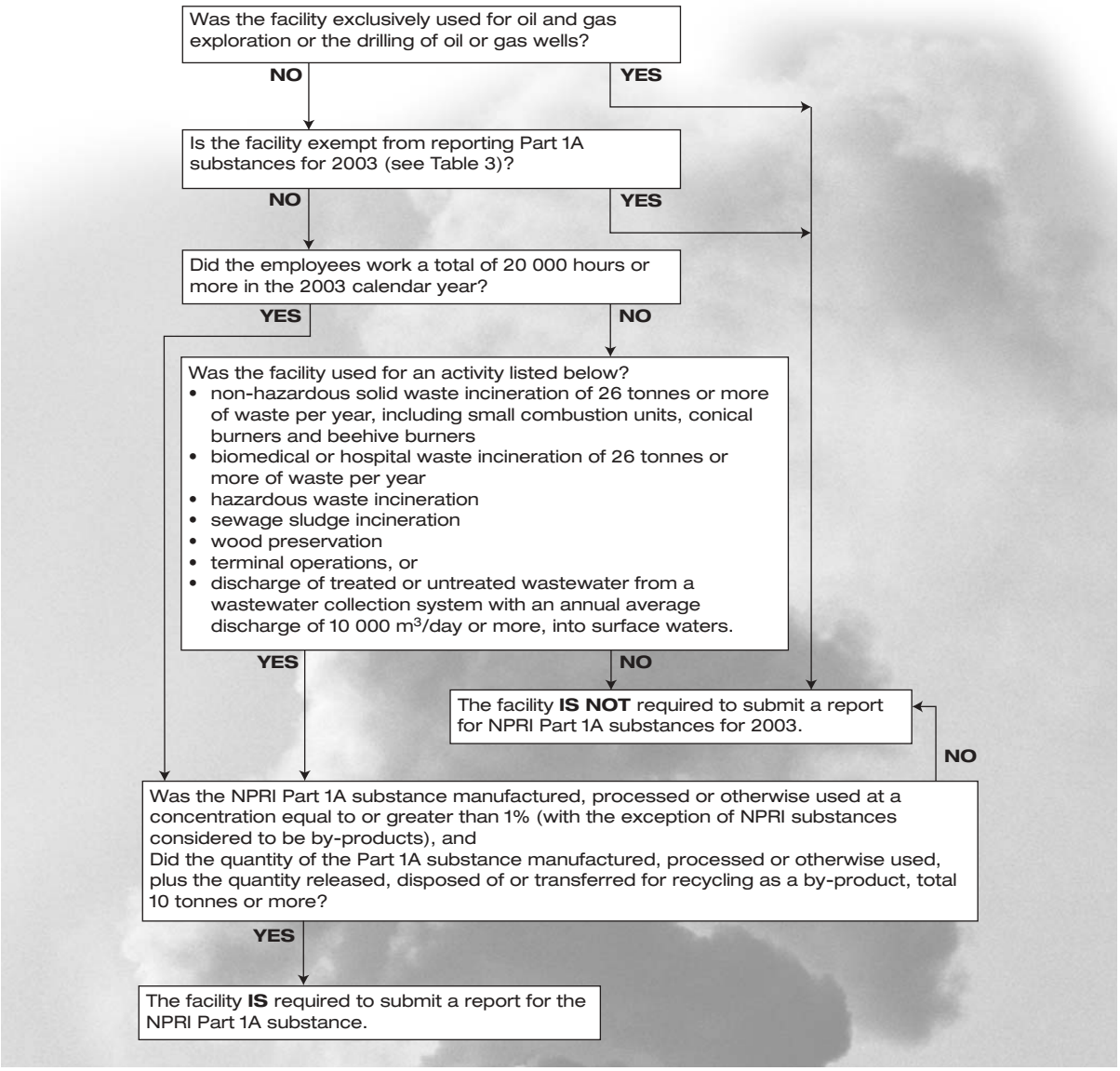
The terms "manufacture", "process" and "other use" are defined below. These activities are part of the reporting criteria. An NPRI Part 1A substance at a concentration equal to or greater than 1% or an NPRI Part 1A by-product at any concentration are included in the calculation of the 10-tonne reporting threshold if they were manufactured, processed or otherwise used. An NPRI report does not have to be submitted for a substance that was never manufactured, processed or otherwise used at the facility during the reporting year.

#### Manufacture

The term "manufacture" means to produce, prepare or compound an NPRI substance. It also includes the incidental production of an NPRI substance as a "by-product" resulting from the manufacture, processing or other use of other substances.

The production of chlorine dioxide by a chemical plant is an example of manufacturing. The production of hydrochloric acid during the manufacture of chlorofluorocarbons is an example of coincidental production.

**FIGURE 4 REPORTING CRITERIA FOR PART 1A SUBSTANCES**




### Process

The term "process" means the preparation of an NPRI substance, after its manufacture, for distribution in commerce. Processing includes the preparation of a substance with or without changes in physical state or chemical form. The term also applies to the processing of a mixture or formulation that contains an NPRI substance as one component, as well as the processing of "articles" (see Article below).

The use of chlorine (an NPRI substance) to manufacture hypochloric acid (not an NPRI substance) is an example of processing of chlorine. The use of toluene and xylenes to blend paint solvent mixtures is an example of processing without changes in chemical form.

### Other Use

The terms "other use" and "otherwise used" encompass any use or "disposal" of an NPRI substance at a facility that does not fall under the definitions of "manufacture" or "process". This includes the use of the substance as a chemical processing aid, manufacturing aid or some other ancillary use. The use of trichloroethylene in the maintenance of manufacturing and process equipment is considered an "other use". "Other use" does not include substances used for routine janitorial or facility grounds maintenance.


### By-products

A "by-product" is an NPRI substance that is incidentally manufactured, processed or otherwise used at the facility at any concentration by weight, and that is released on site to the environment or disposed of.

By-products are included in the calculation of the 10-tonne reporting threshold for Part 1A substances to capture large-volume, low-concentration releases and disposals. By-product reporting affects facilities that release to the environment or dispose of large quantities of NPRI Part 1A substances at low concentrations. Some examples of affected sectors include, but are not limited to, power generation, aluminum smelting, and pulp and paper production.

Normally, only NPRI Part 1A substances in concentrations equal to or greater than 1% are included in the threshold calculations. The 1% concentration limit is consistent with the reporting requirements under the WHMIS. Minor constituents (with some exceptions) are not included on MSDSs. **However, NPRI Part 1A by-products at any concentration by weight must be included in the calculation of the 10-tonne reporting threshold.**

The NPRI applies to any person who possesses or who may reasonably be expected to have access to the types of information requested. This reasonable expectation limits the reporting liability of facilities that cannot easily determine minor amounts of NPRI substances in their feedstock or process.

To determine if an NPRI Part 1A substance is a by-product, the following criteria should be considered:

- The NPRI Part 1A substance is not relevant to the manufacture, processing or other use of substances at the facility. It may be the product of an unwanted side-reaction or an impurity in a feedstock material.
- NPRI Part 1A substances that meet the above criteria are only considered by-products if they are released to the environment or disposed of. Substances that are recycled or that remain in the final product are excluded from the by-product definition.

The following examples illustrate application of the by-product definition:

***Example 1***

Hydrogen fluoride is incidentally manufactured and released during aluminum smelting. For some large facilities, more than 10 tonnes may be released to the atmosphere at concentrations of less than 1%. Since hydrogen fluoride is an NPRI Part 1A substance, the weight of the hydrogen fluoride by-product must be used in the calculation of the 10-tonne reporting threshold.

***Example 2***

Manganese and nickel are incidentally present in coal. During combustion, a portion of these metals is concentrated in the ash which is disposed of and a portion of the metals is released in stack emissions. The weight of the heavy metal by-products must be included in the calculation of the 10-tonne reporting threshold, regardless of the initial concentrations of the metals in the coal.

***Example 3***

An NPRI Part 1A substance is present in trace amounts in a product that is being packaged for retail sale. The quantity of this substance released through spillage or through fugitive air emissions cannot be determined because the formulation of the product is proprietary or the substance concentration is not listed on the MSDS and more detailed information cannot be obtained from the supplier or manufacturer. Although this NPRI Part 1A substance is considered a by-product, it is not included in the calculation of the 10-tonne reporting threshold because it is an unreasonable expectation that the facility could obtain information on the substance identity, concentration or quantity.


**Article**

***General***

An "article" is defined as a manufactured item that does not release an NPRI substance under normal conditions of processing or use. When articles are processed and there are no releases, or the releases are recycled 100% with due care, the NPRI substances in that article need not be included in the threshold calculation. Exercising "due care" in ensuring 100% recycling means that the facility generated less than 1 kg of the NPRI Part 1A substance as waste during the calendar year.

***Welding***

Refer to the *NPRI Toolbox* for guidance on welding.

### *3.4.6 Calculating the 10-tonne Reporting Threshold*

The 10-tonne reporting threshold is based on the quantity of an NPRI Part 1A substance manufactured, processed or otherwise used at the facility at concentrations equal to or greater than 1% **plus** the quantity of the same NPRI Part 1A substance, at any concentration, that is considered to be a by-product and that is released on site to the environment or disposed of.

When calculating the 10-tonne reporting threshold, **include** the quantity of an NPRI Part 1A substance that is:

- manufactured at a concentration equal to or greater than 1%
- processed at a concentration equal to or greater than 1%
- otherwise used at a concentration equal to or greater than 1%, and
- a by-product, at any concentration, released on site to the environment or disposed of.

Any NPRI Part 1A substances that are transferred off site for recycling and returned to the facility should be treated as the equivalent of newly-purchased material for the purposes of NPRI threshold determinations. Since an NPRI Part 1A substance may undergo many processes in a facility, care should be taken not to double-count process streams when calculating the reporting threshold.

**NPRI Part 1A Substances Equal to or Greater than 1% Concentration**

The total quantity of an NPRI Part 1A substance manufactured, processed or otherwise used at concentrations greater than or equal to 1%, at any time or in any part of the facility, **must** be used in the calculation of the 10-tonne reporting threshold.

The quantity of a substance received by a facility at 30% concentration and then diluted to less than 1% for use, is included in the threshold calculation. A substance received at the facility at less than 1% and subsequently concentrated to 5% would also be included in the threshold calculation.

Facilities that blend or formulate NPRI Part 1A substances such as solvents, must include the total quantity of the substance blended or mixed in the reporting threshold calculation since blending, mixing and formulating are considered processing, which is a reportable activity.

Facilities that repackage or transfer NPRI Part 1A substances between containers need only consider the quantity of the substance repackaged or transferred.

If only a range of concentrations is available for a substance present in a mixture, use the average of the range for threshold determinations.


**NPRI Part 1A Substances of Less than 1% Concentration**

The total quantity of an NPRI Part 1A substance manufactured, processed or otherwise used at less than 1% is not included in the calculation of the 10-tonne reporting threshold, provided that the substance was not received as a more concentrated solution and subsequently diluted to less than 1% for manufacturing, processing or other use.

The following example illustrates how to handle substances manufactured, processed or otherwise used at a concentration of less than 1%:

*Example 1*

Metal cuttings, sent for disposal, contain alloyed nickel at a concentration of less than 1%. The nickel is an essential component of the alloy; therefore it is not incidentally processed and is not considered to be a by-product. The nickel in the metal cuttings is not included in the calculation of the 10-tonne reporting threshold.

*Example of Calculating the Reporting Threshold*

The following example illustrates the calculation of the 10-tonne reporting threshold. This facility has several processes in which an NPRI Part 1A substance is manufactured, processed or otherwise used.

In this example, the facility would be required to submit a report to the NPRI (assuming it also met the 20 000-hour employee threshold) because the total amount of substance "Z" manufactured, processed or otherwise used at the facility exceeded 10 tonnes for the calendar year.

**TABLE 6 EXAMPLE OF THRESHOLD CALCULATION FOR PART 1A SUBSTANCES**

| Material containing Part 1A substance "Z" | Total weight of material containing Part 1A substance "Z" | Concentration of Part 1A substance "Z" in the material or stream | Net weight of Part 1A substance "Z" |
|---|---|---|---|
| Process stream [1] | 150 tonnes | 5.00 % | 7.5 tonnes |
| Raw material in process [2] | 2 tonnes | 100.00 % | 2.0 tonnes |
| Raw material in process [3] | 45 tonnes | 0.20 % | n/a |
| By-product released from process [4] | 10 000 tonnes | 0.01 % | 1.0 tonne |
| | | **Total weight of substance "Z"** | **10.5 tonnes** |

[1] In the first process, the NPRI Part 1A substance "Z" is present at 5% concentration and is included in the threshold calculation.

[2] In the second process, a raw material added to the process is pure substance "Z". It is also included in the threshold calculation, regardless of any subsequent dilution in the process. This also applies to a substance received at the facility at less than 1% which is subsequently concentrated to more than 1% in the process.

[3] The weight of substance "Z" in the raw material used in process 3 is not included in the threshold calculation because the concentration is less than 1%. Note, however, that since the facility in this example must report because it meets the 10-tonne reporting threshold, it is required to take into account and report releases, disposals and transfers for recycling from all processes including those, such as process 3, that were not used in the threshold calculations.

[4] The weight of substance "Z" produced and released from process 4 is included in the calculation because it is a by-product. The concentration criterion does not apply to by-products.


## 3.5 Reporting Criteria for Part 1B Substances

### *3.5.1 Overview*

Part 1B substances include mercury [1], cadmium [1], arsenic [1], hexavalent chromium compounds, lead [2] and tetraethyl lead. These substances are pollutants which have significant environmental and human health impacts at relatively low levels. They occur naturally in the environment, but human activities can concentrate them to levels that are toxic to human health and the environment. Because minimal releases of Part 1B substances may result in significant adverse effects, Environment Canada lowered the concentration and reporting thresholds for Part 1B substances.

### *3.5.2 Substances*

The Part 1B substances and their reporting criteria are provided in Table 7. With the exception of tetraethyl lead, the pure element and any substance, alloy or mixture of any Part 1B substance must be reported as the equivalent weight of its respective element. Tetraethyl lead is reported as the pure compound.

Note that "tetraethyl lead" and "lead (and its compounds)" both appear on the NPRI Part 1B list. The additional qualifier "does not include lead (and its compounds) in stainless steel, brass or bronze alloys" was added for "lead (and its compounds)" in 2002. Therefore, when submitting a report for "lead (and its compounds)", exclude the lead contribution from tetraethyl lead, stainless steel, brass and bronze alloys. Apply the reporting criteria to each substance separately. If required, complete separate reports for "lead (and its compounds)" and "tetraethyl lead".

### *3.5.3 Units*

The reporting unit for Part 1B substances is kilograms (kg).

### *3.5.4 Reporting Criteria*

The reporting criteria for Part 1B substances are outlined in Figure 5.

A facility is required to report on-site releases, disposals and off-site transfers for recycling of Part 1B substances if, during the 2003 calendar year:

- employees worked a total of 20 000 hours or more or the facility was used for an activity to which the 20 000-hour employee threshold does not apply (listed in Table 5),

**AND**

- a Part 1B substance was manufactured, processed or otherwise used at a concentration and quantity meeting or exceeding the thresholds outlined in Table 7. The total weight of by-products at any concentration must also be included in the calculation of the prescribed threshold for each NPRI Part 1B substance.

The 1% concentration exemption included in the 10-tonne manufacture, process or other use threshold for Part 1A substances **does not** apply to Part 1B substances.

A Material Safety Data Sheet (MSDS) is an important source of information on the composition of a purchased product. Suppliers of hazardous materials are required, as part of the Workplace Hazardous Materials Information System (WHMIS), to supply MSDSs on request. Note that minor constituents at concentrations lower than 1% may not be included on the MSDS.

**Once you have determined that your facility is required to submit a report for a Part 1B substance, all on-site releases, disposals or off-site transfers for recycling of that substance are reportable, regardless of the concentration or quantity (including "zero" releases, disposals and transfers for recycling).**

---

[1] and its compounds

[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys


**TABLE 7 MASS AND CONCENTRATION THRESHOLDS FOR PART 1B SUBSTANCES**

| Substance | CAS No. | Mass Threshold | Concentration Threshold (by weight) |
|---|---|---|---|
| Mercury [1] | * | 5 kg | n/a |
| Cadmium [1] | * | 5 kg | 0.1% |
| Arsenic [1] | * | 50 kg | 0.1% |
| Hexavalent chromium compounds | * | 50 kg | 0.1% |
| Lead [2] | * | 50 kg | 0.1% |
| Tetraethyl lead | 78-00-2 | 50 kg | 0.1% |

[1] and its compounds

[2] and its compounds, does not include tetraethyl lead or lead contained in stainless steel, brass or bronze alloys

* no single CAS No. applies to this substance

Locating and estimating documents listed in the References and Bibliography section provide detailed information for estimating releases, disposals and transfers for recycling for some Part 1B substances. The *NPRI Toolbox* contains examples and descriptions of tools available to assist you with your threshold calculations.

### *3.5.5 Definitions*

The terms "manufacture", "process" and "other use" are defined in section 3.4.5 Nature of Activities.

### *3.5.6 Article*

An "article" is defined as a manufactured item that does not release an NPRI substance under normal conditions of processing or use. This is further explained in section 3.4.5 Nature of Activities. However, there is no quantitative measure of "due care" in recycling Part 1B substances because even minimal releases of these substances can cause significant adverse effects and can reasonably be expected to contribute to exceeding their low thresholds. Therefore, if an "article" containing a Part 1B substance is processed or used and there were releases, the Part 1B substance must be included in the threshold calculation.

Special reporting guidance developed by Environment Canada impacts the reporting of Part 1B substances contained in welding rods and welded material. For detailed guidance regarding reporting by this sector, see the *NPRI Toolbox*.

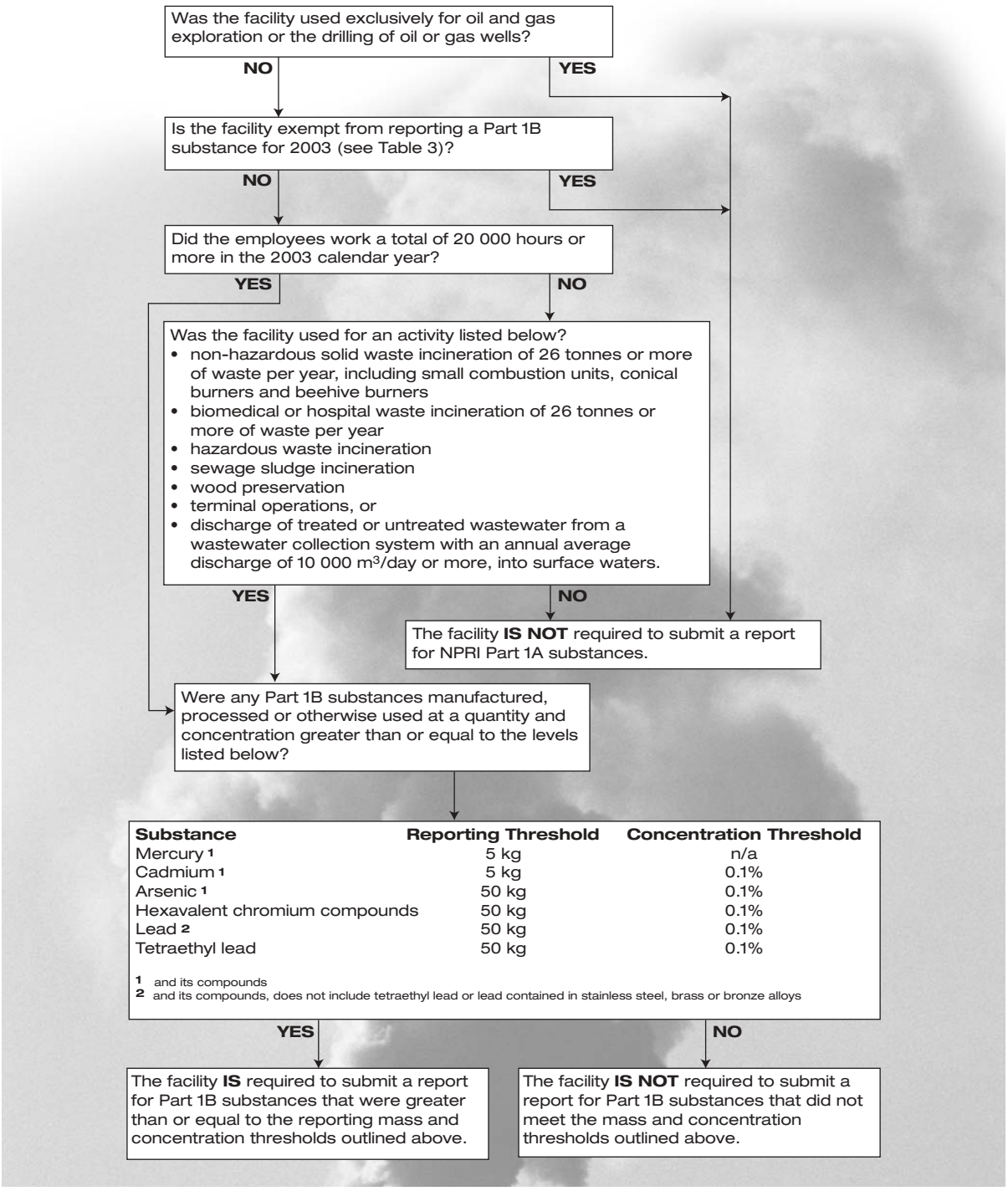
***Example 1***

A sealed, glass bulb containing mercury used in a leveling switch meets the definition of an article. However, the quantity of mercury in the switch must be included in a facility's calculation of the 5-kg reporting threshold if the item loses its article status, (i.e., the bulb is broken, thus allowing a release of mercury). As long as the bulbs remain intact, they are considered articles and are therefore not included in calculating the reporting threshold.

***Example 2***

A lead-acid battery meets the definition of an article. A metal reclamation facility accepts spent lead-acid batteries for recycling. The batteries are broken into pieces in a hammermill and their parts (acid, lead and plastic) are subsequently reclaimed. In this context, the batteries lose their article status since they are broken apart during the recycling process. Consequently, the lead content in the batteries must be included in the facility's calculation of the 50-kg reporting threshold.

**FIGURE 5 REPORTING CRITERIA FOR PART 1B SUBSTANCES**




## 3.6 Reporting Criteria for Part 2 Substances – 17 Polycyclic Aromatic Hydrocarbons (PAHs)

### *3.6.1 Overview*

Polycyclic aromatic hydrocarbons (PAHs) may be used as commercial chemicals or incidentally manufactured in certain industrial processes. PAHs are listed as a group on the List of Toxic Substances under the CEPA 1999.

Since the 17 PAHs listed in Part 2 of the NPRI are mostly incidentally manufactured and released, disposed of or transferred from facilities, rather than used as commercial chemicals, Environment Canada has set reporting criteria based on releases, disposals and transfers for recycling resulting from their incidental manufacture.

Two PAHs remain on the NPRI Part 1A substance list – anthracene (CAS No. 120-12-7) and naphthalene (CAS No. 91-20-3). These substances are commercial chemicals used in significant quantities, and are less toxic than the 17 Part 2 PAHs added to the NPRI at a lower threshold in 2000. As a result, Environment Canada has retained the 10-tonne manufacture, process and other use reporting threshold for anthracene and naphthalene.

### *3.6.2 Substances*

The 17 PAHs listed in Part 2 of the NPRI are presented in Table 8.

The NPRI has an additional substance listing in the NPRI reporting software – "PAHs, total Part 2" – which refers to all 17 PAHs or any combination thereof listed in Table 8. The 17 PAHs may be reported under the substance listing titled "PAHs, total Part 2" **only** if you do not have information available to estimate releases, disposals and transfers for recycling for any of the individual PAHs.

Anthracene and naphthalene are Part 1A substances; as such, their reporting criteria differ from those discussed in this section. Do not include anthracene and naphthalene when determining whether your facility met the reporting criteria for the 17 PAHs listed in Table 8. Do not include anthracene and naphthalene under the "PAHs, total Part 2" listing.

### *3.6.3 Units*

Report individual PAHs listed in Table 8 or "PAHs, total Part 2" in kilograms (kg).

### *3.6.4 Reporting Criteria*

With the exception of wood preservation using creosote, the reporting criteria for PAHs listed in Table 8 are as follows:

- reporting the 17 PAHs is based on the quantities of the substances *incidentally* manufactured and released, disposed of or transferred for recycling, **not** on the quantities manufactured, processed or otherwise used
- you must aggregate the quantities of **all** 17 individual PAHs *incidentally* manufactured together in determining if your facility met the 50-kg reporting threshold.

The substance-specific reporting criteria for the 17 PAHs listed in Table 8 are outlined in Figure 6. On-site releases, disposals and off-site transfers for recycling must be reported for the individual PAH substances even though the 50-kg reporting threshold applies to the aggregate total of all 17 PAHs.


With the exception of wood preservation using creosote (see below), you must submit substance reports for one or more of the 17 PAHs listed in Table 8 that were incidentally manufactured if, during the 2003 calendar year:

- employees worked a total of 20 000 hours or more, or the facility was used for an activity to which the 20 000-hour employee threshold does not apply (listed in Table 5)

**AND**

- any individual PAH (listed in Table 8) was incidentally manufactured, and the sum of all PAHs incidentally manufactured and released on site, disposed of or transferred off site for recycling totalled 50 kg or more.

**TABLE 8 PART 2 SUBSTANCES (17 PAHs)**

| CAS No. | Substance Name | CAS No. | Substance Name |
|---|---|---|---|
| 56-55-3 | Benzo(a)anthracene | 224-42-0 | Dibenz(a,j)acridine |
| 218-01-9 | Benzo(a)phenanthrene | 53-70-3 | Dibenzo(a,h)anthracene |
| 50-32-8 | Benzo(a)pyrene | 189-55-9 | Dibenzo(a,i)pyrene |
| 205-99-2 | Benzo(b)fluoranthene | 194-59-2 | 7H-Dibenzo(c,g)carbazole |
| 192-97-2 | Benzo(e)pyrene | 206-44-0 | Fluoranthene |
| 191-24-2 | Benzo(g,h,i)perylene | 193-39-5 | Indeno(1,2,3-c,d)pyrene |
| 205-82-3 | Benzo(j)fluoranthene | 198-55-0 | Perylene |
| 207-08-9 | Benzo(k)fluoranthene | 85-01-8 | Phenanthrene |
| | | 129-00-0 | Pyrene |

### Wood Preservation Using Creosote

Wood preservation means the use of a preservative for the preservation of wood by means of heat or pressure treatment, or both, and includes the manufacture, blending or reformulation of wood preservatives for that purpose. The 50-kg reporting threshold does not apply for PAHs released, disposed of or transferred for recycling from a wood-preservation process using creosote because the PAHs are contained in the creosote and not incidentally manufactured.

PAHs can constitute up to 90% of creosote and for this reason, may be released, disposed of or transferred for recycling from most wood-preservation activities using this material.

**A facility used for wood preservation must submit a report for each/any of the 17 individual PAHs released on site, disposed of or transferred off site for recycling from a wood-preservation process using creosote, regardless of the quantity of PAHs released, disposed of or transferred for recycling or the number of hours worked by employees. All PAHs released on site, disposed of or transferred off site for recycling from wood-preservation processes using creosote must be reported, regardless of the quantity.**

Environment Canada has prepared a technical guide entitled *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory* to assist facilities using creosote for wood preservation to estimate their releases. This technical guide is available on the NPRI Web site http://www.ec.gc.ca/npri/.

STEP 1

**FIGURE 6 REPORTING CRITERIA FOR PART 2 SUBSTANCES – 17 PAHs**

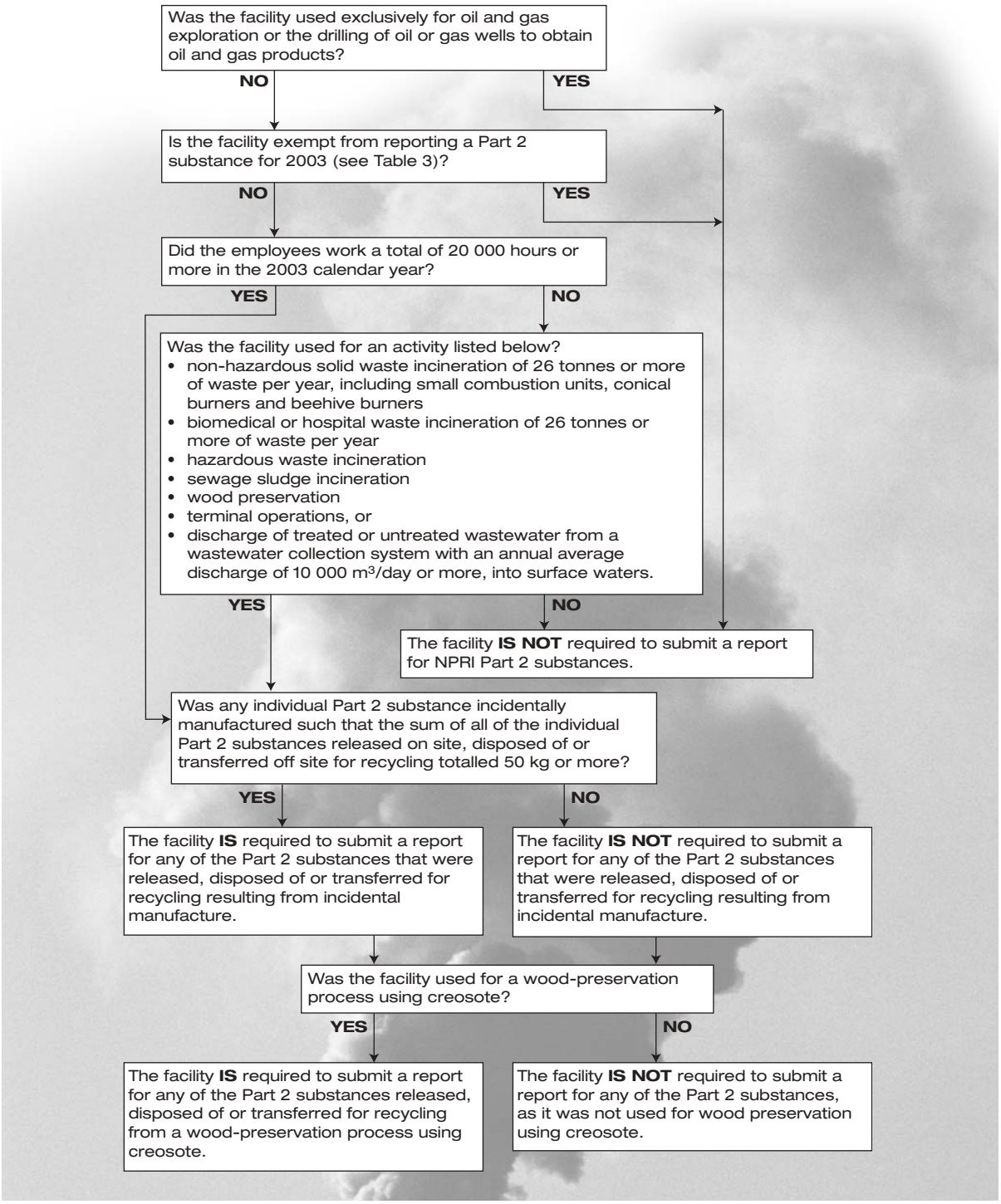



**TABLE 9 DIOXIN AND FURAN CONGENERS INCLUDED IN THE NPRI DIOXINS/FURANS GROUP**

| CAS No. | Name of Congener |
|---|---|
| | **Dioxins** |
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin |
| 3268-87-9 | Octachlorodibenzo-*p*-dioxin |
| | **Furans** |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran |
| 39001-02-0 | Octachlorodibenzofuran |

## 3.7 Reporting Criteria for Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB)

### *3.7.1 Overview*

Polychlorinated dibenzo-*p*-dioxins (PCDD or dioxins), polychlorinated dibenzofurans (PCDF or furans) and hexachlorobenzene (HCB) are released primarily as by-products of industrial and combustion processes, but are also found as contaminants in certain pesticides or chlorinated solvents. HCB may also be found as a contaminant in ferric chloride used for water or wastewater treatment. These substances have been identified as toxic substances under the CEPA 1999, and are slated for virtual elimination.

Facilities engaged in identified activities (see Table 10) have the potential to incidentally manufacture dioxins/furans or HCB and are therefore required to submit a report to the NPRI. The identified activities were selected by Environment Canada to cover all main point sources of dioxins/furans and HCB releases being targetted by the *Canada-wide Standards* initiatives for dioxins/furans and HCB. Reporting by limited sectors known to release these substances will capture all significant releases from such facilities, while minimizing reporting burden on other NPRI reporting facilities.

### *3.7.2 Substances*

**Dioxins/Furans**

A single substance report is required for the cumulative release of the 17 dioxins/furans congeners; these dioxins/furans congeners and their respective CAS numbers are listed in Table 9. There is no CAS number provided for the dioxin/furan group since the listing includes 17 individual dioxin and furan congeners. A congener is a compound belonging to a family of compounds having similar chemical structure, but differing in the number and position of hydrogen substitutes.

Because these 17 congeners have related, cumulative toxic effects, report on-site releases, disposals and off-site transfers for recycling of dioxins/furans as a group, in grams of international toxicity equivalent (TEQ) to the most toxic congener of dioxin (i.e., 2,3,7,8-tetrachlorodibenzo-*p*-dioxin). The quantity in grams of


TEQs of dioxins/furans released, disposed of or transferred for recycling is estimated by adding the individual units of TEQ for each congener. A more detailed description of TEQs and their calculation is provided in section 4.8.1 What Are Toxic Equivalents (TEQs) of Dioxins/Furans.

**Hexachlorobenzene (HCB)**
Hexachlorobenzene (HCB) has the CAS No. 118-74-1.

### *3.7.3 Units*

**Dioxins/Furans**
Report the cumulative quantity of the 17 congeners of dioxins/furans listed in Table 9 in grams of international toxic equivalent (g TEQ). TEQs are further discussed in section 4.8.1 What Are Toxic Equivalents (TEQs) of Dioxins/Furans?

**HCB**
You must report the quantities of HCB in grams (g).

### *3.7.4 Reporting Criteria*

The reporting criteria for dioxins/furans and HCB are summarized in Figure 7.

If a facility was "**engaged in**" an activity listed in Table 10, and the activity occurred at the facility at any time during the year, regardless of extent or the primary purpose of the facility, then the releases, disposals and transfers for recycling of dioxins/furans and HCB must be considered.

A facility is required to submit substance reports for dioxins/furans and HCB if:
- the facility was used for one of the activities identified in Table 5 **or** met the 20 000-hour employee threshold,

**AND**
- the facility was engaged in one of the activities listed in Table 10.

Facilities used primarily for incineration, or wood preservation using pentachlorophenol, are required to submit substance reports for dioxins/furans and HCB regardless of the number of employee hours worked. A facility used for terminal operations or wastewater collection does not automatically trigger dioxin/furan and HCB reporting. Wastewater collection facilities or terminal operations must also have been engaged in one of the activities in Table 10 to trigger reporting.

A description of what and how you must report is given in sections 4 and 5. Examples of estimation methods and reporting scenarios are provided in the *NPRI Toolbox*. **Special reporting requirements** for dioxins/furans and HCB are also outlined in 4.8 Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB).

### *3.7.5 Description of Activities Listed in Table 10*

**Table 10 Activities (20 000-hour employee threshold applies)**
The first four activities in Table 10 (a-d) were previously described. For a detailed description of waste incineration and its various classes, see 3.3.2 Activities to which the 20 000-hour Employee Threshold Does Not Apply. While reviewing the definitions for waste incineration, keep in mind that a facility with a primary business activity that is not incineration but which is nonetheless engaged in some form of incineration at the facility, is required to report for dioxins/furans and HCB only if it also met the 20 000-hour employee threshold.

**Smelting Activities**
Smelting includes the melting of raw or scrap materials (containing metals) to produce metal for further processing into metal products (i.e., castings, ingots, sheets, etc.). The smelting process is typically accompanied by a chemical change in which impurities are removed (i.e., the addition of flux to separate metals from other contaminants).

**FIGURE 7 REPORTING CRITERIA FOR PART 3 SUBSTANCES – DIOXINS/FURANS AND HCB**

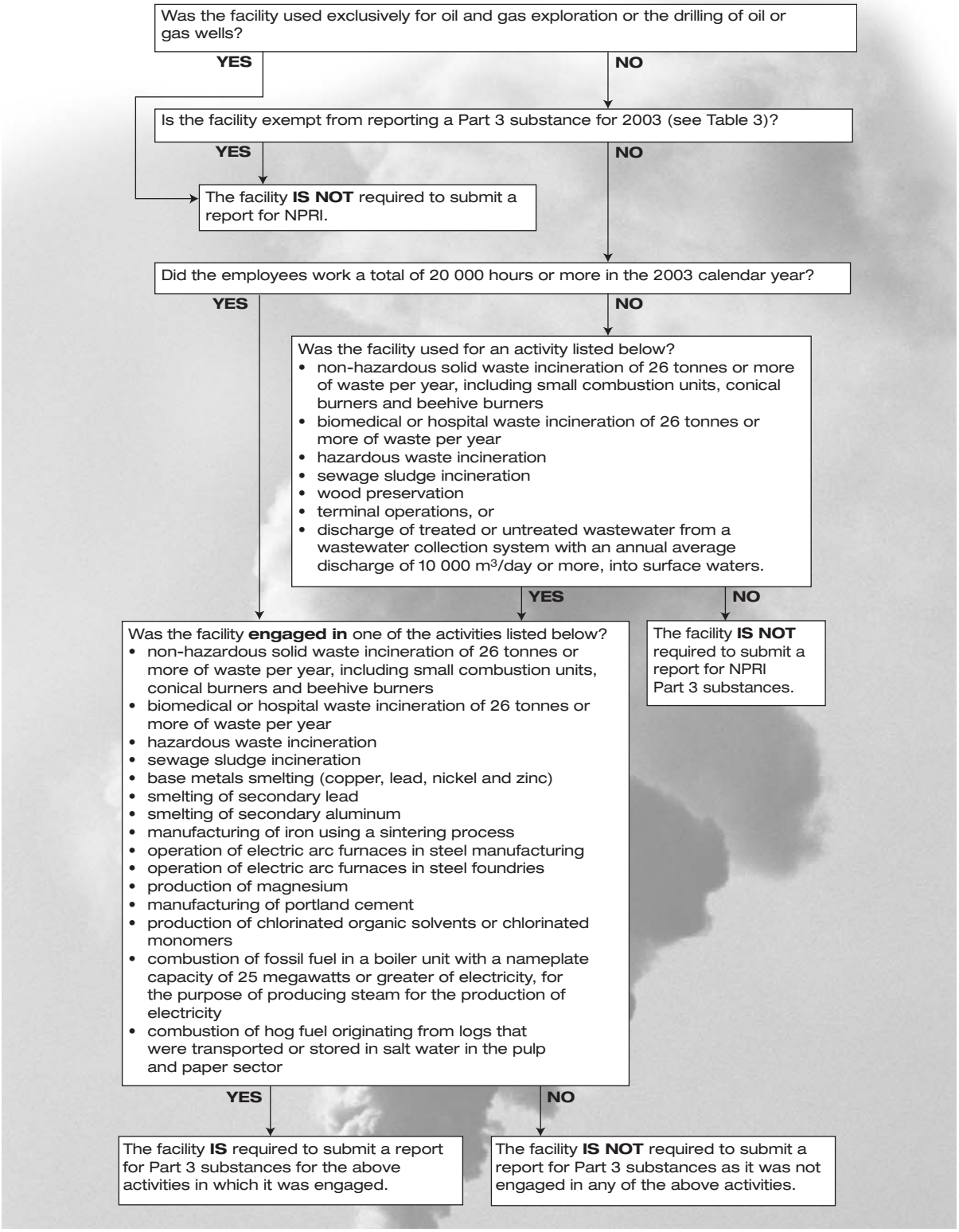



**TABLE 10 ACTIVITIES FOR WHICH DIOXINS/FURANS AND HCB REPORTS ARE REQUIRED (20 000-HOUR EMPLOYEE THRESHOLD APPLIES)**

| Activity |
|---|
| a) non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners |
| b) biomedical or hospital waste incineration of 26 tonnes or more of waste per year |
| c) hazardous waste incineration |
| d) sewage sludge incineration |
| e) base metals smelting (this refers to copper, lead, nickel and zinc) |
| f) smelting of secondary lead |
| g) smelting of secondary aluminum |
| h) manufacturing of iron using a sintering process |
| i) operation of electric arc furnaces in steel manufacturing |
| j) operation of electric arc furnaces in steel foundries |
| k) production of magnesium |
| l) manufacturing of portland cement |
| m) production of chlorinated organic solvents or chlorinated monomers |
| n) combustion of fossil fuel in a boiler unit, with a nameplate capacity of 25 megawatts or greater of electricity, for the purpose of producing steam for the production of electricity |
| o) combustion of hog fuel originating from logs that were transported or stored in salt water in the pulp and paper sector |
| p) combustion of fuel in kraft liquor boilers used in the pulp and paper sector |
| q) wood preservation using pentachlorophenol |

***e) Base metals smelting***

Base metals refer to copper, lead, nickel and zinc. This activity does not include smelting of aluminum or any other metals. It also does not include the smelting of secondary lead, which is a separate activity listed in Table 10 (see description below).

***f) Smelting of secondary lead***

Secondary lead refers to lead-bearing scrap or lead-bearing materials, other than lead-bearing concentrates derived from a mining operation. Facilities engaged in smelting of lead-bearing concentrates derived from a mining operation are considered to be base metal smelters (see description above).

***g) Smelting of secondary aluminum***

Secondary aluminum refers to aluminum-bearing scrap or aluminum-bearing materials. Secondary aluminum smelting involves two processes – pre-cleaning and smelting – both of which may produce emissions of dioxins/furans.

**Other Activities**

***h) Manufacturing of iron using a sintering process***

Sintering is the welding together and growth of contact area between two or more initially-distinct particles at temperatures below the melting point, but above one-half of the melting point (in Kelvin). In sintering operations, dioxins/furans may be formed as unwanted by-products during high-temperature decomposition and combustion of raw materials containing chlorine and organic compounds.

***i) Operation of electric arc furnaces in steel manufacturing***

In an electric arc furnace, material is heated by the heat energy released from an electric arc. The electric arc is a component of an electric circuit, like a resistor, but with its own peculiar characteristics. Dioxins/furans may be formed as unwanted by-products during high-temperature decomposition and combustion of raw materials containing chlorine and organic compounds.


***j) Operation of electric arc furnaces in steel foundries***
In an electric arc furnace, material is heated by the heat energy released from an electric arc, during which dioxins/furans and HCB may be formed.

***k) Production of magnesium***
Production of magnesium from magnesium chloride by electrolysis may result in the generation of dioxins/furans and HCB.

***l) Manufacturing of portland cement***
Portland cement is a fine greyish powder consisting of four basic materials – lime, silica, alumina and iron compounds. Cement production involves heating (pyroprocessing) the raw materials to a very high temperature in a rotating kiln to induce chemical reactions that produce a fused material called clinker. The cement clinker is further ground into a fine powder, then mixed with gypsum to form portland cement.

***m) Production of chlorinated organic solvents or chlorinated monomers***
This activity is limited to the intentional manufacturing of chlorinated organic solvents or chlorinated monomers, and does not include coincidental production.

***n) Combustion of fossil fuel in a boiler unit, with a nameplate capacity of 25 megawatts or greater of electricity, for the purpose of producing steam for the production of electricity***
Fossil fuel means a fuel that is in a solid or liquid state at standard temperature and pressure, such as coal, petroleum or any liquid or solid fuel derivatives. This activity includes electric power-generation utilities and large industrial facilities co-generating electric power using waste heat from industrial processes. It does not include combustion of natural gas or other fuels that are gaseous in form at ambient pressure and temperature. It also does not include diesel generators, which are not boiler units.

***o) Combustion of hog fuel originating from logs that were transported or stored in salt water in the pulp and paper sector***
Pulp and paper boilers burning salt-laden wood are unique to British Columbia. Dioxins/furans are emitted from the burning of salt-contaminated hog fuel. Logs transported and stored in salt water take up chlorine into the bark. The bark is stripped from logs and ground up with other waste wood to produce hog fuel. The material is then used as boiler fuel to produce heat and electrical energy for pulp and paper processes. The Canada-wide Standards for Dioxins and Furans state that every boiler covered by the Standards will be tested twice each year to determine the emissions of dioxins/furans to air for the years prior to 2003, and annually for the year 2003 and beyond.

***p) Combustion of fuel in kraft liquor boilers used in the pulp and paper sector***
A kraft liquor boiler burns black liquor, composed mostly of lignin, the residue from the digester in a kraft (sulphate) pulping process. The boiler recovers chemical products from the combusted black liquor, which are later recycled, and also produces steam which is used in mill process operations.

***q) Wood preservation using pentachlorophenol***
Pentachlorophenol (PCP), by its chemical structure, is a close surrogate to HCB. PCP is derived from HCB by substituting one of HCB's six chloro-substituents with a hydroxyl group. Given its chemical similarity to HCB and that its manufacturing ingredients contain the precursors for dioxin/furan production (i.e., chlorinated aromatics), the manufacture of PCP often results in the incidental manufacture of both HCB and dioxins/furans. Hence, dioxins/furans and HCB are present in PCP formulations used for wood preservation and may be released, disposed of or transferred for recycling when used for wood preservation.


## 3.8 Reporting Criteria for Part 4 Substances – Criteria Air Contaminants (CACs)

### *3.8.1 Overview*

Environment Canada implemented CAC emissions reporting (releases to air) beginning with the 2002 reporting year. Information on CAC emissions is required to enable governments to monitor and assess whether risk-management activities for various industrial sources of CACs are resulting in reduced emissions, and to support many domestic and international programs such as the:

- Canada-wide Standards for PM and Ozone
- Canada – US Air Quality Agreement
- Ozone annex to the Canada – U.S. Air Quality Agreement
- Canada-wide Acid Rain Strategy
- Convention on the Long-range Transport of Air Pollutants, and
- Development of Ambient Air Quality Objectives

Information on federal government actions is posted on Environment Canada's Clean Air Web site at www.ec.gc.ca/air/introduction_e.cfm.

### *3.8.2 Substances*

Provided their respective reporting criteria are met, substance reports are required for the seven CAC substances – nitrogen oxides, sulphur dioxide, carbon monoxide, volatile organic compounds, total particulate matter, particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$) and particulate matter with a diameter less than or equal to 10 microns ($PM_{10}$). The seven CAC substances and their respective CAS numbers, where available, are listed in Table 11.

**TABLE 11 CRITERIA AIR CONTAMINANTS**

| CAS No. | CAC Substance | Substance Threshold |
|---|---|---|
| 11104-93-1 | Nitrogen oxides, $NO_x$ (expressed as $NO_2$) | 20 tonnes |
| 7446-09-5 | Sulphur dioxide, $SO_2$ | 20 tonnes |
| 630-08-0 | Carbon monoxide, CO | 20 tonnes |
| * | Volatile organic compounds, VOCs [1] | 10 tonnes |
| * | Total particulate matter, TPM [2] | 20 tonnes |
| * | Particulate matter <= 2.5 microns, $PM_{2.5}$ [2] | 0.3 tonnes |
| * | Particulate matter <= 10 microns, $PM_{10}$ [2] | 0.5 tonnes |

[1] facilities that met the reporting threshold for VOCs are required to report their air emissions based on the total mass of all VOC substances emitted annually

[2] do not include emissions from road dust

* no single CAS No. applies to this substance

#### Nitrogen Oxides (expressed as $NO_2$)

Nitrogen and oxygen in air at high temperatures can combine to form nitrogen oxides ($NO_X$). Furthermore, fuel combustions and high temperatures, and industrial processes produce $NO_X$. In addition, nitrogen in fuel increases the amount of $NO_X$ produced. The atmospheric reactions involving $NO_X$ are complex. Nitrogen oxides play an important role in the formation of ground-level ozone. $NO_X$ can react with other contaminants (e.g., ammonia) to form $PM_{2.5}$. $NO_X$ is also a major component of acid rain.

Nitrogen oxides ($NO_X$) include both nitric oxide (NO) and nitrogen dioxide ($NO_2$). Since $NO_X$ is a mixture, both NO and $NO_2$ must be expressed on an $NO_2$-equivalent basis before the individual quantities are combined for the total $NO_X$ release. Do not include nitrous oxide ($N_2O$) when calculating your $NO_X$ release.


As with other CAC substances, the release concentration for $NO_X$ (expressed as $NO_2$) may be in units of parts-per-million volume (ppmv or ppm (volume)). Before you use this value to estimate your emissions, you will need to convert this value to tonnes. This is a two-step process. The first step is to convert the ppmv concentration to a mass-per-unit volume in $g/m^3$. Once the mass-per-unit volume is determined, the second step is to use the stack flow rate to determine an annual release value from that stack. This process is shown is detail in the *NPRI Toolbox*.

Emission factors for $NO_X$ are available from various emission factor databases and documents, such as the U.S. Environmental Protection Agency's (EPA's) Factor Information REtrieval (FIRE) database (version 6.23). More information on FIRE is provided in the *NPRI Toolbox*. Documents available from the U.S. EPA's *Compilation of Air Pollutant Emission Factors* (AP-42) provide further information on the use of the emission factors. If you are using an emission factor to determine your $NO_X$ release, it is important to determine how the emission is expressed. FIRE, for example, will give you the total $NO_X$ released already expressed as $NO_2$.

**Sulphur Dioxide**

Sulphur dioxide ($SO_2$) is a pollutant formed when sulphur is oxidized and emitted to the atmosphere. Fuel containing sulphur emits $SO_2$ when it is burned. Common sulphur-containing fuels include coal and oil. $SO_2$ is also released during metal smelting and other industrial processes. Like $NO_X$, $SO_2$ is a precursor to the formation of particulate matter and, subsequently, smog. It is also a major component of acid rain.

Sulphur dioxide belongs to the sulphur oxide ($SO_X$) family of gases. However, reporting to the NPRI is only required for $SO_2$, not $SO_X$. Therefore the quantity of sulphite or sulphur trioxide ($SO_3$) and sulphate ($SO_4$) released at your facility should not be considered when calculating your $SO_2$ release. However, sulphuric acid ($H_2SO_4$) is listed in the NPRI as a Part 1A substance and all air releases of sulphuric acid should be considered in the Part 1A calculation for sulphuric acid.

If you are using emission factors to determine your $SO_2$ release, note that the emissions estimation documents and the FIRE database provide some emission factors for both $SO_2$ and $SO_X$. Ensure that you use the most applicable emission factor. However, if you only have access to a $SO_X$ emission factor for your process, you can use this emission factor, since the concentration of the other sulphur oxides in the total is generally low.

**Carbon Monoxide**

Carbon monoxide is a colourless, odourless, poisonous gas formed during the incomplete combustion of carbon. The rate of carbon monoxide (CO) emissions from combustion sources depends on the overall oxidation efficiency of the carbon to carbon dioxide. The presence of CO in the exhaust gases of combustion systems results primarily from incomplete fuel combustion.

**Volatile Organic Compounds (VOCs)**

Volatile organic compounds (VOCs) are substances that can photochemically-react in the atmosphere. In addition, VOCs are precursors to the formation of secondary particulate matter and ground-level ozone. For NPRI purposes, VOCs that do not photochemically-react significantly (outlined in Appendix 5) are not included in calculating VOC air releases.

There are many industrial and commercial sources of VOCs, such as loading and unloading of petroleum products, petroleum spills, process venting, spill remediation, flaring of untreated natural gas, evaporative losses from storage tanks, painting and stripping activities, degreasing activities, burning fuel (e.g., oil, wood, coal, natural gas), solvents, wood preservatives and stored fuels.


**TABLE 12 SOME EXAMPLE CATEGORIES OF VOLATILE ORGANIC COMPOUNDS**

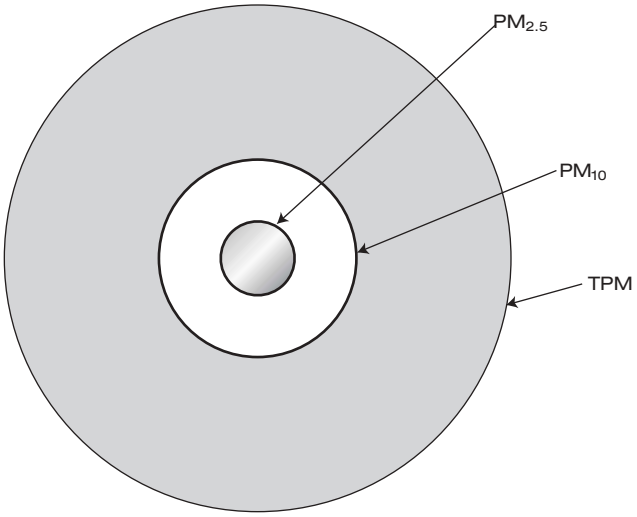
| Category | Example Compounds |
|---|---|
| Alcohols | Ethanol |
| | Isopropyl alcohol |
| | Methanol |
| Alkanes | *n*-Butane |
| | Propane |
| | Octane |
| Alkenes | Ethylene |
| | Propylene |
| | Isobutene |
| | trans-2-Pentene |
| Alkynes | Acetylene |
| Aromatics | Benzene |
| | Benzo(a)pyrene |
| | Fluoranthene |
| | Toluene |
| | 1,2,4-Trimethylbenzene |
| | Xylene (all isomers) |
| Aldehydes | Formaldehyde |
| | Acetaldehyde |
| Ketones | Methyl isobutyl ketone |
| Ethers | Methyl *tert*-butyl ether |
| | Tripropylene glycol monomethyl ether |

The NPRI uses the definitions of VOC as proposed under CEPA 1999 (refer to Appendix 5). This VOC definition includes a list of individual and classes of substances that do not fall under the VOC definition and should not be considered in your threshold calculations or when reporting VOC emissions to the NPRI.

For the purposes of reporting to the NPRI, it is important to note that:

- VOCs are a class of substances that are not limited to the approximately 100 VOC substances listed in the NPRI with either a 10-tonne manufacture, process and other use reporting threshold or an alternative reporting threshold. You must consider these VOC substances in your threshold calculations for VOCs and **ALL** other VOC substances emitted at your facility during 2003.
- substances that are considered VOCs include, but are not limited to, acetic acid, acetylene, acrolein, aniline, ethylene glycol, hexane (all isomers), methyl ethyl ketone, mineral spirits, heavy and light aromatic solvent naphtha, octane (all isomers), other petroleum distillates, phenol, propylene, Stoddard solvent, styrene, trichloroethylene, vinyl acetate and vinyl chloride. Refer to Table 12 for examples of VOC categories and other VOC substances.
- when reporting to the NPRI, your estimate for VOCs emitted to air should be based on **the total mass of all VOC substances** that are emitted annually at your facility.
- In addition to VOCs, facilities may be required to report individual VOCs (species) contained in the VOCs emission reported in Part 4. Refer to 3.9 Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds (VOCs) for more information.


**FIGURE 8 SIZE FRACTIONS OF PARTICULATE MATTER**




**Particulate Matter**

Particulate matter is any solid particle found in the air. Particulate matter in the atmosphere reduces visibility and forms haze. Smaller-sized particulate matter can be inhaled and may cause respiratory problems. Particulate matter may be released directly into the atmosphere or formed secondarily in the atmosphere from precursors as a result of physical or chemical transformations. Primary particulate matter (Primary PM), as measured using U.S. EPA method 5 or 5a, includes both filterable and condensable PM. Only **filterable PM** is to be reported to the NPRI. Emission factors exist for primary PM, condensable PM and filterable PM; ensure you are using the correct factor. Road dust emissions are not to be included in your particulate matter estimates or when reporting to the NPRI.

The NPRI requires reporting for three size fractions of particulate matter:

- total particulate matter with a diameter less than 100 microns (TPM)
- particulate matter with a diameter less than or equal to 10 microns ($PM_{10}$),

**AND**

- particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$).

As shown in Figure 8, the TPM fraction includes $PM_{10}$ and $PM_{2.5}$, while $PM_{10}$ includes $PM_{2.5}$. For this reason, it is impossible for $PM_{2.5}$ or $PM_{10}$ releases to exceed TPM because TPM includes both of these fractions. It is also impossible for $PM_{2.5}$ releases to exceed $PM_{10}$ as $PM_{10}$ includes $PM_{2.5}$. Therefore, a calculation error has occurred if $PM_{2.5}$ releases exceed $PM_{10}$ or TPM. Emission factors are published for each of the specific particulate fractions. As such, at no time should the particulate emissions estimated by each fraction-specific emission factor be added together. For example, $PM_{10}$ should never be added to $PM_{2.5}$. Likewise, $PM_{10}$ and $PM_{2.5}$ should never be added to yield TPM.

$PM_{10}$ may be released directly into the atmosphere or formed secondarily in the atmosphere from precursors as a result of physical or chemical transformations. $PM_{2.5}$, also referred to as fine particulate, is the fraction of particulate matter recognized as having the greatest effect on human health.


Particulate matter is formed in various industrial and non-industrial processes. Some common sources of particulate matter include burning of fuels in combustion units, separation processes, land treatment, mine tailings and storage piles. Wet stacks release considerable amounts of water/steam into the atmosphere from which particulate matter can form. However, for the purposes of the NPRI, TPM, $PM_{10}$ and $PM_{2.5}$ emissions should be reported on a dry basis.

In some cases, there may be TPM emissions available (from testing or emission factors) but no size distribution. The U.S. EPA has software available, PM Calculator, which contains particle size distribution information and size-specific control information for control devices. This software may be used to estimate the $PM_{10}$ and $PM_{2.5}$ emissions from a process. The software can be found on the U.S. EPA's Web site at www.epa.gov/ttn/chief/software/pmcalc/index.html/. Read the documentation accompanying the software for information on preparing the input files.

In other cases, emission factors are available for $PM_{10}$ and $PM_{2.5}$, but not for TPM. In the absence of other information, the $PM_{10}$ emission factor may be assumed to be the same as the TPM emission factor. Similarly, if an emission factor is only available for $PM_{2.5}$, that factor can be used for $PM_{10}$ and TPM estimates.

### *3.8.3 Units*

Report quantities for CACs released to air in tonnes.

### *3.8.4 Reporting Criteria*

The reporting criteria for CACs are described in Figure 3.

If your facility was engaged in an activity exempt from reporting NPRI Parts 1 through 3 substances, you may be required to report for CAC emissions from stationary combustion equipment. For the purposes of the NPRI, stationary combustion equipment includes any combustion equipment which needs to be stationary to function or operate properly or is not capable of self-propulsion. For example, a portable generator which had to be hard wired into the process and bolted down to eliminate vibrations during operation would be considered stationary. Both internal and external combustion equipment should be considered in the stationary combustion equipment category.

### *3.8.5 Sources of CAC Emissions to Consider When Determining if your Facility Met the Threshold*

The first step in determining is your facility met the CAC reporting threshold is to identify what emission sources should be included in your calculation. Two possible scenarios must be considered. In Case 1, all CAC emission sources at the facility must be included in the calculation; in Case 2, only the releases from the stationary combustion equipment at the facility must be included. Each case is described below.

#### CASE 1 – Consider All Sources of CAC Emissions at the Facility

You are required to consider **all** sources of CAC emissions at your facility, including stationary combustion equipment, if your facility met the following criteria:

- a contiguous facility or offshore installation at which employees worked 20 000 hours or more,

**OR**

- a facility used for an activity listed in Table 5, regardless of the hours worked by employees.

Additionally, CAC emissions from stationary combustion equipment used in the activities listed in Table 5 must be included when determining whether your facility met a CAC threshold and when reporting to the NPRI. However, emissions from the sources listed in Table 4 should not be included in your estimate.

#### CASE 2 – Only Consider CAC Emissions from Stationary Combustion Equipment

Facilities only need consider emissions from stationary combustion equipment if:

- employees worked less than 20 000 hours,

**OR**

- the facility was used exclusively for an activity listed in Table 3,


**OR**

- the facility is a pipeline installation.

***Exclusion from Reporting for CASE 2 Facilities***

If you are a Case 2 reporter, you are **not** required to submit a report to the NPRI for any CAC, if **all** the following criteria are met:

- the CAC substances were only emitted to air at the facility from stationary, external combustion equipment,

**AND**

- the cumulative nameplate capacity of **all** stationary, **external** combustion equipment was less than 10 million BTU/hour (10.55 million kJ/hour),

**AND**

- the only type of fuel combusted in that equipment was commercial grade natural gas, liquefied petroleum gas, Number 1 or 2 fuel oil or any combination thereof.

This exclusion does not apply if any fuel other than commercial grade natural gas, liquefied petroleum gas, Number 1 or 2 fuel oil or any combination thereof was also burned in the stationary, external combustion equipment. Definitions for important terms used in the exclusion can be found in the glossary.

A report is required for each CAC substance emitted (released to air) in a quantity greater than or equal to the threshold listed in Table 11.

In contrast to the majority of NPRI substances, the thresholds for CAC emissions are based on the quantity released to air, rather than on the quantity manufactured, processed or otherwise used. When reporting to the NPRI for the 2003 reporting year, facilities meeting the reporting thresholds for CACs (e.g., VOCs) are required to report their air emissions based on the total mass emitted during the year.

### *3.8.6 Sources of CACs*

#### Stationary Combustion Equipment and Other CAC Sources

The NPRI requires reporting for stationary combustion equipment at the facility. For the purpose of reporting to the NPRI, stationary combustion equipment refers to any combustion equipment which needs to be stationary to function or operate properly or is not capable of self-propulsion. Both internal and external combustion equipment can fall into the stationary category.

The sum of the contribution from a number of smaller sources should not be overlooked. If your facility has a number of smaller sources, you are still required to calculate your combined release from all sources to determine if you are required to submit a report to the NPRI for CACs.

#### External Combustion Equipment

An external combustion unit is defined as any equipment with a combustion process that occurs at atmospheric pressure and with excess air. Equipment that may fall within this definition includes heaters, furnaces, incinerators, boilers, flares, combustion chambers, external combustion engines such as steam engines and Stirling engines, steam/electric generating plants and other commercial units.

#### Internal Combustion Equipment

Internal combustion units are identified as those in which combustion of the fuel takes place in a confined space and above atmospheric pressure. The expanding gases produced by the combustion are used to provide mechanical power. Some examples of stationary, internal combustion equipment include, but are not limited to, gas turbines, natural gas-fired reciprocating engines, gasoline and diesel industrial engines and large, stationary diesel and dual-fuel engines.


### Storage Tank Emissions

CAC emissions may result from any storage tank containing fuels, solvents, hydrocarbons, paints and other solutions that contain VOC substances. The emissions are the result of the evaporation of stored substances. The rate of evaporation depends on the type of storage tank, ambient conditions, as well as the vapour pressure of the substance(s). Generally, there are six basic tank designs that are used for organic liquid storage vessels – fixed roof (vertical and horizontal), external floating roof, domed external (or covered) floating roof, internal floating roof, variable vapour space, and pressure (low and high). A brief description of each tank and its associated vapour-loss mechanisms is provided in Appendix 6. As noted in Table 3, do not consider emissions resulting from the distribution, storage or retail sale of fuels, except as part of terminal operations, when reporting Parts 1A through 3 substances.

The U.S. EPA's TANKS software may be used to estimate emissions from storage tanks. For common fuels, there is default information available. Otherwise, the procedure outlined in the U.S. EPA's documentation should be followed.

### Other Sources of Emissions

Combustion is not the only source of CAC emissions. It is, however, the major source of industrial and commercial CAC emissions. To assist in identifying other sources at your facility, the following section has been prepared. Note that the sources discussed in this section do not constitute a comprehensive list. CAC emissions from sources other than those discussed here should be considered when determining if the facility met the substance threshold.

- ***Storage Piles***

Storage piles are a source of fugitive CAC emissions because handling of the piles generates particulate matter emissions. Pile moisture content, age of pile and proportion of aggregate fines, all exert an impact on total emissions released from a storage pile.

To calculate the release from a storage pile, use the following equation:

$$E = k * (0.0016) * [(U/2.2)^{1.3} / (M/2)^{1.4}] \text{ kg/tonne}$$

Where:
E = emission factor, kg/tonne
k = particle size multiplier (dimensionless)
U = mean wind speed, metres per second (m/s)
M = material moisture content (%)

Once the emission factor is calculated using the equation above, multiply it by the number of tonnes of the substance in the storage pile.

Refer to Chapter 13, subsection 13.2.4, in the U.S. EPA's AP-42 document for further information on emissions from these sources. [Reference: www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-4.pdf]

- ***Loading/Unloading***

Fugitive CAC emissions can result from the loading and unloading of vehicles or containers. If the material being transferred is a liquid, the resulting emissions would likely be in the form of VOCs. If the material is a solid, the resulting emissions would likely be in the form of particulate matter. Emission factors are available for calculating the release from loading or unloading either a solid or liquid material. [Reference: www.epa.gov/ttnchie1/eiip/techreport/volume03/iii12_apr2001.pdf]

- ***Fermenting***

The process of fermentation involves the use of yeast, bacteria, enzymes, etc., to break down complex organic compounds into intermediate or final products. Many industries use the fermentation process, including those involved in the production of bread, spirits, pharmaceuticals and fuel, beer and wine making,


and environmental bioremediation processes. Emission factors and mass balances can be used to estimate the CAC emissions using the formula presented in the U.S. EPA's methodology. [Reference: www.epa.gov/ttn/chief/ap42/ch09/final/c9s09-6.pdf]

• ***Painting***
Volatile organic compounds are released from paint during its application and drying. This category includes, but is not limited to, the painting of vehicles, storage tanks and any other painted product.

It is possible to estimate the release by assuming that the entire VOC content of the paint and solvents is released. The percentage of VOCs in the paint and solvents used should be listed on the MSDS for the products. The total release then would be equal to the VOC percentage multiplied by the total weight of the paint used. *Generic* emission factors are also available for painting and coating processes. However, consult the coatings' manufacturer to determine if an emission factor specific to the product used is available. [References: www.epa.gov/ttn/chief/eiip/techreport/volume02/ii07_july2001.pdf and Chapter 4.2 of AP-42 concerning Surface Coating.]

• ***Abrasive Blasting***
Abrasive blasting is the process of cleaning or texturing materials such as metals and ceramics with an abrasive material. Sand is the common abrasive used in blasting. However, coal, smelter slag, mineral, metallic and synthetic abrasives are also used. The blasting process itself is a source of particulate matter emissions, especially $PM_{10}$ and $PM_{2.5}$. Emission factors and mass balances can be used to estimate CAC emissions using the formula presented in the U.S. EPA's methodology.
[Reference: www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-6.pdf]

• ***Equipment Leaks***
Equipment connections, joints and interfaces can be the source of both gaseous and liquid releases. If the equipment is handling a gaseous stream containing a CAC substance, the gaseous leak would result in a fugitive CAC release. Depending on the properties of a liquid (such as vapour pressure, temperature and pressure), the liquid release may also result in a fugitive CAC emission. Emission factors are available for estimating the release of CAC substances from equipment leaks.
[References: www.epa.gov/ttn/chief/eiip/techreport/volume02/ii04_a.pdf and www.epa.gov/ttn/chief/eiip/techreport/volume02/ii04_b.pdf]

• ***Open Burning***
Open burning consists of the burning of any material in a pit or pile, including the open burning of fuel used for fire-fighting training purposes. The material being burned is not contained in any structure and is completely open to the atmosphere. Open burning can release any or all seven of the CACs. Emissions from this activity are often estimated using emission factors.
[Reference: www.epa.gov/eiip/techreport/volume03/iii16_apr2001.pdf]

If no specific information is available on open burning of fuel for fire training, emission factors developed for specific fuels combusted in boilers can be used interchangeably to estimate emissions from the open burning of fuel. Information on fire training and open burning of certain fuels can be found on the Australian NPI Web site at www.npi.gov.au/index.html.

• ***Solvent Use***
Solvent use includes, but is not limited to, solvent degreasing, waste solvent reclamation, fugitive emissions during product formulation and commercial solvent use. Many solvents contain VOCs which are released during use and storage through evaporation. Emission factors, mass balances, and engineering estimates are often used to estimate VOC emissions from solvent use.
[Reference: www.epa.gov/ttn/chief/ap42/ch04/final/c4s06.pdf]

Methods of estimation commonly used to calculate CAC emissions and the effect of pollution-control equipment are provided in the *NPRI Toolbox*.


## 3.9 Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds (VOCs)

### *3.9.1 Overview*

The key driver for collecting data on emissions of individual VOC species is to assist regional air quality modelling. Additional drivers for collecting VOC speciation emissions include domestic and international programs that require information on emissions, trends and forecasts such as the:

- Canada-wide Standard for Ozone
- Canada-wide Acid Rain Strategy
- Ozone Annex to the Canada – U.S. Air Quality Agreement
- Convention on the Long-range Transport of Air Pollutants
- Development of Ambient Air Quality Objectives, and
- International Joint Commission

VOC emissions also influence atmospheric chemistry by contributing to the formation of ground-level ozone. Elevated levels of ground-level ozone and certain VOC species, in turn, diminish air quality, thereby compromising human health.

### *3.9.2 Substances*

VOCs, as their name implies, are an aggregate grouping of almost 1 000 organic substances that readily volatilize. The list of species increases as new compounds are discovered which contribute to the formation of ground-level ozone and secondary PM. VOC speciation reporting with respect to the NPRI requires that facilities account for and report releases of some of the individual VOCs comprising VOC emitted.

Sixty individual VOCs have been added to the NPRI beginning in the 2003 reporting year. These speciated VOCs (Part 5 substances) are listed in Appendix 1.

### *3.9.3 Units*

Report quantities for speciated VOCs released to air in tonnes.

### *3.9.4 Reporting Criteria*

Speciated VOC reporting only needs to be considered by facilities that met the 10-tonne air-release threshold for VOCs under the reporting criteria for Part 4 substances. If this threshold was met, the facility must determine whether it needs to report for any of the VOCs listed in Part 5. To minimize the reporting burden, a minimum threshold of 1 tonne was established for speciated VOC reporting. Therefore, if a facility met the 10-tonne VOCs threshold, it must report for all VOCs listed in Part 5 that were released to air in a quantity greater than or equal to 1 tonne.


You now have completed Step 1 and should know whether you are required to report to the NPRI and, if so, for which substances.

**Note that if your facility met the reporting criteria, you must submit a report even if on-site releases, disposals or off-site transfers for recycling of NPRI substances were zero.**

Threshold calculations for Part 1-3 substances do not need to be reported to the NPRI. Their purpose is to determine the substance(s) for which a facility is required to report on-site releases, disposals and off-site transfers for recycling. Keep this information in your files. Persons reporting to the NPRI for 2003 are required to retain copies of all information on which their report was based, including any calculations, measurements or other data, at the facility or parent company in Canada, for three years.

**If You Are Required to Report**

If you have determined that you are required to report for your facility, continue to Step 2. You will also need to consult the NPRI Software Guide in order to prepare and submit your NPRI report. If you have questions, contact your regional NPRI office (see listings on the inside front cover).

You are legally required to submit your NPRI report and a signed Statement of Certification to your regional NPRI office, postmarked, courier-dated or e-mailed no later than **June 1, 2004**. If you do not have access to a computer, a paper reporting form can be provided by your regional NPRI office. Extra copies of the reporting package can also be ordered from your regional NPRI office. Note: Use of the paper forms frequently results in reporting errors and subsequent follow-up by Environment Canada. Use of the reporting software is strongly recommended.

**If You Are Not Required to Report**

If you have concluded that you are not required to report for your facility, either because it was used for an exempt activity or it did not meet all reporting criteria, advise your regional NPRI office (listed on the inside front cover) to update its records and mailing lists.

**Facilities that submitted a report to the NPRI for the 2002 reporting year are legally required to notify Environment Canada if they are not required to report for the 2003 reporting year.**

# 4. Step 2 – Estimate releases, disposals and transfers for recycling and collect the information required for the NPRI report

The second step is to estimate your releases, disposals and transfers for recycling and collect the information required to complete the NPRI report. This section outlines different methods and sources of information available to assist you in estimating releases, disposals and transfers for recycling of NPRI substances for which you are required to report.

Note that the reporting criteria for Part 1A and 1B NPRI substances apply to manufacture, process or other use activities. **However, it is the quantity of releases, disposals and transfers for recycling of the substance that must be reported to the NPRI.**


The 2003 Canada Gazette notice states that the information required by the NPRI need only be reported to the Minister of the Environment if the facility owner or operator possesses the information or may reasonably be expected to have access to the information. **Consequently, the NPRI does not require additional monitoring or measurement of the quantities or concentration of substances released to the environment, beyond those already required under the provisions of other laws or regulations.** You are, however, required to show "due diligence" in obtaining the information required by the 2003 *Canada Gazette* notice.

## 4.1 Retain Information Collected

Persons reporting to the NPRI for 2003 are required to retain copies of all information upon which their report was based, at the facility or parent company in Canada, for three years.

## 4.2 Sources of Information

### *4.2.1 Technical Guides*

The References and Bibliography section contains a list of technical guidance documents that can be consulted for information on certain substances or processes. This includes technical guides prepared by Environment Canada, the U.S. EPA and industry associations. The *NPRI Toolbox* contains examples, additional guidance, and descriptions of tools available to assist you with your threshold calculations.

Environment Canada has also prepared a guidance document for the wastewater sector titled "*National Pollutant Release Inventory Guidance Manual for the Wastewater Sector 2003*". This document helps wastewater collection facilities estimate on-site releases, disposals and off-site transfers for recycling of NPRI substances commonly released by this sector.

In addition, Environment Canada has published a technical guide to assist facilities in the wood-preservation sector estimate their releases of certain substances. The document, *"Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory"*, provides a step-by-step methodology for estimating releases, disposals and transfers for recycling of NPRI substances from wood-preservation facilities, including PAHs, dioxins/furans and HCB. This document does not cover all CACs released from the wood preservation process. Chapter 10.8 (Wood Preserving) of the U.S. EPA's AP-42 document can be consulted for assistance with estimating other CAC releases, as well as PAHs, from the wood-preservation process.

These guides are available on the NPRI Web site at www.ec.gc.ca/npri/ in electronic form. They are also available in hard copy from your regional NPRI office.

#### *4.2.2 Material Safety Data Sheet (MSDS)*

A Material Safety Data Sheet (MSDS) is an important source of information on the composition of a purchased product. Suppliers of hazardous materials are required, as part of the Workplace Hazardous Materials Information System (WHMIS), to supply MSDSs on request. Note that the goal of the MSDS is to protect the health of the workers, not the environment. Therefore, an MSDS may not list all product ingredients which may be reportable to the NPRI.

#### *4.2.3 Factor Information REtrieval Database*

The U.S. EPA's Factor Information REtrieval (FIRE) database contains emission factors for a number of NPRI substances including, but not limited to, CACs, mercury (and its compounds), individual PAHs, dioxins/furans and HCB. The database is further explained in the *NPRI Toolbox*.

If you are a member of a regional or national industry association, you may also have access to emission factors, guidance and other calculation tools through that organization.

#### *4.2.4 Permits and Certificates of Approval*

Another source of information on substances at your facility may be municipal, provincial, territorial or regional operating permits and certificates of approval you have obtained.


## 4.3 Method Detection Limit (MDL)

There are several situations in which the issue of measurements below the detection limit, or method detection limit (MDL), arises in NPRI reporting. The MDL is the smallest concentration of the substance under analysis (analyte) that produces an instrumental response and that meets all analyte detection and identification criteria of a specified test method.

#### Dealing with Multiple Data Points and Non-detected Values

Facilities must use reasonable judgment as to the presence and amount of an NPRI-listed substance based on the best readily-available information. An indication that a reportable substance was below the MDL is not equivalent to stating that the substance was not present. If it is known that the substance was present, a concentration equivalent to half of the MDL should be used. Persons at a facility should not estimate releases solely on measurement or monitoring devices; they should also rely on their knowledge of specific conditions at the facility.

Where, during the year, multiple measurements of a substance in a given process stream were all below the MDL, and the facility has no other reason to believe that the substance was present, the facility should assume that the concentration of the substance in that process stream was zero.

Where, over a year, multiple measurements were taken in a given process stream and some indicated that the substance was above and some were below the MDL, the facility has good reason to assume that the substance was present. The facility should, therefore, use a concentration value of half the MDL for those measurements where the concentration was below the MDL.

## 4.4 Methods of Estimation

Estimates of the quantity of a substance that was manufactured, processed or otherwise used, and the quantity that was released on site, disposed of or transferred off site for recycling, may be based on one of the following methods:

- Continuous Emission Monitoring Systems (CEMS)
- Predictive Emission Monitoring (PEM)
- Source Testing
- Mass Balance

- Site-specific Emission Factor
- Published Emission Factor,

**OR**

- Engineering Estimates

When you report on-site releases to each environmental medium, disposals and off-site transfers for recycling, you will enter the method of estimation in the NPRI reporting software. A description of the available estimation methods is provided below; examples employing these estimation methods are provided in the *NPRI Toolbox*.


### *4.4.1 Continuous Emission Monitoring Systems (CEMS)*

Continuous Emission Monitoring Systems record emissions/releases over an extended and uninterrupted period. Various methods are employed to measure the concentration of contaminants in the effluent or gas stream. Once the contaminant concentration and the flow rate have been determined, release or emission rates can be calculated by multiplying the contaminant concentration by the discharge flow rate or volumetric stack gas flow rate. Annual releases of the contaminant can then be estimated by multiplying the contaminant concentration by the annual flow rate of the discharged effluent or gases in the stack or duct.

### *4.4.2 Predictive Emission Monitoring (PEM)*

Predictive Emission Monitoring is based on developing a correlation between contaminant release/emission rates and process parameters (e.g., fuel usage, steam production, furnace temperature). PEM may be considered a hybrid of continuous monitoring, emission factors and stack tests. A correlation test must first be performed to develop the relationship between contaminant emission rates and process parameters. Releases/emissions can then be calculated or predicted using process parameters to predict release/emission rates based on the results of the initial source test.

### *4.4.3 Source Testing*

Source testing involves collecting a sample of the emission or effluent, and then determining the concentration of one or more substances in the sample. The concentration of the substance(s) of interest would then be multiplied by the volumetric flow rate to determine the amount of the substance(s) emitted over time. Source testing of air emissions generally involves inserting a sampling probe into the stack or duct to isokinetically collect a volume of exhaust effluent. The contaminants are collected in or on various media and subsequently analyzed. For liquid effluents, grab samples or 24-hour composite samples are extracted from the effluent stream.

Source testing is often conducted as a regulatory requirement for provincial, territorial or regional authorities.

### *4.4.4 Mass Balance*

Mass balances apply the law of conservation of mass to a facility, process or piece of equipment. If there is no accumulation, then all the materials that go into the system must come out. Releases are determined from the difference in the input and output of a unit operation where the accumulation and depletion of a substance are included in the calculations.

The general equation for a mass balance is:

$$M_{in} = M_{out} + M_{accumulated/depleted}$$

Where:

$M_{in}$ = Mass of compound in the raw material feed

$M_{out}$ = Mass of compound in the finished product and released to air, land and water

($M_{out} = M_{product} + M_{emitted}$)

$M_{accumulated/depleted}$ = Mass of compound accumulated or depleted in the system

The reliability of release estimates based on mass balances is dependent on the source type considered. Mass balance methods may be a preferred method for some releases, such as solvent loss from coating applications and solvent use. This method may not be suitable for many other sources, such as in cases where chemical transformation of the input streams occurs in the process.

Mass balance methods may or may not account for emission controls, depending on the system, process or operation to which the mass balance is applied. Care should be taken to ensure that pollution-control equipment is taken into account when performing mass balance calculations.

### *4.4.5 Site Specific and Published Emission Factors*

Emission factors' are available for many emission-source categories and are generally based on the results of source-sampling tests performed at one or more facilities within a specific industry. Generally, emission factors relate the quantity of substances emitted from a source to some common activity associated with those emissions. Emission factors have been published by government agencies and industry associations for application to emission sources in their particular jurisdiction or industrial sector. Industrial facilities may also develop their own site-specific emission factors using emission-testing data and source-activity information. For a particular piece of equipment, specified emission factors may be available from the manufacturer or sales centre. When completing the report, you must specify whether a site-specific emission factor or published emission factor was used.


The basic equations to determine emissions from emission factors are as follows:

$$E_X = BQ \times CEF_X \quad \text{or} \quad E_X = BQ \times EF_X \times \frac{100 - CE_X}{100}$$

Where:
$E_X$ = Emission of contaminant x, kg
BQ = Activity rate or base quantity (BQ), base quantity unit
$CEF_X$ = Controlled emission factors of contaminant x, kg/BQ unit
(value is dependent on the external control device installed)
$EF_X$ = Uncontrolled emission factors of contaminant x, kg/BQ unit
$CE_X$ = Overall emission control efficiency of contaminant x, %

The Factor Information REtrieval (FIRE) database is a comprehensive depository of process-specific emission factors. The database is further explained in the *NPRI Toolbox*.

Other emission factors for NPRI substances can be located in the Locating and Estimating Documents listed in the References and Bibliography section of this Guide.

When making use of emission factors, ensure that you note the units and convert if necessary.

### *4.4.6 Engineering Estimates*

#### General

In many cases, sound engineering assessment is the most appropriate approach to determine process factors and base quantity values. Releases can be estimated from engineering principles and judgment, using knowledge of the chemical and physical processes involved, the design features of the source, and an understanding of the applicable physical and chemical laws. The reliability of these estimates depends on the complexity of the process and the level of understanding of its physical-chemical properties. To apply an engineering assessment method, there are four basic principles which should be followed:

- review all data pertaining to the specific source and to the industrial sector in general
- use this data to provide gross approximations and refine these using sound engineering principles as data become available to provide more accurate estimations

- whenever possible, alternate methods of calculation should be followed to cross-check each level of approximation, and
- employ good record keeping by documenting all related information for further emission refinement when more accurate data become available.

### Emission Models

Emission estimation models, also known as emission estimation tools, are equipment-specific and may be available from process developers and designers, government agencies or others.

Emission models generally require detailed input such as equipment specifications, process and environmental conditions and other factors that affect emissions. Generally, these models also have default input parameters, such as meteorological data, which can be used when site-specific information is not available. Care should be taken to review the default data to determine their applicability to local conditions. The resulting estimates should be reviewed to ensure their accuracy.


## 4.5 Part 1A Substances

If the reporting criteria are met for an NPRI Part 1A substance, then **all** on-site releases, disposals and off-site transfers for recycling for that substance must be reported **regardless of the concentration or quantity.** The facility is required to submit a substance report even if on-site releases, disposals or off-site transfers for recycling were zero. You must account for total releases of Part 1A substances from your facility to each environmental medium (air, water and land).

Examples of estimating releases, disposals and transfers for recycling are provided in the NPRI Toolbox; "Basis of Estimate" reporting is explained in the *NPRI Software Guide*.

## 4.6 Part 1B Substances

Part 1B substances include mercury [1], cadmium [1], arsenic [1], hexavalent chromium compounds, lead [2] and tetraethyl lead. If the reporting criteria are met for a Part 1B substance, according to the concentration and mass thresholds outlined in Table 7, then **all** on-site releases, disposals and off-site transfers for recycling of the Part 1B substance must be reported **regardless of the concentration or quantity**. The facility is required to submit a substance report even if on-site releases, disposals or off-site transfers for recycling were zero. You must account for total releases of Part 1B substances from your facility to each environmental medium (air, water and land).

Examples of estimating releases, disposals and transfers for recycling of some Part 1B substances are provided in the *NPRI Toolbox*; "Basis of Estimate" reporting is explained in the *NPRI Software Guide*.

## 4.7 Part 2 Substances – Polycyclic Aromatic Hydrocarbons (PAHs)

With the exception of wood preservation using creosote, if your facility met the 50-kg reporting threshold for the 17 PAHs listed in Table 8, you must report on-site releases, disposals and off-site transfers for recycling **individually** for each of the 17 PAHs that were incidentally manufactured and released, disposed of or transferred for recycling.

[1] and its compounds

[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

A facility used for wood preservation must submit a report for each/any of the 17 individual PAHs released on site, disposed of or transferred off site for recycling from a wood-preservation process using creosote, regardless of the quantity of PAHs released, disposed of or transferred for recycling or the number of hours worked by employees.

If you do not have information available to estimate releases, disposals and transfers for recycling for any of the 17 individual PAHs, the PAHs may be reported together under the listing "PAHs, total Part 2". You may report for the 17 individual PAHs, or "PAHs, total Part 2", **but not both**. If you report under the listing of "PAHs, total Part 2", indicate in the "Comments" field which substances are included in the data, if known.

You must account for total releases of the 17 PAHs from your facility to each environmental medium (air, water and land), disposals and transfers for recycling.

An example of estimating releases, disposals and transfers for recycling of PAHs is provided in the *NPRI Toolbox*; "Basis of Estimate" reporting is explained in the *NPRI Software Guide*.


## 4.8 Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB)

A facility that met the criteria set out in 3.7 Reporting Criteria for Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB) must provide substance reports for dioxins/furans and HCB. The dioxins/furans or HCB substance report submitted to the NPRI will indicate:

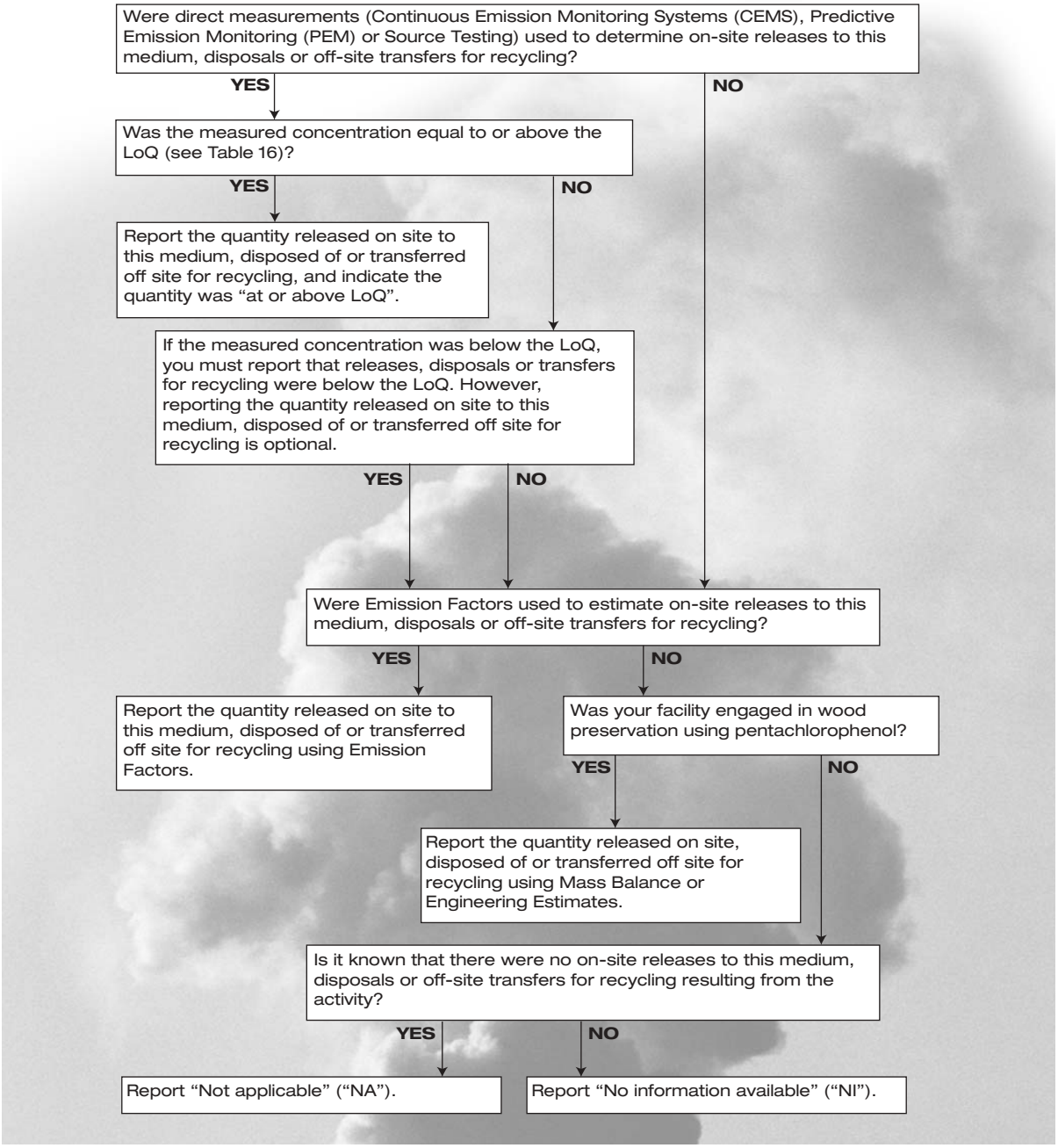
- the **quantity** released on site, disposed of or transferred off site for recycling as the result of incidental manufacture during an activity listed in Tables 5 or 10, and
- that **directly-measured releases to a specific medium, disposals or transfers for recycling** were at concentrations above, equal to or below the Level of Quantification (LoQ) concentrations set out in Table 16 (this option is available only if estimates were based on Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) or Source Testing), or
- that there were **no releases to a specific medium, no disposals or no transfers for recycling**, or
- that **no information** was available on which to base an estimate.

Quantities of dioxins/furans and HCB released on site, disposed of and transferred off site for recycling must be reported unless:

- you directly measure dioxins/furans and HCB resulting from incidental manufacture from an activity listed in Tables 5 or 10, and the concentrations were below the LoQ values as defined in Table 16, or
- you have no information available on which to base estimates of on-site releases, disposals and off-site transfers for recycling.

Use the flowchart in Figure 9 to determine what you must report to the NPRI for dioxins/furans and HCB. You must report total releases of dioxins/furans and HCB from your facility to each environmental medium (air, water and land), as well as disposals and transfers off site for recycling.

**FIGURE 9 WHAT YOU MUST REPORT FOR DIOXINS/FURANS AND HCB**




### *4.8.1 What Are Toxic Equivalents (TEQs) of Dioxins/Furans?*

You must report on-site releases, disposals and off-site transfers for recycling of dioxins/furans in units of grams TEQ of the 17 congeners listed in Table 13. Dioxins and furans are often found in complex mixtures, typically at extremely low concentrations, making it difficult to determine the cumulative toxicity of the mixture. Accordingly, scientists have assigned toxic equivalency factors (TEFs) to each dioxin/furan congener as weighting factors. These TEFs are assigned relative to the toxicity of 2,3,7,8-TCDD, the most toxic congener, which is assigned a TEF of 1.

**TABLE 13 TOXIC EQUIVALENCY FACTOR (TEF) VALUES FOR DIOXINS AND FURANS**

| CAS No. | Congener | Abbreviation | TEF |
|---|---|---|---|
| | **Dioxins** | | |
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin | 2,3,7,8-TCDD | 1 |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin | 1,2,3,7,8-PeCDD | 0.5 |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin | 1,2,3,4,7,8-HxCDD | 0.1 |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin | 1,2,3,6,7,8-HxCDD | 0.1 |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin | 1,2,3,7,8,9-HxCDD | 0.1 |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin | 1,2,3,4,6,7,8-HpCDD | 0.01 |
| 3268-87-9 | Octachlorodibenzo-*p*-dioxin | OCDD | 0.001 |
| | **Furans** | | |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran | 2,3,7,8-TCDF | 0.1 |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran | 2,3,4,7,8-PeCDF | 0.5 |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran | 1,2,3,7,8-PeCDF | 0.05 |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran | 1,2,3,4,7,8-HxCDF | 0.1 |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran | 1,2,3,7,8,9-HxCDF | 0.1 |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran | 1,2,3,6,7,8-HxCDF | 0.1 |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran | 2,3,4,6,7,8-HxCDF | 0.1 |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 1,2,3,4,6,7,8-HpCDF | 0.01 |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 1,2,3,4,7,8,9-HpCDF | 0.01 |
| 39001-02-0 | Octachlorodibenzofuran | OCDF | 0.001 |

(NATO/CCMS, 1998)


To apply and compare TEQs, the values must be calculated using the same set of TEFs. Most release data on dioxins/furans currently available in Canada are in units of international toxic equivalents (TEQs) (North Atlantic Treaty Organization/Committee on the Challenges of Modern Society, NATO/CCMS, 1998). More recent work undertaken for the World Health Organization (van den Berg, 1998) has resulted in a revised set of TEFs, not just for humans, but for mammals, fish and birds. However, since most of the emission factors currently available are in international TEQs, the TEF values listed in Table 13 must be used for reporting to the NPRI.

To calculate the TEQ of a mixture, you must first multiply the concentration of an individual congener by its respective TEF, or weighting factor, to obtain the congener-specific TEQ concentration. The sum of the TEQ concentrations for the individual congeners is the TEQ concentration for the mixture.

#### Example of a TEQ Calculation

The following table shows the different concentrations of four dioxin and furan congeners in an ash sample. If these concentrations were simply summed together, the sample would be reported as containing 80 nanograms (ng) of dioxins/furans in each kilogram (kg) of ash. However, 1,2,3,4,7,8-HxCDF is 10 times less toxic than 2,3,7,8-TCDD. By applying the TEFs to each congener and summing the values, the resulting toxic equivalent (TEQ) for the mixture is 25 ng TEQ of dioxins/furans in each kg of ash, or 25 ng TEQ/kg.

**TABLE 14 EXAMPLE OF A TEQ CALCULATION**

| Dioxin/Furan Congener | Sample Concentration (ng/kg) | Toxic Equivalency Factor (TEF) | Toxic Equivalent (ng TEQ/kg ash) |
|---|---|---|---|
| 2,3,7,8-TCDD | 10 | 1 | 10 |
| 1,2,3,7,8-PeCDD | 20 | 0.5 | 10 |
| 1,2,3,4,7,8-HxCDF | 30 | 0.1 | 3 |
| 1,2,3,6,7,8-HxCDF | 20 | 0.1 | 2 |
| **Total Concentration** | | | **25 ng TEQ/kg** |


### *4.8.2 Methods of Estimation*

When you report on-site releases to each environmental medium, disposals and off-site transfers for recycling, you will enter the method of estimation in the NPRI reporting software. There are seven methods of estimating releases:

- Continuous Emission Monitoring Systems (CEMS)
- Predictive Emission Monitoring (PEM)
- Source Testing
- Mass Balance
- Site-specific Emission Factor
- Published Emission Factor, and
- Engineering Estimates

In addition to the methods above, two other options are available:

- No information available (NI)
- Not applicable (NA)

The "No information available" option is only available for dioxins/furans and HCB. Select "No information available" if your facility met reporting criteria for dioxins/furans or HCB, but you have no information available on which to base an estimate of the quantity released, disposed of or transferred for recycling. If you report "No information available" for an activity for which an emission factor is available in the FIRE database, state your reason for not using the provided emission factor in the "Comments" field of the NPRI reporting software.

Selecting "Not applicable" indicates that there were no releases from your facility to this medium, no disposals or no transfers for recycling.

For dioxins/furans and HCB substance reports only, you must provide the following information if you select Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) or Source Testing as the method of estimation:

- whether the concentration was at or above LoQ, or
- whether the concentration was below LoQ.

If the concentration was at or above LoQ, you must enter the quantities released, disposed of or transferred for recycling. If the concentration was below LoQ, then reporting of quantities released, disposed of or transferred for recycling is optional.

**TABLE 15 HOW TO REPORT RELEASES, DISPOSALS AND TRANSFERS FOR RECYCLING OF DIOXINS/FURANS AND HCB**

| Method of Estimation | Comparison to LoQ | Report Quantity? |
|---|---|---|
| Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) or Source Testing | At or above LoQ | yes |
| Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) or Source Testing | Below LoQ | optional |
| Mass Balance | n/a | yes |
| Site-specific Emission Factor or Published Emission Factor | n/a | yes |
| Engineering Estimate | n/a | yes |
| No Information Available (NI) | n/a | n/a |
| Not Applicable (NA) | n/a | n/a |


The reporting of dioxins/furans and HCB releases, disposals and transfers for recycling is further explained in the following sections and summarized in Table 15.

**Direct Measurements**

Direct measurements include Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) and Source Testing. A direct measurement is based on measured concentrations of the substance in a waste stream and the volume/flow rate of that stream. Direct measurements should be made of on-site releases, disposals and off-site transfers for recycling representative of the facility's normal operating conditions or production levels.

If your facility has made direct measurements of dioxins/furans or HCB, then you should use these data to determine which releases, disposals and transfers for recycling, if any, you must report to the NPRI. Enter the appropriate method of estimation in the NPRI reporting software. Examples of how to estimate releases using measured data are provided in the *NPRI Toolbox*.

The following sections will help you determine if your measured concentrations were above, equal to or below the LoQ for each type of material that you released on site, disposed of and transferred off site for recycling.

**Level of Quantification (LoQ)**

The level of quantification is defined in Section 65.1 of the CEPA 1999, as "the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods". Environment Canada determines LoQ values by carrying out statistical analyses of several sets of measurements from a variety of emission sources. The LoQ is calculated as 10 times the standard deviation of replicated measurements (ASTM, 2002). The standard deviation is the variability of the test data associated with the sampling, analysis and actual source emission changes during testing, using standard test methods.

Table 16 provides estimated LoQs for dioxins/furans and HCB for three types of material or waste streams that may be released on site, disposed of or transferred off site for recycling – gaseous, liquid and solid. The LoQ values listed include both final and draft values published by Environment Canada. You must compare your

**TABLE 16 ESTIMATED LOQ VALUES FOR CONCENTRATIONS OF DIOXINS/FURANS AND HCB**

| State of Material | Estimated LoQ for Concentrations of Dioxins/Furans | Estimated LoQ for Concentrations of HCB |
|---|---|---|
| Gaseous | 32 pg TEQ/$m^3$ | 6 ng/$m^3$ |
| Liquid | 20 pg TEQ/L | 70 ng/L |
| Solid | 9 pg TEQ/g | 2 ng/g |


measured concentrations to the appropriate LoQ for each type of on-site release, disposal and off-site transfer for recycling that you report to the NPRI. Containment in an off-site landfill is an example of a type of disposal. Recovery of pollution-abatement residues is an example of a type of off-site transfer for recycling.

Environment Canada has published estimated LoQ values for dioxin/furan and HCB concentrations in gaseous releases (Environment Canada, 1999). You should use these values to determine whether concentrations in releases to air from stacks and other sources were above, equal to or below the LoQ.

While Environment Canada has not published an LoQ for dioxin/furan concentrations in liquids, it has extrapolated a draft LoQ for dioxins/furans in liquids from the effective LoQ for 2,3,7,8-TCDD in the *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations*. Facilities should use 20 pg TEQ/L as the LoQ for concentrations of dioxins/furans in liquids.

Environment Canada has developed an estimated LoQ for concentrations of HCB in chlorinated solvents (Environment Canada, 1997). Facilities should use 70 ng/L as the estimated LoQ for concentrations of HCB in all liquids.

Environment Canada published proposed LoQ values for dioxins/furans and HCB in soil in early 2000 (Environment Canada, 2000). You should use LoQ values of 9 pg TEQ/g for dioxins/furans and 2 ng/g for HCB to determine whether concentrations of dioxins/furans or HCB in solid materials were equal to or above the LoQ. Incinerator bottom ash, pollution-abatement residues and sludges are examples of solid materials containing dioxins/furans or HCB that may be released on site, disposed of or transferred off site for recycling.

### Were Your Measured Concentrations Equal to or Above LoQ?

When comparing measured concentrations to LoQ values, measurements should be made of on-site releases, disposals and off-site transfers for recycling representative of your facility's normal operating conditions or production levels. If you determine that your measured concentrations were equal to or above the LoQ, you must estimate and report the quantities of on-site releases, disposals and off-site transfers for recycling for the 2003 calendar year using these concentrations. Indicate in the NPRI reporting software that concentrations were at or above LoQ.

### Were Your Measured Concentrations Below LoQ?

When comparing measured concentrations to LoQ values, measurements should be made of on-site releases, disposals and off-site transfers for recycling representative of your facility's normal operating conditions or production levels. If you directly measured dioxins/furans and HCB in an on-site release, disposal or off-site transfer for recycling resulting from incidental manufacture during an activity listed in Tables 5 or 10, and the concentrations were below LoQ, reporting the quantities released on site, disposed of and transferred off site for recycling is optional. Indicate in the NPRI reporting software that concentrations were below LoQ.

**Example**
A facility has directly measured dioxins/furans resulting from incineration of non-hazardous solid waste (incidental manufacture of dioxins/furans during an activity listed in Table 5). The facility determined that dioxins/furans were released to air from a stack at a concentration of 20 pg TEQ/m³. The measured concentration was below the LoQ of 32 pg TEQ/m³ so the facility does not need to report the quantities of dioxins/furans released on site from stacks. The facility will report that releases to air of dioxins/furans from the stack were below LoQ.

### Dealing with Multiple Data Points and Non-detected Values
If you have several sets of directly-measured concentrations for a given release, disposal or transfer for recycling, you should compare the average or mean value of all the concentrations with the appropriate LoQ (see 4.3 Method Detection Limit for more guidance on how to calculate a mean concentration when you have multiple data points and non-detected values). Once you have calculated the mean concentration of all the measured values, use this concentration to calculate the quantities of dioxins/furans and HCB released on site, disposed of or transferred off site for recycling.


### Emission Factors
An emission factor is based on average measured emissions from several similar processes. Emission factors usually express releases as a ratio of quantity released to process or equipment throughput. In the absence of data from direct measurements, your facility should estimate on-site releases, disposals or off-site transfers for recycling of dioxins/furans or HCB as a result of incidental manufacture, using emission factors that you possess or to which you have reasonable access.

Emission factors may be developed for one or more facilities using measured data under similar process conditions. Many emission factors for activities listed in Tables 5 and 10 are compiled in the FIRE database (refer to the *NPRI Toolbox*). You should indicate, in the "Comments" field of the NPRI reporting software, the source of any emission factor used. If an emission factor for your activity is available in the FIRE database, but you choose not to use it, you should provide your reason in the "Comments" field.

If you use emission factors to estimate on-site releases, disposals and off-site transfers for recycling, you must report the quantities released, disposed of or transferred for recycling. You cannot report that your concentrations for a specific on-site release, disposal or off-site transfer for recycling were below the LoQ.

### No Information Available
If information is not available for releases to a specific medium, for a disposal or for a transfer for recycling, either through direct measurements, emission factors or some other source to which the facility possesses or may reasonably be expected to have access, then the facility should report "No information available" for on-site releases to that medium, for disposals or for off-site transfers for recycling. If you report "No information available" for an activity for which an emission factor is available in the FIRE database, you should provide, in the "Comments" field of the NPRI reporting software, your reason for not using the values in the database.

### No On-site Releases to a Specific Medium, Disposals or Transfers Off Site for Recycling
If there were no dioxins/furans or HCB released on site to a given medium, disposed of or transferred off site for recycling for the specified activity, the facility should report "Not applicable" for that release, disposal or transfer for recycling for that substance.

For example, if dioxins/furans were only released to air from a combustion process of an activity listed in Tables 5 or 10, and there was no related process with releases to water as a result of that activity, the facility reports "Not applicable" for on-site releases of dioxins/furans to water.

**TABLE 17 STACK-SPECIFIC REPORTING THRESHOLDS FOR STACKS ≥ 50 M ABOVE GRADE**

| Substance Name | Stack Reporting Threshold |
|---|---|
| Nitrogen oxides, $NO_X$ (expressed as $NO_2$) | 5 tonnes |
| Sulphur dioxide, $SO_2$ | 5 tonnes |
| Carbon monoxide, CO | 5 tonnes |
| Volatile organic compounds, VOCs | 5 tonnes |
| Total particulate matter, TPM | 5 tonnes |
| Particulate matter ≤ 2.5 microns, $PM_{2.5}$ | 0.15 tonnes |
| Particulate matter ≤ 10 microns, $PM_{10}$ | 0.25 tonnes |


## 4.9 Part 4 Substances – Criteria Air Contaminants (CACs)

If the reporting criteria are met for an NPRI Part 4 substance, the air releases of that substance must be reported.

Further, if a reporting criterion is met for any CAC, a facility is required to break down its releases on a stack-by-stack basis for stacks greater than 50 metres above grade if the stack-specific threshold is met. For example, if a facility met the reporting criteria for $NO_X$ (20 tonnes) and has a stack greater than 50 metres above grade that emitted 7 tonnes of $NO_X$, this amount must be reported because it exceeded the stack-specific threshold for $NO_X$ (5 tonnes). The stack-specific thresholds are provided in Table 17.

The rationale for stack-by-stack breakdown of CAC emissions is outlined in Appendix 7 – Data Requirements for Regional Air Quality Modelling.

## 4.10 Part 5 Substances – Speciated Volatile Organic Compounds (VOCs)

Reporting for individual Part 5 substances only needs to be considered if the facility met the Part 4 VOCs reporting requirements. Reporting is required if the Part 5 substances were emitted to air in a quantity greater than or equal to 1 tonne. Individual Part 5 substance reporting applies to both stacks greater than 50 metres above grade where more than 5 tonnes of VOCs have been emitted and other sources. Individual VOC substances not on the Part 5 substance list may also be reported in a comment field available in the *NPRI Software*.

### *4.10.1 Stack-specific Speciated VOC Reporting*

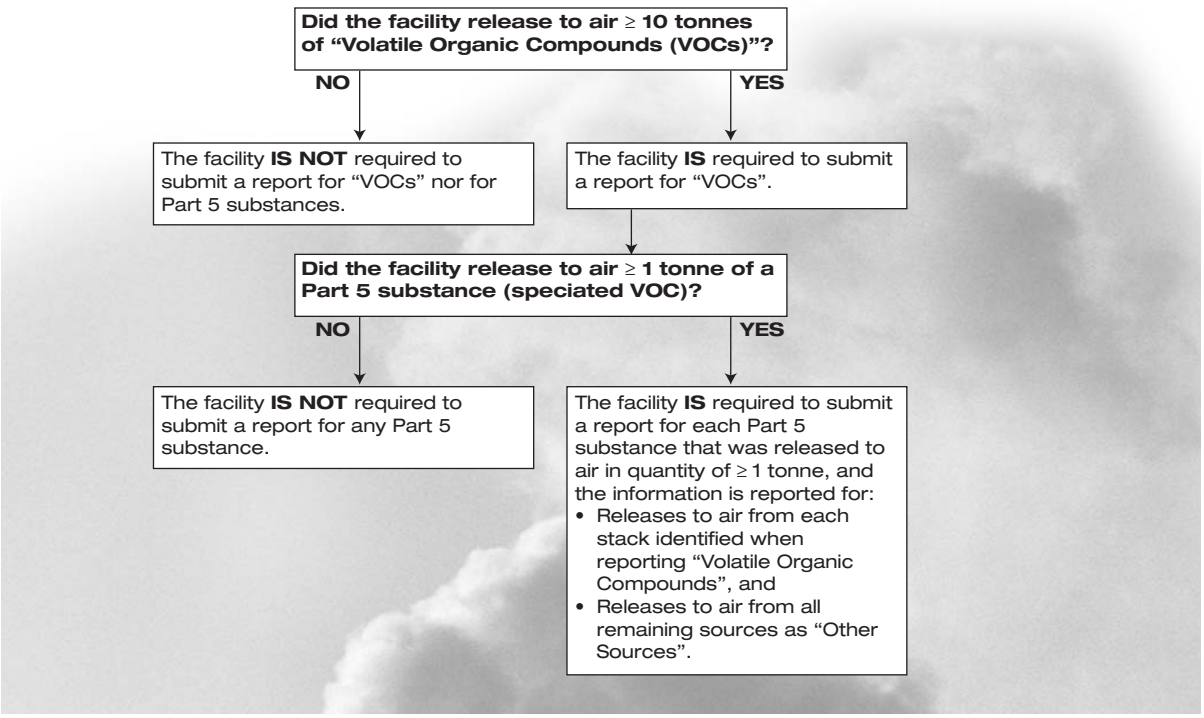
Reporting on a stack-by-stack basis for stacks greater than 50 metres above grade is only required if stack-by-stack reporting is required in Part 4 (total VOCs ≥ 10 tonnes and stacks ≥ 50 metres above grade with ≥ 5 tonnes VOCs emissions). If the criteria are met, individual Part 5 substances emitted from a stack greater than 50 metres above grade must be reported. Figure 10 outlines the reporting process. An example follows to illustrate this principle.

**Example**

A facility emits 28 tonnes of "Volatile Organic Compounds (VOCs)" to air, 7 tonnes of which are emitted from a 65 metre stack. The 28 tonnes are from the following sources: 7 tonnes from a stack with height of 65 meters, and the remaining 21 tonnes are from storage/handling, fugitive releases, spills, other non-point sources.

The facility releases 3 tonnes of styrene to air – a component of its VOC emissions, 0.4 tonnes of which are from the 65 metre stack.

**FIGURE 10 WHAT YOU MUST REPORT FOR PART 5 SUBSTANCES**






The reporting requirements are as follows:

- The reporting threshold for VOCs is 10 tonnes released to air. Since the facility released 28 tonnes of VOCs to air, it exceeds the threshold, and is required to submit a report for "VOCs".
- When reporting "VOCs" a facility is required to provide details on stacks with a height ≥ 50 meters that release ≥ 5 tonnes of VOCs. This facility has a stack that is 65 meters tall which releases 7 tonnes of VOCs. As such, the stack-specific threshold has been met.
- Styrene is a Part 5 substance (speciated VOC). The styrene release of 3 tonnes exceeds the 1 tonne release threshold for a Part 5 substance. As such, the information must be reported as follows: 0.4 tonnes released from the 65 metre stack, and 2.6 tonnes released from "Other Sources".

### *4.10.2 Isomers*

With respect to isomer groups on the Part 5 substance list, reporting is an aggregated total. In the list of Part 5 substances, there are two instances where a specific isomer is listed separately from the listing for the Isomer Group.

- The listing for "Hexane" includes all isomers of hexane, except for "*n*-Hexane" since it is listed separately in the Part 5 substance list.
- The listing for "Trimethylbenzene" includes all isomers of trimethylbenzene, except for "1,2,4-Trimethylbenzene" since it is listed separately in the Part 5 substance list.

The *NPRI Toolbox* contains a list of substances and CAS numbers included in the listings for each of the Part 5 Isomer Groups.

### *4.10.3 Mixtures*

With respect to "other groups and mixtures" on the Part 5 substance list, it is required that the facility report emissions from the group or mixture. While not required, if information on individual VOC species contained in a mixture or group is available, this may be provided in the Comments field for Part 5 Substances.

The *NPRI Toolbox* contains a list of substances and CAS numbers included in the listings for each of the Part 5 Isomer Groups.

### *4.10.4 Methods of Estimating Speciated VOC Emissions*

The three commonly-used methods of estimating speciated VOC emissions are listed below. Refer to 4.4 Methods of Estimation for details.

- Source Testing
- Mass Balance
- Engineering Estimates

For case studies and examples on how to use these methods, refer to the *NPRI Toolbox*.


### SPECIATE 3.2

SPECIATE (version 3.2, released in November 2002) is the U.S. EPA's repository of Total Organic Compound (TOC) and Particulate Matter (PM) speciated profiles for a variety of sources for use in source-apportionment studies. Searching for profiles by keyword is available and the user can browse through the profiles. No profiles have been added to SPECIATE since its release in October, 1999.

For any of the methods listed, the use of air pollution control equipment should be considered in the estimation of emissions. Refer to the *NPRI Toolbox* for more information.

It should be noted that TOC and VOC do not have the same definition. All VOCs can be considered TOCs, however, not all TOC species are VOCs. For example, acetone is considered a TOC but it does not meet the VOC definition. If you are using the SPECIATE 3.2 program to calculate your speciated VOC values for NPRI Part 5 substances, ensure that only the TOC species that meet the VOC definition are included in your report.

# 5. What Must be Reported

In general, NPRI reporting is divided into two categories – facility-related information and substance-related information. The information reported must be based on the best available data and information in your possession or to which you have reasonable access.

## 5.1 Facility Information

The required facility information includes the company's legal name and address, its business number, the number of employees, the nature of the facility's business and contact information including the technical contact and the company official certifying the NPRI report. In addition, any facility that is reporting for a CAC must provide the facility's operating schedule. Finally, the facility screens of the NPRI reporting software provide an opportunity for facilities to identify any pollution-prevention plans they implemented or prepared in 2003. More information on the facility-related screens in the reporting software is available in the *NPRI Software Guide*.

**New for 2003**

You now must report the business number. Business Numbers (BNs) can be found on all forms issued to a business by the Canada Customs and Revenue Agency. The first nine digits are the registration number and must be reported to the NPRI. This registration number remains the same no matter how many or what types of accounts a business may have. BNs are issued to Canadian businesses that register for one or more of the following accounts – Corporate Income Tax, Importer/Exporter account number, Payroll (source) deductions (Trust accounts) and Good and Services Tax.


## 5.2 Substance Information

The required substance information for the majority of NPRI substances includes the name of the substance, its CAS number, the nature of its use, the quantities released on site to various media, the quarterly breakdown of on-site releases, disposal quantities, the quantities transferred off site for recycling, the anticipated releases, disposals and transfers for recycling over the next three years, and any pollution-prevention activities implemented by the facility.

In contrast to Parts 1A through 3 substances, only on-site releases to air need be reported for Parts 4 and 5 substances. In addition, CAC (Part 4) releases must be broken down on a monthly basis and, provided the relevant criteria are met, on a stack-by-stack basis. For stacks greater than or equal to 50 metres above grade meeting the relevant criteria, a number of stack parameters must be reported including the stack height, diameter, exit velocity and exit temperature of the stack gases. Part 5 substances emitted in a quantity greater than or equal to 1 tonne must also be reported provided the VOCs threshold is met. More information on the substance-related screens in the reporting software is provided in the *NPRI Software Guide*.

## 5.3 Retain a Copy of the Information on which your NPRI Report was Based

This is a legal requirement, pursuant to subsection 46(8) of the CEPA 1999, and the *Canada Gazette* notice. The owner or operator of a facility is required to keep copies of the required information, together with any calculations, measurements and other data on which the information reported was based. This information must be kept at the facility to which it relates or at the facility's parent company for a period of three years.

## 5.4 Request for Confidentiality

Reporting to the NPRI for 2003 is governed by the requirements of the CEPA 1999, as well as the *Canada Gazette* notice, published January 4, 2003, and its amendment published January 17, 2004.

Pursuant to sections 51 and 313 of the CEPA 1999, any person who provides information in response to the 2003 *Canada Gazette* notice may submit a written request that it be treated as confidential, based on the reasons set out in section 52 of the CEPA 1999. For each facility and each substance reported, the request for confidentiality must clearly indicate each field for which a request is being made. **The written request must accompany the report**.

To be treated as confidential, the company must demonstrate that it treats the information as confidential and wishes to continue to do so. It must also demonstrate that this information is not available to the general public through legal means, such as obtaining a public copy of a provincial waste permit.

**A request for confidentiality is not determinative.** A determination of whether the information is confidential will be based on an objective analysis of the facts.

It is recommended that you include with your request for confidential treatment, documentation that would be required to justify that the information submitted should be confidential as per the criteria outlined in section 52 of the CEPA 1999.

If substantiation is not provided with the claim, or the substantiation provided does not support the claim, the Minister may follow the procedures with respect to publication of the information set out in section 53 of the CEPA 1999. Notwithstanding the above, the Minister may, in the appropriate circumstances, contact the person to inform them that the information may be disclosed as permitted under sections 315 through 317 of the CEPA 1999.


**A request for confidentiality will be denied if the data are already in the public domain.**

Necessary precautions should be taken when submitting an NPRI report for which a request for confidentiality is being made. This includes, but is not limited to, the following:

- confidential materials are to be sent in double envelopes, excluding the courier outer envelope
- the outside envelope should be unmarked except for mailing and return addresses, and postage, and
- the inside envelope should be stamped on both sides with wording such as "Contains Confidential Information".

Should you have any questions concerning confidentiality requests, contact your regional NPRI office listed on the inside front cover of this Guide.

### *5.4.1 Section 52 of the CEPA 1999*

With regard to information submitted to the NPRI, section 51 of the CEPA 1999, allows any person to submit with the information, a written request, setting out the reason(s) referred to in section 52 (see below), that the information be treated as confidential.

Section 52 of the CEPA 1999, provides that:

> **52.** Despite Part 11, a request under section 51 may only be based on any of the following reasons:
>
> *(a)* the information constitutes a trade secret;
> *(b)* the disclosure of the information would likely cause material financial loss to, or prejudice to the competitive position of, the person providing the information or on whose behalf it is provided; and
> *(c)* the disclosure of the information would likely interfere with contractual or other negotiations being conducted by the person providing the information or on whose behalf it is provided.

# Questions and Answers

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## Questions and Answers

1. **Is a facility meeting the criteria described in the *Canada Gazette* notice required to report if there were no releases of NPRI substances during the calendar year?**

   Yes. The reporting requirements vary by substance. The criteria for most substances are based only on quantity manufactured, processed or otherwise used, number of employees and concentration of NPRI substances. The reporting criteria for Part 1B substances, polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, hexachlorobenzene and criteria air contaminants (CACs) differ from those previously mentioned, and may be activity-or release-based. Once you meet the substance-specific reporting criteria, you must report regardless of the amounts released, disposed of or transferred for recycling.

2. **Our facility closed part way through the calendar year. Are we required to submit an NPRI report?**

   Yes. If your facility met the reporting criteria and was in operation during any portion of the calendar year, you are required to report.


3. **In British Columbia, several fish processors have factories on ships. They use ammonia and chlorine in their fish processing operations. Is each ship considered a "facility" under the *Canada Gazette* notice or is the whole group of ships (assume one company) a facility?**

   Under the NPRI, a facility can be a contiguous facility, a pipeline installation, or an offshore installation (see 3.2 Facility Criteria for the definition of these facility types). A ship is not a contiguous facility as defined under the notice, because it is not stationary nor is it located on a single site. Nor is a ship classified as a pipeline installation. The definition of offshore installation includes ships only if the ship is directly related to the exploitation of oil and gas. Since the ships in question are in the fishing industry, they are not offshore installations. Therefore, there is no requirement to report since none of the facility definitions apply to the ships in question.

4. **A barge-repair facility cleans barges by vacuuming out residual products containing listed substances and recycling them. Must the facility report?**

   The facility is processing the chemicals. Therefore, if the threshold criteria for reporting are met, the facility must submit a report. Releases during vacuuming must be reported as well as releases from related activities such as spills and equipment cleaning.

   Routine cleaning of the exterior of the barge is considered maintenance of a transportation vehicle and is therefore exempt.

5. **Does the determination of a full-time employee "equivalent" include the hours worked by sales staff whose offices are located in the same building as the production staff, or who work outside the facility?**

   Yes. All staff employed at a facility, regardless of function or location, count toward the employee threshold determination.

This includes persons employed at the facility, owners who performed work on site at the facility, and persons such as contractors who performed on-site work related to the normal operation of the facility on a routine basis.

**6. Would a facility with nine full-time employees and four part-time employees be required to report to the NPRI?**

Total the hours worked by all people, including contractors who are performing work related to the operations of the facility. If the total is 20 000 hours or more per year, the criterion for the number of full-time employees has been met and all NPRI substances must be considered.

However, if the facility was used for incineration, wood preservation, terminal operations or wastewater collection, all NPRI substances must be considered, regardless of the hours worked by employees.

Further, if the total employee-hours are less than 20 000, only CACs from stationary combustion equipment must be considered. However, it is possible for a facility with less than 20 000 employee hours to be exempt from reporting to the NPRI for CACs if **all three** of the following criteria are met:

- the only releases to air occurred from stationary external combustion equipment, and
- it had a cumulative nameplate capacity of less than 10 million BTU/hour for all sources, and
- the only fuel combusted in the equipment was commercial grade natural gas, liquefied petroleum gas, or No.1 or 2 fuel oil, or any combination thereof.


**7. When calculating the total number of hours worked by all employees during the calendar year, should overtime, vacation and sick leave be included in the 20 000-hour threshold?**

Yes. The facility must consider all overtime, paid vacation and sick leave in the 20 000-hour threshold. An employee includes a person employed at the facility, an owner who performed work on site at the facility, and a person who performed work on site at the facility on a routine basis that is related to the normal operations of the facility, for the period of time the person performed that work, such as contractors.

**8. When should an individual's time spent working at a facility be counted for purposes of determining whether or not a facility meets or exceeds the 20 000-hour threshold?**

If an individual is employed by the facility or by the facility's parent company to work at the facility, then all of the hours worked by the individual must be counted toward the 20 000-hour threshold. Contractors performing work related to the operations of the facility must also be included. If an individual both owns and works for the facility, their hours must be applied to the 20 000-hour threshold.

**9. Who is required to submit the NPRI report for a given calendar year if the facility has changed ownership during that year?**

The owner or operator of the facility as of December 31 of the calendar year is responsible for submitting the report for that year if the facility met the criteria for reporting. Transfers of ownership must ensure that information for NPRI reporting for the entire calendar year is available.

**10. Is the owner or the operator responsible for reporting?**

The notice requires a person who owns or operates a facility to report information to which the person has access or can reasonably be expected to have access. This is usually the operator. However, both the owner and the operator are subject to the notice. If no report is received from a facility that met the reporting requirements, both persons may be held liable.

**11. What is considered a Parent Company?**

The parent companies of interest to the NPRI are those Canadian companies that have greater than 10% ownership in the company. For example, if CNS Corporation has five owners, but one of the owners is American, only four companies would be shown as parent companies, provided they each owned more than 10% of CNS Corporation.

**12. A company had been operating its manufacturing processes in a leased warehouse. In July, it bought its own warehouse and moved the manufacturing operations. These two sites are neither adjacent nor contiguous. The company did not shut down or close during this time. How should the company make threshold determinations and report to the NPRI?**

When determining thresholds and reporting, the company must consider two separate facilities because the operations were carried out at two distinctly separate physical sites. Threshold determinations must be made for the period of time during which each facility operated. A new NPRI ID number will be assigned to the new facility.


**13. Acme Plastics is a wholly-owned subsidiary of a major chemical company which is a wholly-owned subsidiary of XYZ Oil Corporation. Which is the parent company?**

XYZ Oil Corporation is the parent company because it is the highest-level company that directly controls Acme Plastics.

**14. We lease land adjacent to our existing facility, which is separated from it by a public railway. Do we need to include the operations on this leased land in our threshold calculations for the existing facility?**

Two sites owned or operated by the same company that function as a single integrated site, but are separated by a railway, would be considered adjacent sites since they are physically adjacent to one another except for a public right-of-way. Therefore, reporting thresholds would be determined by the combined quantities of substances manufactured, processed or otherwise used at both sites. The 20 000-hour threshold would be determined by the sum of hours worked at both sites.

**15. A Vancouver-based company has a plant in Alberta which processes 12 tonnes of methanol, a plant in Ontario which processes 8 tonnes of methanol, and a plant in Quebec which processes 11 tonnes of methanol. Do the three plants have to report as a company or can they report as separate facilities?**

A report is required for each facility that met the reporting criteria; their activities cannot be combined. In this case, the plant in Ontario is not required to submit a report for methanol, but the other two are since they met the 10-tonne threshold. In addition, since methanol is a VOC, each

facility must include any methanol released to air in the calculation of its VOCs air emissions. The company may choose to report for each of the facilities meeting the reporting criteria on one disk, or to have each facility submit its report separately.

**16. When contractors working at a facility supply their own materials and supplies, such as solvents containing NPRI substances, should these substances be included in the threshold determination and reported by the facility?**

Yes. The owner or operator of the facility must include in their threshold calculations the quantities of NPRI substances manufactured, processed or otherwise used or released to air by contractors if those activities are relevant to the purpose of the facility.

**17. An NPRI substance is the working fluid in our heat-transfer equipment. Must the quantity of the NPRI substance be accounted for in determining the reporting threshold?**


Yes. Heat-transfer equipment can, under normal operating conditions, result in the release of NPRI substances. Therefore, the fluid within the heat-transfer equipment is considered to be an "other use" of the NPRI substance, relevant to the purposes of the facility as defined in the Canada Gazette notice. All NPRI substances in the heat-transfer equipment must be included in the threshold calculation.

**18. Our company disposes of some of its waste in a landfill site which belongs to the company, but is in a different location. Is this an on-site or off-site disposal?**

This would be considered an off-site disposal because the landfill is not adjacent to or contiguous with the facility.

**19. Our company sorts scrap metal and compresses it into bales to be sold to secondary metal producers. Most of the metal we recover contains some NPRI substances (Zn, Cr excluding hexavalent chromium) in excess of 1% concentration. The process does not release any NPRI substances; it only compresses the pieces into bales. Are we required to submit a report?**

No. In this case, the items being handled would retain their status as articles as long as there are no on-site releases to the environment or any disposals.

**20. At what point in the processing of ore must mining companies report?**

The exemption for mining is for activities related to the actual removal of ore, rock or overburden, up to and including primary crushing. The mining exemption, however, does not apply to Part 4 substances (CACs) released from stationary combustion equipment. In this case, the mining operation must report any CAC releases from its combustion equipment that met the CAC mass thresholds. The exemption for CAC reporting explained in Question 6 may be valid if the only activities occurring at the mine were up to and including primary crushing.

Any NPRI substances manufactured, processed or otherwise used or released to air in the further processing of the rock or ore, such as milling, concentrating, smelting and refining would be reportable if the thresholds were met.

This would include, but not be limited to, NPRI substances found in the processed ore, solvents, acids, flotation agents, flocculation agents, dust suppressants, and fuels used in power generation, particulate matter and combustion contaminants (e.g. $NO_X$, $SO_2$). Listed substances in tailings are not reported unless they left the tailings impoundment or other forms of on-site containment.

**21. If a substance is spilled one year, and will result in air emissions over time in the following year, how should it be reported?**

The portion of the spill not cleaned up must be reported as a release the year it occurred. It must be reported as a release to the environmental media affected (air, water, land). Further migration between media does not need to be reported.

**22. Can a facility use its own software to report electronically to the NPRI?**

Environment Canada supplies the software required for reporting and strongly recommends that this be used to submit an NPRI report.

If you choose to use other software and the report submitted cannot be read and verified by Environment Canada's own reporting software, the report will be considered incomplete and will be returned for correction. Environment Canada reserves the right to change its software and file structure at any time.


**23. We use a 50% methanol solution in one part of the plant. The annual consumption of methanol exceeds 10 tonnes. In another part of the plant, a completely separate process produces a few tonnes of methanol which are released through a stack. Do we have to estimate methanol releases from the stack even if they are from a different process?**

Yes. Because your facility uses more than 10 tonnes of methanol, it is required under Part 1A substance requirements to report all its releases, disposals and transfers for recycling of methanol, regardless of the process stream. Since methanol is a VOC, the amount of methanol released to air must also be included in your VOCs emissions. As per Part 4 substance requirements, a report is needed for the VOCs air emissions if the 10-tonne release threshold is exceeded. Methanol is also subject to Part 5 substance requirements. Therefore, a report would be required under Part 5 if the VOCs release threshold is exceeded (i.e., 10 tonnes of VOCs air emissions) in Part 4 and if the amount of methanol released to air was greater than 1 tonne.

**24. We have a provincial waste permit to discharge sulphuric acid at a pH between 5.8 and 6.6. How do we report our releases of sulphuric acid if we met all the reporting requirements?**

Releases of mineral acids at a pH of 6.0 or greater are considered neutralized and must be reported as zero (0). The portion of sulphuric acid discharged at a pH of less than 6.0 will constitute a reportable release and must be calculated and reported.

**25. We send an NPRI substance to an outside company for recovery. The recovered substance is then sent back to us for reuse. Does the recovered substance count toward the threshold calculation?**

Yes. If the recovered substance is being processed or used it would have to be included in the threshold calculation since it is the same as new material being processed or used.

**26. A company engaged in electroplating is using equipment and lead anodes purchased and installed before the current reporting year. Sixty kilograms of lead anodes were originally installed in the plating tanks. The lead anodes dissolve over time and the lead ends up in sludge and wastewater. During the calendar year, the company replaced 20 kilograms of lead anodes. Does the company have to submit an NPRI report for lead?**

Yes. The entire electrode assembly is considered to be an "other use" of lead, relevant to the purposes of the facility as defined in the Canada Gazette notice. The entire quantity of lead in the electrode assembly, 60 kilograms, must be used in the threshold calculation, not just the 20 kilograms consumed in the process.

**27. When do metal parts, sheets or wire containing NPRI Part 1A and 1B substances lose their status as articles?**

Metal parts, sheets or wire lose their article status when there are releases to the environment or disposals.


If all materials removed during processing, such as turnings or blanks, are completely recycled and due care has been exercised to ensure that the materials are 100% recycled within the facility, the materials retain their article status.

Due care is considered to have been exercised if no more than 1 kg (0.001 tonne) of an NPRI Part 1A substance is released in a given year as a result of the processing or other use of an article.

Due care does not apply to Part 1B substances because of their low reporting thresholds.

Typical metal-processing activities that revoke article status include welding (consumable electrode processes e.g. shielded metal arc welding, flux cored arc welding, gas-metal arc welding, submerged arc welding), torch cutting, quenching, etching and dry grinding.

Typical metal-processing activities that do not revoke article status (assuming "due care" is exercised in ensuring 100% recycling of materials) include cutting, stamping, bending, punching, machining, shearing, soldering and cold extrusion.

**28. Our company purchases metal parts and then welds them together using welding rods. We then paint them and glue other parts to them. What would be reportable in this case?**

The metal parts would retain their article status, so NPRI substances contained in these parts would not be included in the threshold calculation. The welding rods, however, would lose their article status since the operation is a consumable welding operation. If more than 5 000 kg of welding rods were used, reporting for $Cr^{3+}$, Co, Mn, Ni, $Cr^{6+}$ and/or Pb would be required. If more than 25 kg but less than 5 000 kg of rods were used, reporting would only be required for $Cr_6^+$ and Pb. Refer to the *NPRI Toolbox* for more guidance on welding.

NPRI substances contained in the paints and glues would be reportable if the threshold criteria were met. The reporting requirements for VOCs (Parts 4 and 5 substances) should be checked particularly since VOCs can constitute a major part of paint and glue formulations.

**29. Is the use of fuel exempt from reporting?**

No. The use of fuel is not implicitly exempt from reporting. If the threshold criteria are met, use of fuel in a stationary system, such as for power generation, would be reportable. The combustion of fuel in stationary combustion equipment must also be considered when calculating the release thresholds for Parts 4 and 5 substances.

Retail sale, storage and fuel distribution are exempt except as part of terminal operations. Refuelling of motor vehicles is also covered by this exemption even if the vehicle is refuelled from a tank on company property. Mobile sources such as vehicles and earth-moving equipment are not stationary items considered part of a facility. They are not to be included in the calculation of the reporting threshold.

**30. Chromated copper arsenate (CCA) is used in the wood-treatment industry but is not on the NPRI substance list. Do we have to report?**

While CCA is not an NPRI substance, copper (Cu), chromium (Cr), arsenic (As) and their compounds are on the list. A threshold calculation must be performed for each individual substance. Furthermore, since the chromium in CCA is hexavalent, the 50-kg threshold applies for both chromium and arsenic.

A typical bulk solution of CCA (50% concentrate) contains 12.3% Cr, 7.39% Cu, and 11.09% As, by weight. A company would therefore have to use 407 kg, 135 tonnes and 451 kg, respectively, of 50% concentrate of CCA to render Cr, Cu and As reportable.


**31. Should fugitive dust from tailings dams and tailings impoundments be reported to the NPRI as releases?**

Yes. NPRI substances that are released as fugitive emissions must be reported. For mines, this might include the individual metals in the dust, as well as the dust itself as a reportable particulate. The deposit of NPRI substances contained in the mineral portion of the ore or rock to a tailings pond is not reportable, but releases from the pond or dam are.

**32. Our mine operates a wastewater-treatment system for tailings impoundment effluent. The treatment process generates a metal hydroxide sludge containing two NPRI substances. The sludge is pumped back into the tailings impoundment. Are the NPRI substances in the sludge considered releases?**

Substances that are pumped back into a tailings impoundment are not considered releases. The amount of substances leaving the tailings impoundment would be reported as a release.

**33. Should hydraulic backfill pumped underground and used for filling open stopes for ground control be reported?**

No. Stope filling for ground control is part of the extraction process and is therefore included in the mining exemption.

**34. We use zinc in our primary crusher as backing for concaves and shells. Is it reportable?**

No. The mining exemption covers all activities from extraction up to and including primary crushing.

**35. Do NPRI substances contained in a refractory brick furnace have to be reported?**

No. Refractory bricks would retain their status as articles as long as they do not release any NPRI substances during normal use. However, the refractory bricks lose their article status if during normal conditions of use they degrade and release NPRI substances. In that event, the total quantity of NPRI substances in the refractory lining must be used in the calculation of the reporting thresholds for each substance.

**36. Our ore-processing facility uses greases and fuels in many machines used in the benefaction of the ore. Are NPRI substances in these greases and fuels reportable?**


Yes. Process equipment maintenance using materials such as grease, oils or lubricants, disinfectants or paint, etc., is not exempt and must be considered for the purposes of NPRI reporting. For the purpose of Part 1 substances, the use of greases and fuels in this situation would be considered as "other use". The air releases emitted by these materials would have to be considered for Parts 4 and 5 substance reporting requirements.

**37. We use more than 10 tonnes of sodium cyanide in our flotation beds. The substance is entirely consumed and transformed to non-ionic cyanides in the process. We met all other reporting criteria. Are we required to report?**

Yes. Reporting of NPRI Part 1A substances is based on quantity manufactured, processed or otherwise used, not on quantities released. You must perform your threshold calculations based on the amount of cyanide ion used or processed and submit a report if you met or exceeded the 10-tonne threshold. Since non-ionic forms of cyanide are not on the NPRI substance list, you would report a zero release of cyanide ion.

**38. We use copper sulphate as a reagent. During the process, it attaches itself to other compounds and remains with the concentrate. There are no releases. Is it reportable?**

Yes. If the amount of copper met or exceeded the 10-tonne reporting threshold, you would submit a report for "copper (and its compounds)" and report a release of zero for this process. All other releases of copper from your facility would also have to be reported.

**39. We use zinc sulphate, zinc oxide and zinc stearate. How do we handle reporting of all these different metal compounds?**

Report only the zinc portion of the compounds under the substance name "zinc (and its compounds)".

**40. Is fuel used for fire-training purposes reportable to the NPRI?**

A facility used for the education or training of students is exempt from reporting Part 1A, 1B, 2 and 3 substances. The use of fuels does not need to be reported. However, if the training facility operates a stationary combustion unit and does not qualify for the exemption (see Question 6 for explanation), then it must report CAC releases from the combustion unit that met any of the CAC mass thresholds.

The fire-training activities occurring at a facility not used exclusively for the training of students (e.g., at an airport) are not exempt from reporting. The CAC releases from the combustion of fuel for fire-training, including extinguishing structure fires, and other stationary combustion sources must be included in the CAC release threshold calculations. Any other NPRI substances manufactured, processed, otherwise used or released during the training must also be considered in the threshold calculations.

**41. We store products in our warehouse that don't belong to us. We do not use these products in the operation of our warehouse. Some of these products contain NPRI substances. Are we required to report?**


No. A warehouse is not required to report if it does not manufacture, process or otherwise use NPRI substances. Transfer of NPRI substances between containers is considered processing. Wholesale distribution is exempt, provided there are no releases of NPRI substances.

**42. We buy bulk NPRI substances in tanks and drums. Some of these substances are simply repackaged in smaller containers, e.g., tanks to drums, drums to 4-litre plastic bottles. However, some of the substances are mixed together and then repackaged. Are we required to report?**

Transfer of substances between containers is considered processing and those quantities must be included in the threshold calculation. Mixing of substances together prior to packaging is also considered processing and must be considered in the threshold calculation.

**43. We use an NPRI substance in our process that met all reporting criteria. Unfortunately, we have no data on possible releases and we cannot find any estimation factors. Is a release of zero acceptable in this case?**

For Part 1A, 1B, 2, 4 and 5 substances, you are required to report the information that you possess. You must collect your facility information and identify the substances for which a report is required. You would report "zero" releases, disposals or transfers for recycling only if it is known that these substances were not released, disposed of or transferred for recycling.

If you met the reporting criteria for dioxins/furans and HCB (Part 3 substances), but have no data and cannot find emission factors, you are required to report "No information available" for any releases, disposals and transfers for recycling expected to contain these substances (e.g., releases to air from a combustion process that generates dioxins/furans).

**44. What needs to be considered when calculating the annual threshold quantity of an NPRI substance for a soaking bath used for metal-cleaning or metal-plating operations?**

Metal-cleaning and metal-plating baths are considered to be an "other use" of an NPRI substance, relevant to the purposes of the facility as defined in the *Canada Gazette* notice. The entire quantity of the individual NPRI substance(s) in the metal-cleaning or -plating bath and any quantity used to refill the bath must be used in the threshold calculation, not just the quantity consumed in the process. If the facility exceeds the threshold, the owner/operator would only report releases, disposals and transfers for recycling of the individual NPRI substance(s).

**45. Are vinyl chloride and polyvinyl chloride (PVC) the same compound?**

No. Polyvinyl chloride is a polymer made from vinyl chloride. It is not the same substance and is not listed in the NPRI; therefore, it is not reportable. Only free vinyl chloride monomer is reportable. Some formulations of pre-polymers may contain a percentage of free monomer. If you purchase pre-polymers which contain free vinyl chloride monomer, add this to the threshold calculation.


**46. Asbestos is listed with the CAS number 1332-21-4. We use asbestos with the following names and CAS numbers: Azbolen (17068-78-9), Actinolite (77536-66-4), Amosite (12172-73-5), Anthropylite (77536-67-5), Tremolite (77536-68-6) and Serpentine. Are we required to report?**

The CAS number 1332-21-4 is defined as "Asbestos, a greyish, non-combustible fibrous material. It consists primarily of impure magnesium silicate". Asbestos with the CAS number 1332-21-4 is the general CAS number for a number of specific types of asbestos including those mentioned. Those types of asbestos would be reportable if they are in friable form.

**47. A facility coats materials using a vacuum deposition process. When it uses aluminum for coating, is it required to report for aluminum fumes?**

In vacuum deposition, the metal is converted to a vapour state under low pressure. The vapour condenses on the material to be coated. Vapours are not fumes. A metal fume consists of finely divided particulate matter dispersed in a gas (like smoke). Because vapours and fumes are different, this process would not be considered a reportable activity unless the condensation creates fumes or dust.

**48. What types of routine maintenance are exempt?**

Routine janitorial or other facility grounds maintenance activities that use NPRI substances contained in cleaners, fertilizers or pesticides are exempt.

Process equipment maintenance using materials such as grease, oils or lubricants, disinfectants or paint etc., is not exempt and must be considered for the purposes of NPRI reporting.

**49. Our process uses metal grinding wheels which suffer regular abrasion. Would NPRI substances in these wheels be reportable?**

Yes. Items such as grinding wheels are, by their nature and use, intended to wear down and release substances. They are designed to be replaced and are subject to reporting.

**50. Are degreasers used in a plant's maintenance shop reportable?**

Yes. Degreasing of equipment for maintenance is not considered routine maintenance and is not exempt. It would be reported as "otherwise used" (Part 1 substances) or as air releases (Part 4 and 5 substances).

**51. Is our quality-control laboratory exempt from reporting under the research and testing exemption?**

Yes. The laboratory is exempt from reporting Parts 1A, 1B, 2 and 3 substances if it did not perform pilot-scale studies or specialty chemical production. However, if the quality-control lab operates stationary combustion equipment and did not meet the exemption criteria explained in Question 6, then it must report for each CAC released from the stationary combustion equipment that exceeded the release threshold.

**52. Are photo development laboratories exempt?**

No. The laboratory exemption includes research facilities that perform auxiliary functions to the manufacturing or processing activities of a facility. Photo development laboratories do not perform auxiliary functions, but rather perform activities essential to the development of their products (photographs, films, etc.).


**53. We buy more than 10 tonnes of chlorine gas and use it in a reaction vessel to produce more than 10 tonnes of chlorine dioxide. We then dilute the chlorine dioxide to less than 1% concentration. What do we have to report?**

Because you met the 10-tonne threshold for chlorine gas, you are required to report any releases, disposals and transfers for recycling of chlorine gas. Because you manufacture chlorine dioxide at a concentration greater than 1%, you are required to report any releases, disposals and transfers for recycling of chlorine dioxide. The subsequent dilution of the chlorine dioxide does not affect the threshold calculation.

**54. How do we address NPRI substances contained in industrial and commercial batteries?**

Items such as batteries, which contain NPRI substances that are not released during normal use, are considered articles and are not subject to reporting. However, the item loses its article status if NPRI substances were released. Also, if you recycle lead-acid batteries by crushing and removing the lead, then the batteries cease to be articles and the NPRI substances they contain must be considered in the threshold calculation.

**55. How do we treat a solvent sent off site for distillation and then shipped back to us?**

A solvent received from a recycling operation located off-site counts as new material and must be included in the threshold calculation. The quantity sent off site for distillation must be reported as material sent for recycling.

**56. We use a paint thinner that contains toluene. We also use toluene in another part of our plant. In total, more than 10 tonnes of toluene are used annually. The waste thinner is sent to an off-site facility for blending in fuels. How do we report this activity?**

NPRI substances sent off site for fuel blending or that add energy to a heat-recovery activity must be reported as a transfer for energy recovery. Other releases, disposals or transfers for recycling of toluene must also be reported. In addition, any toluene released to air must be included in the calculation of the VOCs air emissions under Part 4 (Part 4 threshold for VOCs is 10 tonnes released to air). It would also have to be included under Part 5 if the quantity of toluene released to air was greater than 1 tonne.

**57. Are NPRI substances used in maintenance activities such as paint-booth cleaning, reportable?**

Paint-booth cleaning is not considered a routine janitorial activity and would be reportable under the classification "other use" (Part 1 substances) or as air releases (Part 4 and 5 substances).


**58. How does the NPRI definition of a facility apply to a multi-plant site?**

"Facility" is defined in the *Canada Gazette* notice as a contiguous facility, a pipeline installation, or offshore installation. A contiguous facility includes all buildings or structures located on a single site or on adjacent sites which are owned or operated by the same person and function as a single integrated site.

Plants must report separately if they manufacture or process unrelated products and if they do not share common manufacturing or processing operations. For example, a battery plant and a vehicle-assembly plant, located side-by-side, are two distinct manufacturing operations that have different SIC codes. In the case of the battery plant, it also ships products to other installations. Other examples are smelters and fertilizer plants, a refinery and a chemical plant.

**59. Is reporting to the NPRI mandatory under the *Canadian Environmental Protection Act, 1999* (CEPA 1999)? If so, how will it be enforced?**

If the criteria for reporting to the NPRI are met, then reporting to the NPRI is mandatory under section 46 of the CEPA 1999. It is the responsibility of each person who owns or operates a facility to determine whether they are required to report after examining the *Canada Gazette* notice and the CEPA 1999 and to report by June 1 if reporting is required. There is a *Compliance and Enforcement Policy for the CEPA 1999*, which dictates how regulations and notices are enforced. The *Canada Gazette*, the CEPA 1999 and the above-mentioned policy are available on the CEPA Registry Internet site at the following address at www.ec.gc.ca/CEPARegistry.

**60. A pulp mill is connected to its waste-treatment facility by a 10-km pipeline. The pipe travels on land not owned by the company. The waste-treatment facility employs only two full-time staff. How should they report?**

A waste-treatment facility owned or operated by the company or parent company and connected to the pulp mill by any combination of a permanent continuous pipe, conveyor, tunnel or sluiceway, and which functions as part of a single integrated facility shall be considered part of the pulp mill for the purposes of reporting to the NPRI.

In this case, the treatment plant is an integral part of the pulp mill and is connected to it by a permanent, continuous connection. Both plants are operated by the same company as a single integrated facility. This represents a contiguous facility, and the company's report to the NPRI must include activities at the waste-treatment facility.

**61. A facility that previously reported to the NPRI has been split up and now is owned and operated by two separate companies. How should they report to the NPRI?**

If the companies are owned by the same parent company AND function as a single integrated facility, they must report as one facility. If they do not meet both of the above conditions, they must perform separate threshold calculations and report separately.

**62. Are substances regulated under other legislation (e.g., *Pest Control Products Act*) exempt from reporting to the NPRI?**

There is no exemption for substances regulated under other legislation.


**63. Is a solid-waste landfill required to report to the NPRI?**

For Part 1 to 3 substances, the definition of "other use" includes disposal. For Part 4 and 5, all stationary sources of CACs must be considered at the landfill sites. Solid-waste landfills may provide final disposal for NPRI substances. If the facility met all threshold criteria for these substances, it is required to report. Additionally, landfills can generate, as a consequence of the disposal, by-products such as ammonia in their leachate or VOCs releases to air. A report is needed for these substances if the threshold criteria are met.

**64. We use chlorine as an aqueous disinfectant in our facility. Will we have to report chlorine releases?**

Assuming you met the 10-tonne threshold for chlorine, you must submit a report. Chlorine, when added to water, will dissociate and no longer exist in most circumstances, resulting in a report of zero release. However, if the pH of the treated water falls below 6, you must consider the equilibrium of chlorine and hydrochloric acid (HCl), which is also a reportable substance, when performing the threshold calculations for each substance.

**65. What activities at a chemical distribution facility would potentially trigger NPRI reporting?**

Unloading, transferring, blending and repackaging are forms of processing which can trigger NPRI reporting. All releases, disposals and transfers for recycling resulting from these activities are reportable. Substances that arrived in sealed containers and were only stored in a warehouse prior to distribution would not be included. The filling and emptying of storage tanks is also considered processing, and fugitive releases from those tanks must be included when calculating CAC release thresholds. In addition, CACs released from the stationary combustion equipment used at the chemical distribution facility must also be included in the CAC mass release thresholds.

**66. Our mine used 200 tonnes of steel grinding balls which contain 15-18% of chromium (excluding hexavalent chromium). These grinding balls are totally consumed during processing after primary crushing. Do we need to report for chromium?**

Approximately 30-36 tonnes of chromium (excluding hexavalent chromium) were used in processing the ore. The threshold criteria for reporting for chromium (and its compounds) has been met and you are required to report.

**67. After primary crushing of ore at a mine, ethylene glycol was applied to the crushed ore as a dust suppressant or to prevent the ore from freezing. Does this use of an NPRI substance fall under the exemption for mining in the *Canada Gazette* notice?**

No. Addition of ethylene glycol was done intentionally to aid in the further processing of ore or distribution of the ore in commerce. This is not related to the primary extraction of the mined materials and is a processing step that does not fall under the basic mining exemption and therefore must be reported to the NPRI.


**68. My facility has heating, ventilation and air conditioning (HVAC) systems and refrigerant equipment that contain halocarbons listed on the NPRI substance list. Does this use have to be considered?**

Yes. Reporting to the NPRI would be required if the HVAC systems and refrigerant equipment within a facility had a total holding capacity of 10 tonnes or greater (Note: this does not refer to the cooling capacity of the system which may also be expressed in tonnes. The equipment nameplate should also indicate the halocarbon capacity of each unit). The 10-tonne threshold calculation should be completed for each halocarbon within the facility (i.e., if the chillers contain CFC-11 but the condensers and evaporators contain HCFC-22 they are not to be included in the same calculation). Also, calculations should include the quantity of halocarbon that was in the system at the beginning of the year plus any additional halocarbons that were added during refilling (i.e., during annual leak test) throughout the calendar year. Halocarbons used in office and plant air conditioning systems must be included in the 10-tonne threshold calculation. Halocarbons used by employees for personal use (i.e., refrigerators in lunch rooms/cafeteria, water fountains, vending machines) are not to be included.

**69. Our facility has a halon fire-suppression system. Do we need to report for halon?**

Halon in a fire-suppression system is considered to be an "other use" of an NPRI substance. If the fire-suppression system contains Halon 1211 or Halon 1301 in quantities equal to or greater than 10 tonnes and also meets the employee and concentration reporting criteria, the facility would be required to report to the NPRI. Also, calculations should include the quantity of halon that was used in the system at the beginning of the year, plus any additional halon added during refilling (i.e., after use or during maintenance). The type and quantity of halon will be listed on the equipment nameplate. Halons in storage are not in use and do not need to be included in a threshold calculation, although any leaks from storage must be considered.

**70. As part of its process equipment, a facility has installed a catalyst containing one or more NPRI-listed substances. The catalyst has a fixed shape (pellets). Does the article exemption apply to catalysts and to the NPRI substances they contain?**

No. An article is "a manufactured item that does not release a substance, under normal conditions of processing or other use". Even though the pellets themselves appear to meet the definition of an article, there will be releases (dust emissions, spills, etc.) as a result of normal handling in installation or charging, removal for disposal, regeneration or recycling, and operational use of the catalyst. Therefore, the article exemption does not apply in this case. All NPRI substances present in the catalyst must be included in the threshold calculation for each substance.

Also, the article exemption does not apply to Part 1B substances in any case. This is because there is no quantitative measure of due care in recycling Part 1B substances. Even minimal releases of Part 1B substances can cause significant adverse effects to human health and the environment and can reasonably be expected to contribute to exceeding their low thresholds.

**71. This year, we removed asbestos, used as insulation, from our facility. Are we required to submit a report for asbestos?**

While asbestos is used as insulation and emits no on-site releases, it is considered an article and is exempt from reporting. However, if asbestos (friable form) is removed from any part of the facility, it loses its article status and is considered to be "otherwise used". In this case, the asbestos must be included in determining whether the facility met the 10-tonne manufacture, process or otherwise use threshold for this substance. Once the facility meets the 10-tonne threshold, a report must be submitted for asbestos, and the quantity removed from any part of the facility must be reported. This information should be reported in the NPRI software under "other use" as "ancillary or other use".

# Glossary

"abrasive blasting" is the process of cleaning or texturing materials such as metals and ceramics with an abrasive material.

"ambient" means surround, or on all sides. For example, the air outside surrounding the facility or city.

"alloy" includes metal products containing two or more elements as a solid solution, intermetallic compounds, and mixtures of metallic phases.

"article" means a manufactured item that does not release a substance, listed in Schedule 1 of the *Canada Gazette* notice, under normal conditions of processing or other use.

"base metal" means copper, lead , nickel and zinc.

"biomedical or hospital waste" refers to waste that is generated by human or animal health-care facilities, medical or veterinary research and testing establishments, health-care teaching establishments, clinical testing or research laboratories, and facilities involved in the production or testing of vaccines. Biomedical or hospital waste includes human anatomical waste, animal waste, microbiology laboratory waste, human blood and body fluid waste, and waste sharps that have not been disinfected or decontaminated. It does not include waste from animal husbandry, or waste that is controlled in accordance with the *Health of Animals Act* (Canada).


"boiler" is an external combustion unit which turns water into steam for heating or power; or a tank for heating or storing water.

"by-product" means a substance, listed in Schedule 1, which is incidentally manufactured, processed or otherwise used at the facility at any concentration, and released on-site to the environment, released to surface waters or disposed of.

"carbon monoxide" is a colourless, odourless, poisonous gas that is formed during the incomplete combustion of fossil fuels or the incomplete oxidation of carbon to carbon dioxide.

"CAS number" means the Chemical Abstract Service Registry Number.

"commercial grade natural gas" consists of a high percentage of methane (generally above 85%) and varying amounts of ethane, propane, butane and inerts.

"contiguous facility" means all buildings, equipment, structures, and stationary items that are located on a single site or contiguous or adjacent sites and that are owned or operated by the same person and that function as a single integrated site and includes wastewater collection systems that discharge treated or untreated wastewater to surface waters.

"cumulative nameplate capacity" refers to the total nameplate capacities of all stationary **external** combustion equipment at the facility.

"disposal" means the final disposal of the material (e.g., landfill) or treatment (e.g., stabilization) prior to final disposal.

"emission" means, for the purposes of reporting CACs to the NPRI, any discharge of a CAC substance to air.

"emission factors' relates the quantity of substances emitted from a source to some common activity associated with those emissions, and can be categorized into

a) "published emission factors" means those that have been published by government agencies and industry associations for application to emission sources in their particular jurisdiction or industry sector; or

b) "site-specific emission factors" means those that have been developed by the industrial facilities using their own specific emission-testing data and source-activity information.

"employee" includes a person employed at the facility, an owner who performs work on site at the facility, and a person who performs work on site at the facility on a routine basis that is related to the normal operations of the facility, for the period of time the person is performing that work, such as contractors.

"external combustion equipment" mean any equipment with a combustion process that occurs at atmospheric pressure and with excess air.

"facility" means a contiguous facility, an offshore installation, or a pipeline installation.

"fermentation" the use of yeast to breakdown complex organic compounds, used in alcohol production and baking processes.

"fermentor" is a container in which fermentation takes place.

"fossil fuel" means fuel that is in a solid or liquid state at standard temperature and pressure, such as coal, petroleum or any solid or liquid fuel derived from such.


"fugitive release" means the total of all releases to air that are not released through confined process streams. These releases include:

- fugitive equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines, etc.
- evaporative losses from surface impoundments and spills
- releases from building ventilation systems, and
- any other fugitive or non-point air emissions from land treatment, mine tailings, storage piles, etc.

"full-time employee equivalent" means the unit obtained by dividing by 2 000 hours, the sum of:

a) the total hours worked by persons employed at the facility, and the total hours of paid vacation and of sick leave taken by persons employed at the facility;

b) the hours worked on site at the facility by the owner of the facility, if not employed by the facility; and

c) the hours worked on site at the facility by a person who performs work on a routine basis related to the normal operations of the facility, such as contractors.

"generator" is an internal combustion unit that produces gas or steam, or that changes mechanical energy into electrical energy.

"hazardous waste" includes those wastes that are potentially hazardous to human health and/or the environment because of their nature and quantity, and that require special handling techniques. Hazardous waste is fully defined in Appendix 4.

"industrial space heater" is an external combustion unit used to heat a single confined area.

"internal combustion equipment" means any equipment with a combustion process that occurs in a confined space and above atmospheric pressure.

"isokinetically" refers specifically to the term "isokinetic source sampling" which means sampling in a manner where the linear velocity of the gas entering the sampling nozzle is equal to that of the undisturbed gas stream at the sampling point.

"level of quantification" means, in respect of a substance, the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods.

"liquefied petroleum gas (LPG or LP-gas)" consists of propane, propylene, butane and butylenes, however the most common LPG is propane. There are two grades of LPG available as heating fuels. Grade 1 fuel is intended for use in internal combustion engines operating under moderate to high engine severity. Grade 2 fuel is adequate for most industrial uses, especially where low ambient temperatures exist and uniformity of fuel volatility is important. Propane is also used as an alternative to gasoline and as a standby fuel for facilities with interruptible natural gas service contracts.

"manufacture" means to produce, prepare or compound a substance in Schedule 1 of the *Canada Gazette* notice and includes the coincidental production of a substance listed in Schedule 1, as by-product as a result of the manufacturing, processing or other use of other substances.

"nameplate capacity" refers to the total designed energy input capacity of the external stationary combustion equipment.

"nitrogen oxides (expressed as $NO_2$)" includes nitric oxides (NO) [CAS No. 10102-43-9] and nitrogen dioxide ($NO_2$) [CAS No. 1012-44-0]. Nitrogen and oxygen in air at high temperatures can combine to from nitrogen oxides ($NO_X$). Furthermore, fuel combustion and high temperatures, and industrial processes produce $NO_X$. In addition, nitrogen in fuel also increases the amount of $NO_X$ produced.


"non-hazardous solid waste" means any waste, regardless of origin, which might normally be disposed of in a non-secure manner, such as at a sanitary landfill site, if not incinerated.

"number 1 or 2 fuel oils" are distillate oils suitable for use in liquid fuel burning equipment without preheating. Type 1 fuel oil is primarily intended for use in sleeve type, wick fed and most vapourizing pot-type burners. Type 2 fuel oil is a heavier distillate than Type 1. Type 2 intended use is in medium-capacity, commercial-industrial burners where ease of handling and availability justifies its use. Neither Type 1 nor 2 fuel oils include heavy fuel oils or residual oils.

"offshore installation" means an offshore drilling unit, production platform or ship, or subsea installation attached or anchored to the continental shelf of Canada in connection with the exploitation of oil or gas.

"other use" includes any use or disposal of a substance, listed in Schedule 1 of the *Canada Gazette* notice, relevant to the purpose of the facility which is not included under the definitions of "manufacture" or "process".

"parent company" means the highest level company or group of companies that own or directly control the reporting facility.

"pipeline installation" means a collection of equipment situated at a single site, used in the operation of a natural gas transmission or distribution pipeline.

"$PM_{2.5}$" means any particulate matter with a diameter less than or equal to 2.5 microns.

"$PM_{10}$" means any particulate matter with a diameter less than or equal to 10 microns.

"pollution prevention" means the use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste, and reduce the overall risk to the environment or human health.

"ppm" means the concentration in units of parts per million.

"process" means the preparation of a substance, listed in Schedule 1 of the *Canada Gazette* notice, after its manufacture, for commercial distribution and includes preparation of a substance in the same physical state or chemical form as that received by the facility, or preparation which produces a change in physical state or chemical form.

"recycling" includes any activity that prevents a material or a component of the material from becoming a material destined for disposal.

"release" means the emission or discharge of a substance from the facility site to air, surface waters, or under certain circumstances, to land (e.g. spills, leaks).

"secondary aluminum" means aluminum-bearing scrap or aluminum-bearing materials.

"secondary lead" means lead-bearing scrap or lead-bearing materials, other than lead-bearing concentrates derived from a mining operation.

"sewage sludge" means sludge from a facility treating wastewater from a sanitary sewer system. The drying of sludge to reduce water content is part of the incineration stage.

"sludge" means a semi-liquid mass removed from a liquid flow of wastes.


"stationary combustion equipment" means any combustion equipment which needs to be stationary to function or operate properly or is not capable of self-propulsion.

"stationary, external combustion equipment" refers to any stationary equipment with a combustion process that occurs at atmospheric pressure and with excess air. This may include thermal electric generating plants, industrial boilers, and commercial and domestic combustion units. Commercial grade natural gas, liquefied petroleum gas, and Number 1 and 2 fuel oils are among the fuels used.

"sulphur dioxide ($SO_2$)" is formed during oxidation reactions involving sulphur and oxygen. $SO_2$ emissions are generated primarily from the smelting of ore and fuel combustion.

"terminal operations" means:

a) the use of storage tanks and associated equipment at a site used to store or transfer crude oil, artificial crude or intermediates of fuel products into or out of a pipeline, or

b) operating activities of a primary distribution installation normally equipped with floating-roof tanks that receives gasoline by pipeline, rail car, marine vessel or directly from a refinery.

"total particulate matter" means any particulate matter with a diameter less than 100 microns.

"toxicity equivalent" commonly referred to as TEQ, means a mass or concentration which is a sum of the masses or concentrations of individual congeners of polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans multiplied by weighting factors set out in Section 4.8.1 What are Toxic Equivalents (TEQs) of Dioxins/Furans?

"treatment" means subjecting the substance to physical, chemical, biological or thermal processes at an off-site location prior to final disposal.

"turbine" is an internal combustion unit that is driven by the pressure of steam, water, air, etc., against the curved vanes of a wheel or set of wheels attached to a drive shaft.

"virtual elimination" of a toxic substance released into the environment as a result of human activity is defined in subsection 65(1) of the CEPA 1999, as "the ultimate reduction in the quantity or concentration of the substance in the release below the level of quantification". Substances that are determined to be CEPA-toxic, persistent, bioaccumulative and primarily the result of human activity are slated for virtual elimination.

"volatile organic compounds" are discussed in Section 3.8 Reporting Criteria for Part 4 Substances – Criteria Air Contaminants (CACs) and defined in Appendix 5.

"volatile organic compound species" are discussed in Section 3.9 Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds (VOCs).

"waste incinerator" is a device, mechanism or structure constructed primarily to thermally treat (e.g., combust or pyrolyze) a waste for the purpose of reducing its volume, destroying a hazardous chemical present in the waste, or destroying pathogens present in the waste.

"wastewater collection system" is the system of sewers and/or ditches that convey sanitary or combined sewage for a community. A collection system includes adjacent service areas or adjoining sewage sheds that function as a single integrated system for a community.

"wastewater treatment system" means a plant or process location that accepts collection system flows of a community for the purposes of removing substances from the wastewater.

"wood preservation" means the use of a preservative for the preservation of wood by means of heat or pressure treatment, or both, and includes the manufacture, blending or reformulation of wood preservatives for that purpose.

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# Publications of the U.S. Environmental Protection Agency

## Guidance Documents for Reporting to the Toxics Release Inventory

In 1988 and 1990, the Office of Pollution Prevention and Toxics of the U.S. Environmental Protection Agency (U.S. EPA) developed many industry-specific guidance manuals to help industries estimate the releases for reporting to the Toxics Release Inventory (TRI). Since 1998, some of these manuals have been revised and some additional industry-specific guidance manuals have been prepared. These manuals, listed below, could also be used for reporting to the NPRI.

1. *Estimating Chemical Releases from Monofilament Fiber Manufacturing*, EPA 560/4-88-004a (January, 1988).
2. *Estimating Chemical Releases from Printing Operations*, EPA 560/4-88-004b (January, 1988).
3. *Estimating Chemical Releases from Electrodeposition of Organic Coatings*, EPA 560/4-88-004c (January, 1988).
4. *Estimating Chemical Releases from Spray Application of Organic Coatings*, EPA 560/4-88-004d (January, 1988).
5. *Estimating Chemical Releases from Semi-Conductor Manufacturing*, EPA 560/4-88-004e (January, 1988).
6. *Estimating Chemical Releases from Formulation of Aqueous Solutions*, EPA 560/4-88-004f (March, 1988).
7. *Estimating Chemical Releases from Electroplating Operations*, EPA 560/4-88-004g (January, 1988).
8. *Estimating Chemical Releases from Textile Dyeing*, EPA 560/4-88-004h (February, 1988).
9. *Estimating Chemical Releases from Presswood and Laminated Wood Products Manufacturing*, EPA 560/4-88-004i (March, 1988).
10. *Estimating Chemical Releases from Roller, Knife, and Gravure Coating Operations*, EPA 560/4-88-004j (February, 1988).
11. *Estimating Chemical Releases from Paper and Paperboard Production*, EPA 560/4-88-004k (February, 1988).
12. *Estimating Chemical Releases from Leather Tanning and Finishing*, EPA 560/4-88-0041 (February, 1988).
13. *Estimating Chemical Releases from Wood Preserving Operations*, EPA 560/4-88-004p (February, 1988).
14. *Estimating Chemical Releases from Rubber Production and Compounding Operations*, EPA 560/4-88-004q (March, 1988).
15. *Issue Paper – Clarification and Guidance for the Metal Fabrication Industry*, (January, 1990).
16. *Guidance for Food Processors*, EPA 560/4-90-014 (June, 1990).
17. *EPCRA Section 313 Reporting Guidance For Food Processors (Update)*, EPA 745-R-98-011 (September, 1998).
18. *EPCRA Section 313 Reporting Guidance for Spray Application and Electrodeposition of Organic Coatings*, EPA 745-R-98-014 (December, 1998).
19. *Industry Guidance for Coal Mining Facilities*, EPA 745-B-99-002 (January, 1999).
20. *Industry Guidance for Electricity Generating Facilities*, EPA 745-B-99-003 (January, 1999).

21. *Industry Guidance for Metal Mining Facilities*, EPA 745-B-99-001 (January, 1999).
22. *Industry Guidance for Chemical Distribution Facilities*, EPA 745-B-99-005 (January, 1999).
23. *Industry Guidance for RCRA Subtitle C TSD Facilities and Solvent Recovery Facilities*, EPA 745-B-99-004 (January, 1999).
24. *Industry Guidance for Petroleum Terminals and Bulk Storage Facilities*, EPA 745-B-99-006 (January, 1999).
25. *EPCRA Section 313 Reporting Guidance for Semiconductor Manufacturing*, EPA 745-R-99-007 (July, 1999).
26. *EPCRA Section 313 Reporting Guidance for Leather Tanning and Finishing Industry*, EPA 745-B-00-012 (April, 2000).
27. *EPCRA Section 313 Reporting Guidance for the Printing, Publishing, and Packaging Industry*, EPA 745-B-00-005 (May, 2000).
28. *EPCRA Section 313 Reporting Guidance for Rubber and Plastics Manufacturing*, EPA 745-B-00-017 (May, 2000).
29. *EPCRA Section 313 Reporting Guidance for the Textile Processing Industry*, EPA 745-B-00-008 (May, 2000).
30. *EPCRA Section 313 Reporting Guidance for the Presswood and Laminated Products Industry*, EPA 260-B-01-013 (August, 2001)

In addition, the U.S. EPA has developed a group of guidance documents specific to individual chemicals and chemical categories. Some of these documents are relevant to be used for reporting to the NPRI and are listed below.


31. *Guidance for Reporting Aqueous Ammonia - Revised*, EPA 745-R-00-005 (December, 2000).
32. *List of Toxic Chemicals Within The Water Dissociable Nitrate Compounds Category and Guidance for Reporting – Revised*, EPA 745-R-00-006 (December, 2000).
33. *Guidance for Reporting Sulfuric Acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)*, EPA 745-R-97-007 (November, 1997 and updated March, 1998).
34. *Guidance for Reporting Toxic Chemicals within the Polycyclic Aromatic Compounds Category (Final)*, EPA 260-B-01-03 (August, 2001).
35. *List of Toxic Chemicals within the Polychlorinated Alkanes Category and Guidance for Reporting*, EPA 745-B-99-023 (June, 1999).
36. *Guidance for Reporting Hydrochloric Acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)*, EPA 745-B-99-014 (December, 1999).
37. *Guidance for Reporting Toxic Chemicals within the Dioxin and Dioxin-like Compounds Category (Final)*, EPA 260-B-01-004 (August, 2001).

## Locating and Estimating (L&E) Documents

To assist groups interested in preparing inventories of air emissions of various potentially toxic substances, the U.S. EPA Office of Air Quality and Planning Standards has prepared a series of L&E documents that compiles available information on sources and emissions of these substances. Documents in this series are listed below.

| Substance | EPA Publication # | Publication Date |
|---|---|---|
| 38. Acrylonitrile | EPA-450/4-84-007a | 1984 |
| 39. Arsenic and Arsenic Compounds | EPA-454/R-98-013 | June 1998 |
| 40. Benzene | EPA-450/4-84-007q | 1988 |
| 41. Benzene | EPA-450/R-98-011 | June 1998 |
| 42. 1,3-Butadiene | EPA-454/R-96-008 | November 1996 |
| 43. Cadmium and Cadmium Compounds | EPA-454/R-93-040 | September 1993 |
| 44. Carbon Tetrachloride | EPA-450/4-84-007b | March 1984 |
| 45. Chlorobenzenes | EPA-454/R-93-044 | March 1994 |
| 46. Chloroform | EPA-450/4-84-007c | March 1984 |
| 47. Chromium | EPA-450/4-84-007g | July 1984 |
| 48. Chromium (Supplement) | EPA-450/2-89-002 | August 1989 |
| 49. Coal and Oil Combustion Sources | EPA 450/2-89-001 | 1989 |
| 50. Cyanide | EPA-454/R-93-041 | September 1993 |
| 51. Dioxins and Furans | EPA-454/R-97-003 | May 1997 |
| 52. Epichlorohydrin | EPA-450/4-84-007j | March 1984 |
| 53. Ethylene Dichloride | EPA-450/4-84-007d | March 1984 |
| 54. Ethylene Oxide | EPA-450/4-84-0071 | September 1986 |
| 55. Formaldehyde | EPA-450/4-91-012 | March 1991 |
| 56. Lead | EPA-454/R-98-006 | May 1998 |
| 57. Manganese | EPA-450/4-84-007h | 1986 |
| 58. Medical Waste Incinerators | EPA-454/R-93-053 | 1993 |
| 59. Mercury and Mercury Compounds | EPA-454/R-97-012 | December 1997 |
| 60. Methylene Chloride | EPA-454/R-93-006 | February 1993 |
| 61. Methyl Ethyl Ketone | EPA-454/R-93-046 | March 1994 |
| 62. Municipal Waste Combustion | EPA-450/2-89-006 | 1989 |
| 63. Nickel | EPA-450/4-84-007f | 1984 |
| 64. Organic Liquid Storage Tanks | EPA-450/4-88-004 | 1988 |
| 65. Perc and Trichloroethylene | EPA 450/2-89-013 | 1989 |
| 66. Phosgene | EPA-450/4-84-007i | 1986 |
| 67. Polycyclic Organic Matter | EPA-454/R-98-014 | July 1998 |
| 68. Sewage Sludge Incinerators | EPA 450/2-90-009 | 1990 |
| 69. Styrene | EPA-454/R-93-011 | April 1993 |
| 70. Toluene | EPA-454/R-93-047 | March 1994 |
| 71. Vinylidene Chloride | EPA-450/4-84-007k | September 1985 |
| 72. Xylene | EPA-454/R-93-048 | March 1994 |

## Other Documents from the U.S. EPA

73. *Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary Point and Area Sources*, U.S. EPA, AP-42, 5th Edition (1996), and AP-42 Supplements A, B, C, D, E, and F (1996, 1997, 1998, 1999, and 2000).
74. *Toxic Air Pollutant Emission Factors – A Compilation for Selected Air Toxic Compounds and Sources, Second Edition*, U.S. EPA, EPA 450/2-90-011 (1990).
75. *Protocols for Equipment Leak Emission Estimates*, U.S. EPA, EPA 453/R-95-017 (November, 1995).
76. *Hot Mix Asphalt Plants – Emission Assessment Report* (Draft), U.S. EPA, EPA 454/R-00-0XX (June, 2000).
77. *Development of Particulate and Hazardous Emission Factors for Electric Arc Welding (AP- 42, Section 12.19) Revised Final Report*, U.S. EPA, EPA (May, 1994).

Copies of the U.S. EPA documents are available from:

U.S. Environmental Protection Agency
National Center For Environmental Publications and Information (NCEPI)
P.O. Box 42419
Cincinnati, OH 45242
U.S.A.
Tel: (513) 489-8190, Fax: (513) 489-8695

U.S. EPA documents can be downloaded from the U.S. Toxics Release Inventory (TRI) Web site at www.epa.gov/tri or the U.S. EPA's Technology Transfer Network Web site at www.epa.gov/ttn/chief/

Or, they can be ordered from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
U.S.A.
Tel: (703) 605-6000
Fax: (703) 605-6900
E-mail: orders@ntis.fedworld.gov
Web site: www.ntis.gov/


## Documents Produced by Industry Associations

78. *Evaporation Loss from External Floating Roof Tanks*, American Petroleum Institute, Publication 2517 (1994).
79. *Evaporation Loss from Fixed Roof Tanks*, American Petroleum Institute, Chapter 19.1 (1991).
80. *Evaporation Loss from Internal Floating Roof Tanks*, American Petroleum Institute, Publication 2519 (1996).
81. *Review of Air Toxic Emission Calculations from Storage Tanks, Air Toxic Emissions Calculation Validation Program: Analysis of Crude Oil and Refined Product Samples and Comparison of Vapor Composition to Model Predictions*, American Petroleum Institute, Publication 2525 (1992).

Copies of the above reports can be ordered from:

American Petroleum Institute
Order Desk
1200 L Street Northwest
Washington, DC 20005
U.S.A.
Tel: (202) 682-8375
Fax: (202) 962-4776

82. Canadian Petroleum Products Institute "Code of Practice for Developing a Refinery Emission Inventory" available at www.cppi.ca

## Environment Canada Guidance Documents

83. Environment Canada (2003) "Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory", in collaboration with the Canadian Institute of Treated Wood.

84. Environment Canada (2004), "National Pollutant Release Inventory Guidance Manual for the Wastewater Sector 2003".

**These documents can be downloaded from the NPRI Web site at www.ec.gc.ca/npri**

## General Information

85. Howard, P. H. and M. Neal, *Dictionary of Chemical Names and Synonyms*, Lewis Publishers, Chelsea, MI (1992).

86. Lide, David R., *CRC Handbook of Chemistry and Physics, 75th Edition*, CRC Press, Inc., Boca Raton, FL (1995) pp. 15-38, *Characteristics of Particles and Particle Dispersoids*.

# Appendix 1 – Alphabetical Listing of NPRI Substances for 2003

The substances are listed in six parts. **The changes in substance listings and the new substances added to the NPRI for 2003 are in bold lettering.** The reporting criteria for the substances listed in each Part differ and are explained in Step 1. Explanations of the footnotes and substance qualifiers are also provided in Step 1.

## Part 1A Substances

| Name | CAS No. [1] |
|---|---|
| Acetaldehyde | 75-07-0 |
| Acetonitrile | 75-05-8 |
| Acetophenone | 98-86-2 |
| Acrolein | 107-02-8 |
| Acrylamide | 79-06-1 |
| Acrylic acid [2] | 79-10-7 |
| Acrylonitrile | 107-13-1 |
| Alkanes, C6-18, chloro | 68920-70-7 |
| Alkanes, C10-13, chloro | 85535-84-8 |
| Allyl alcohol | 107-18-6 |
| Allyl chloride | 107-05-1 |
| Aluminum [3] | 7429-90-5 |
| Aluminum oxide [4] | 1344-28-1 |
| Ammonia (total) [5] | * |
| Aniline [2] | 62-53-3 |
| Anthracene | 120-12-7 |
| Antimony [6] | * |
| Asbestos [7] | 1332-21-4 |
| Benzene | 71-43-2 |
| Benzoyl chloride | 98-88-4 |
| Benzoyl peroxide | 94-36-0 |
| Benzyl chloride | 100-44-7 |
| Biphenyl | 92-52-4 |
| *Bis*(2-ethylhexyl) adipate | 103-23-1 |
| *Bis*(2-ethylhexyl) phthalate | 117-81-7 |
| Boron trifluoride | 7637-07-2 |
| Bromine | 7726-95-6 |
| 1-Bromo-2-chloroethane | 107-04-0 |
| Bromomethane | 74-83-9 |
| 1,3-Butadiene | 106-99-0 |
| 2-Butoxyethanol | 111-76-2 |
| Butyl acrylate | 141-32-2 |
| *i*-Butyl alcohol | 78-83-1 |
| *n*-Butyl alcohol | 71-36-3 |
| *sec*-Butyl alcohol | 78-92-2 |
| *tert*-Butyl alcohol | 75-65-0 |
| Butyl benzyl phthalate | 85-68-7 |
| 1,2-Butylene oxide | 106-88-7 |
| Butyraldehyde | 123-72-8 |
| C.I. Acid Green 3 | 4680-78-8 |
| C.I. Basic Green 4 | 569-64-2 |
| C.I. Basic Red 1 | 989-38-8 |
| C.I. Direct Blue 218 | 28407-37-6 |
| C.I. Disperse Yellow 3 | 2832-40-8 |
| C.I. Food Red 15 | 81-88-9 |
| C.I. Solvent Orange 7 | 3118-97-6 |
| C.I. Solvent Yellow 14 | 842-07-9 |
| Calcium cyanamide | 156-62-7 |
| Calcium fluoride | 7789-75-5 |
| Carbon disulphide | 75-15-0 |
| Carbon tetrachloride | 56-23-5 |
| **Carbonyl sulphide** | **463-58-1** |
| Catechol | 120-80-9 |
| CFC-11 | 75-69-4 |
| CFC-12 | 75-71-8 |
| CFC-13 | 75-72-9 |
| CFC-114 | 76-14-2 |
| CFC-115 | 76-15-3 |
| Chlorendic acid | 115-28-6 |
| Chlorine | 7782-50-5 |
| Chlorine dioxide | 10049-04-4 |
| Chloroacetic acid [2] | 79-11-8 |
| Chlorobenzene | 108-90-7 |
| Chloroethane | 75-00-3 |
| Chloroform | 67-66-3 |
| Chloromethane | 74-87-3 |
| 3-Chloro-2-methyl-1-propene | 563-47-3 |
| 3-Chloropropionitrile | 542-76-7 |
| Chromium [8] | * |
| Cobalt [6] | * |
| Copper [6] | * |
| Cresol [2,9] | 1319-77-3 |
| Crotonaldehyde | 4170-30-3 |
| Cumene | 98-82-8 |
| Cumene hydroperoxide | 80-15-9 |
| Cyanides [10] | * |
| Cyclohexane | 110-82-7 |
| Cyclohexanol | 108-93-0 |
| Decabromodiphenyl oxide | 1163-19-5 |
| 2,4-Diaminotoluene [2] | 95-80-7 |
| 2,6-Di-t-butyl-4-methylphenol | 128-37-0 |
| Dibutyl phthalate | 84-74-2 |
| *o*-Dichlorobenzene | 95-50-1 |
| *p*-Dichlorobenzene | 106-46-7 |
| 3,3'-Dichlorobenzidine dihydrochloride | 612-83-9 |
| 1,2-Dichloroethane | 107-06-2 |
| Dichloromethane | 75-09-2 |
| 2,4-Dichlorophenol [2] | 120-83-2 |

| Name | CAS No. [1] |
|---|---|
| 1,2-Dichloropropane | 78-87-5 |
| Dicyclopentadiene | 77-73-6 |
| Diethanolamine [2] | 111-42-2 |
| Diethyl phthalate | 84-66-2 |
| Diethyl sulphate | 64-67-5 |
| Dimethylamine | 124-40-3 |
| N,N-Dimethylaniline [2] | 121-69-7 |
| N,N-Dimethylformamide | 68-12-2 |
| Dimethyl phenol | 1300-71-6 |
| Dimethyl phthalate | 131-11-3 |
| Dimethyl sulphate | 77-78-1 |
| 4,6-Dinitro-o-cresol [2] | 534-52-1 |
| 2,4-Dinitrotoluene | 121-14-2 |
| 2,6-Dinitrotoluene | 606-20-2 |
| Dinitrotoluene [11] | 25321-14-6 |
| Di-*n*-octyl phthalate | 117-84-0 |
| 1,4-Dioxane | 123-91-1 |
| Diphenylamine | 122-39-4 |
| Epichlorohydrin | 106-89-8 |
| 2-Ethoxyethanol | 110-80-5 |
| 2-Ethoxyethyl acetate | 111-15-9 |
| Ethyl acrylate | 140-88-5 |
| Ethylbenzene | 100-41-4 |
| Ethyl chloroformate | 541-41-3 |
| Ethylene | 74-85-1 |
| Ethylene glycol | 107-21-1 |
| Ethylene oxide | 75-21-8 |
| Ethylene thiourea | 96-45-7 |
| Fluorine | 7782-41-4 |
| Formaldehyde | 50-00-0 |
| Formic acid | 64-18-6 |
| Halon 1211 | 353-59-3 |
| Halon 1301 | 75-63-8 |
| HCFC-22 | 75-45-6 |
| HCFC-122 and all isomers [12] | 41834-16-6 |
| HCFC-123 and all isomers [13] | 34077-87-7 |
| HCFC 124 and all isomers [14] | 63938-10-3 |
| HCFC-141b | 1717-00-6 |
| HCFC-142b | 75-68-3 |
| Hexachlorocyclopentadiene | 77-47-4 |
| Hexachloroethane | 67-72-1 |
| Hexachlorophene | 70-30-4 |
| *n*-Hexane | 110-54-3 |
| Hydrazine [2] | 302-01-2 |
| Hydrochloric acid | 7647-01-0 |
| Hydrogen cyanide | 74-90-8 |
| Hydrogen fluoride | 7664-39-3 |
| Hydrogen sulphide | 7783-06-4 |
| Hydroquinone [2] | 123-31-9 |
| Iron pentacarbonyl | 13463-40-6 |
| Isobutyraldehyde | 78-84-2 |
| Isophorone diisocyanate | 4098-71-9 |
| Isoprene | 78-79-5 |
| Isopropyl alcohol | 67-63-0 |
| *p,p*'-Isopropylidenediphenol | 80-05-7 |
| Isosafrole | 120-58-1 |
| Lithium carbonate | 554-13-2 |
| Maleic anhydride | 108-31-6 |
| Manganese [6] | * |
| 2-Mercaptobenzothiazole | 149-30-4 |
| Methanol | 67-56-1 |
| 2-Methoxyethanol | 109-86-4 |
| 2-Methoxyethyl acetate | 110-49-6 |
| Methyl acrylate | 96-33-3 |
| Methyl tert-butyl ether | 1634-04-4 |
| *p,p*'-Methylenebis(2-chloroaniline) | 101-14-4 |
| 1,1-Methylenebis (4-isocyanatocyclohexane) | 5124-30-1 |
| Methylenebis(phenylisocyanate) | 101-68-8 |
| *p,p*'-Methylenedianiline | 101-77-9 |
| Methyl ethyl ketone | 78-93-3 |
| Methyl iodide | 74-88-4 |
| Methyl isobutyl ketone | 108-10-1 |
| Methyl methacrylate | 80-62-6 |
| N-Methylolacrylamide | 924-42-5 |
| 2-Methylpyridine | 109-06-8 |
| N-Methyl-2-pyrrolidone | 872-50-4 |
| Michler's ketone [2] | 90-94-8 |
| Molybdenum trioxide | 1313-27-5 |
| Naphthalene | 91-20-3 |
| Nickel [6] | * |
| Nitrate ion [15] | * |
| Nitric acid | 7697-37-2 |
| Nitrilotriacetic acid [2] | 139-13-9 |
| *p*-Nitroaniline | 100-01-6 |
| Nitrobenzene | 98-95-3 |
| Nitroglycerin | 55-63-0 |
| *p*-Nitrophenol [2] | 100-02-7 |
| 2-Nitropropane | 79-46-9 |
| N-Nitrosodiphenylamine | 86-30-6 |
| **Nonylphenol and its ethoxylates** [16] | * |
| **Octylphenol and its ethoxylates** [17] | * |
| Paraldehyde | 123-63-7 |
| Pentachloroethane | 76-01-7 |
| Peracetic acid [2] | 79-21-0 |
| Phenol [2] | 108-95-2 |
| *p*-Phenylenediamine [2] | 106-50-3 |
| *o*-Phenylphenol [2] | 90-43-7 |
| Phosgene | 75-44-5 |
| Phosphorus [18] | 7723-14-0 |
| **Phosphorus (total)** [19] | * |
| Phthalic anhydride | 85-44-9 |
| Polymeric diphenylmethane diisocyanate | 9016-87-9 |
| Potassium bromate | 7758-01-2 |
| Propargyl alcohol | 107-19-7 |

| Name | CAS No. [1] |
|---|---|
| Propionaldehyde | 123-38-6 |
| Propylene | 115-07-1 |
| Propylene oxide | 75-56-9 |
| Pyridine [2] | 110-86-1 |
| Quinoline [2] | 91-22-5 |
| *p*-Quinone | 106-51-4 |
| Safrole | 94-59-7 |
| Selenium [6] | * |
| Silver [6] | * |
| Sodium fluoride | 7681-49-4 |
| Sodium nitrite | 7632-00-0 |
| Styrene | 100-42-5 |
| Styrene oxide | 96-09-3 |
| Sulphur hexafluoride | 2551-62-4 |
| Sulphuric acid | 7664-93-9 |
| 1,1,1,2-Tetrachloroethane | 630-20-6 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 |
| Tetrachloroethylene | 127-18-4 |
| Tetracycline hydrochloride | 64-75-5 |
| Thiourea | 62-56-6 |
| Thorium dioxide | 1314-20-1 |
| Titanium tetrachloride | 7550-45-0 |
| Toluene | 108-88-3 |
| Toluene-2,4-diisocyanate | 584-84-9 |
| Toluene-2,6-diisocyanate | 91-08-7 |
| Toluenediisocyanate [11] | 26471-62-5 |
| 1,2,4-Trichlorobenzene | 120-82-1 |
| 1,1,2-Trichloroethane | 79-00-5 |
| Trichloroethylene | 79-01-6 |
| Triethylamine | 121-44-8 |
| 1,2,4-Trimethylbenzene | 95-63-6 |
| 2,2,4-Trimethylhexamethylene diisocyanate | 16938-22-0 |
| 2,4,4-Trimethylhexamethylene diisocyanate | 15646-96-5 |
| Vanadium [20] | 7440-62-2 |
| Vinyl acetate | 108-05-4 |
| Vinyl chloride | 75-01-4 |
| Vinylidene chloride | 75-35-4 |
| Xylene [21] | 1330-20-7 |
| Zinc [6] | * |

**[See Step 1 for an explanation of these qualifiers.]**

* No single CAS number applies to this NPRI listing.

[1] CAS Registry Number denotes the Chemical Abstracts Service Registry Number, as appropriate.

[2] "and its salts" – The CAS number corresponds to the weak acid or base. However, the substance includes the salts of these weak acids and bases. When calculating the weight of these substances and their salts, use the molecular weight of the acid or base, not the total weight of the salt.

[3] "fume or dust"

[4] "fibrous forms"

[5] "Ammonia (total)" means the total of both of ammonia (NH3 – CAS No. 7664-41-7) and the ammonium ion (NH4+) in solution.

[6] "and its compounds"

[7] "friable form"

[8] "and its compounds" except hexavalent chromium compounds

[9] "all isomers" including, but not limited to, the individual isomers of cresol: *m*-cresol (CAS No. 108-39-4), *o*-cresol (CAS No. 95-48-7) and *p*-cresol (CAS No. 106-44-5)

[10] "ionic"

[11] "mixed isomers"

[12] "all isomers" including, but not limited to, HCFC-122 (CAS No. 354-21-2).

[13] "all isomers" including, but not limited to, HCFC-123 (CAS No. 306-83-2) and HCFC 123a (CAS No. 90454-18-5).

[14] "all isomers" including, but not limited to, HCFC 124 (CAS No. 2837-89-0), and HCFC 124a (CAS No. 354-25-6).

[15] "in solution at a pH of 6.0 or greater"

[16] Includes nonylphenol, its ethoxylates and derivatives with CAS numbers: 104-40-5; 25154-52-3; 84852-15-3; 1323-65-5; 26523-78-4; 28987-17-9; 68081-86-7; 68515-89-9; 68515-93-5; 68081-86-1; 104-35-8; 20427-84-3; 26027-38-3; 27177-05-5; 27177-08-8; 28679-13-2; 27986-36-3; 37251-69-7; 7311-27-5; 9016-45-9; 27176-93-8; 37340-60-6; 51811-79-1; 51938-25-1; 68412-53-3; 9051-57-4; 37205-87-1; 68412-54-4; 127087-87-01.

[17] Includes octylphenol and its ethoxylates with CAS numbers: 140-66-9; 1806-26-4; 27193-28-8; 68987-90-6; 9002-93-1; 9036-19-5.

[18] "yellow or white"

[19] Does not include phosphorus (yellow or white) with CAS No. 7723-14-0.

[20] "(except when in an alloy) and its compounds"

[21] "all isomers" including, but not limited to, the individual isomers of xylene: *m*-xylene (CAS No. 108-38-3), *o*-xylene (CAS No. 95-47-6) and *p*-xylene (CAS No. 106-42-3).

## Part 1B Substances

| Name | CAS No. [1] | Name | CAS No. [1] |
|---|---|---|---|
| Mercury [6] | * | Hexavalent chromium compounds | * |
| Cadmium [6] | * | Lead [22, 23] | * |
| Arsenic [6] | * | Tetraethyl lead | 78-00-2 |

22 "and its compounds" except tetraethyl lead
23 Does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

## Part 2 Substances

| Name | CAS No. [1] | Name | CAS No. [1] |
|---|---|---|---|
| Dibenz(a,j)acridine | 224-42-0 | Benzo(k)fluoranthene | 207-08-9 |
| Benzo(a)anthracene | 56-55-3 | Dibenzo(a,h)anthracene | 53-70-3 |
| Benzo(a)phenanthrene | 218-01-9 | Dibenzo(a,i)pyrene | 189-55-9 |
| Benzo(a)pyrene | 50-32-8 | 7H-Dibenzo(c,g)carbazole | 194-59-2 |
| Benzo(b)fluoranthene | 205-99-2 | Fluoranthene | 206-44-0 |
| Benzo(e)pyrene | 192-97-2 | Indeno(1,2,3-c,d)pyrene | 193-39-5 |
| Benzo(g,h,i)perylene | 191-24-2 | Perylene | 198-55-0 |
| Benzo(j)fluoranthene | 205-82-3 | Phenanthrene | 85-01-8 |
| | | Pyrene | 129-00-0 |

## Part 3 Substances

| Name | CAS No. [1] | Name | CAS No. [1] |
|---|---|---|---|
| Hexachlorobenzene | 118-74-1 | Dioxins and Furans [24] | * |

**[See Steps 1 and 2 for an explanation of this footnote.]**

24 This class of substances is restricted to the following congeners:
2,3,7,8 Tetrachlorodibenzo-p-dioxin (1746-01-6);
1,2,3,7,8 Pentachlorodibenzo-p-dioxin (40321-76-4);
1,2,3,4,7,8 Hexachlorodibenzo-p-dioxin (39227-28-6);
1,2,3,7,8,9 Hexachlorodibenzo-p-dioxin (19408-74-3);
1,2,3,6,7,8 Hexachlorodibenzo-p-dioxin (57653-85-7);
1,2,3,4,6,7,8 Heptachlorodibenzo-p-dioxin (35822-46-9);
Octachlorodibenzo-p-dioxin (3268-87-9);
2,3,7,8 Tetrachlorodibenzofuran (51207-31-9);
2,3,4,7,8 Pentachlorodibenzofuran (57117-31-4);
1,2,3,7,8 Pentachlorodibenzofuran (57117-41-6);
1,2,3,4,7,8 Hexachlorodibenzofuran (70648-26-9);
1,2,3,7,8,9 Hexachlorodibenzofuran (72918-21-9);
1,2,3,6,7,8 Hexachlorodibenzofuran (57117-44-9);
2,3,4,6,7,8 Hexachlorodibenzofuran (60851-34-5);
1,2,3,4,6,7,8 Heptachlorodibenzofuran (67562-39-4);
1,2,3,4,7,8,9 Heptachlorodibenzofuran (55673-89-7); and
Octachlorodibenzofuran (39001-02-0).

## Part 4 Substances

| Name | CAS No. [1] |
|---|---|
| Carbon monoxide | 630-08-0 |
| Oxides of nitrogen (expressed as $NO_2$) | 11104-93-1 |
| $PM_{2.5}$ [25] | * |
| $PM_{10}$ [26] | * |
| Sulphur dioxide | 7446-09-5 |
| Total particulate matter [27] | * |
| Volatile organic compounds [28] | * |

[25] means any particulate matter with a diameter less than or equal to 2.5 microns.
[26] means any particulate matter with a diameter less than or equal to 10 microns.
[27] means any particulate matter with a diameter less than 100 microns.
[28] Refer to Appendix 5 for definition of VOCs.

## Part 5 Substances

### Individual Substances

| Name | CAS No. [1] |
|---|---|
| Acetylene | 74-86-2 |
| Adipic acid | 124-04-9 |
| Aniline [2] | 65-53-3 |
| Benzene | 71-43-2 |
| 1,3-Butadiene | 106-99-0 |
| 2-Butoxyethanol | 111-76-2 |
| *n*-Butyl acetate | 123-86-4 |
| Chlorobenzene | 108-90-7 |
| *p*-Dichlorobenzene | 106-46-7 |
| 1,2-Dichloroethane | 107-06-2 |
| Dimethylether | 115-10-6 |
| Ethyl alcohol | 64-17-5 |
| Ethyl acetate | 141-78-6 |
| Ethylene | 74-85-1 |
| Formaldehyde | 50-00-0 |
| *n*-Hexane | 110-54-3 |
| Isopropyl alcohol | 67-63-0 |
| D-Limonene | 5989-27-5 |
| Methanol | 67-56-1 |
| Methyl ethyl ketone | 78-93-3 |
| 2-Methyl-3-hexanone | 7379-12-6 |
| Methyl isobutyl ketone | 108-10-1 |
| Myrcene | 123-35-3 |
| Beta-Phellandrene | 555-10-2 |
| Phenyl isocyanate | 103-71-9 |
| Alpha-Pinene | 80-56-8 |
| Beta-Pinene | 127-91-3 |
| Propane | 74-98-6 |
| Propylene | 115-07-1 |
| Styrene | 100-42-5 |
| 1,2,4-Trimethylbenzene | 95-63-6 |
| Trimethylfluorosilane | 420-56-4 |
| Toluene | 108-88-3 |
| Vinyl acetate | 108-05-4 |

### Isomer Groups

| Name | CAS No. [1] | Name | CAS No. [1] |
|---|---|---|---|
| Name | CAS No.1 | Hexane [30] | * |
| Anthraquinone [29] | * | Hexene [29] | 25264-93-1 |
| Butane [29] | * | Methylindan [29] | 27133-93-3 |
| Butene [29] | 25167-67-3 | Nonane [29] | * |
| Cycloheptane [29] | * | Octane [29] | * |
| Cyclohexene [29] | * | Pentane [29] | * |
| Cyclooctane [29] | * | Pentene [29] | * |
| Decane [29] | * | Terpene [29] | 68956-56-9 |
| Dihydronapthalene [29] | * | Trimethylbenzene [29] | 25551-13-7 |
| Dodecane [29] | * | Xylene [29] | 1330-20-7 |
| Heptane [29] | * | | |

### Other Groups and Mixtures

| Name | CAS No. [1] | Name | CAS No. [1] |
|---|---|---|---|
| Creosote | 8001-58-9 | Mineral spirits | 64475-85-0 |
| Heavy aromatic solvent naphtha | 64742-94-5 | Naphtha | 8030-30-6 |
| Light aromatic solvent naphtha | 64742-95-6 | Stoddard solvent | 8052-41-3 |

[29] "all isomers."
[30] "all isomers", excluding *n*-hexane (CAS No. 110-54-3).
[31] "all isomers", excluding 1,2,4-trimethylbenzene (CAS No. 95-63-6).

# Appendix 2 – NPRI Substances for 2003, Listed by Chemical Abstracts Service (CAS) Registry Number

**The changes in substance listings and the new substances added to the NPRI for 2003 are in bold lettering.** Explanations of the footnotes and substance qualifiers are provided in Step 1.

| Name | CAS No. [1] |
|---|---|
| Ammonia (total) [2] | * |
| **Anthraquinone** [3] | * |
| Antimony [3] | * |
| Arsenic [3] | * |
| **Butane** [3] | * |
| Cadmium [4] | * |
| Chromium [5] | * |
| Cobalt [4] | * |
| Copper [4] | * |
| Cyanides [6] | * |
| **Cycloheptane** [3] | * |
| **Cyclohexene** [3] | * |
| **Cyclooctane** [3] | * |
| **Decane** [3] | * |
| **Dihydronapthalene** [3] | * |
| **Dodecane** [3] | * |
| **Heptane** [3] | * |
| **Hexane** [7] | * |
| Hexavalent chromium compounds | * |
| Lead [8,9] | * |
| Manganese [4] | * |
| Mercury [4] | * |
| Nickel [4] | * |
| Nitrate ion [10] | * |
| **Nonane** [3] | * |
| **Nonylphenol and its ethoxylates** [11] | * |
| **Octane** [3] | * |
| **Octylphenol and its ethoxylates** [12] | * |
| **Pentane** [3] | * |
| **Pentene** [3] | * |
| **Phosphorus (total)** [13] | * |
| $PM_{2.5}$ [14] | * |
| $PM_{10}$ [15] | * |
| Dioxins and Furans [16] | * |
| Selenium [4] | * |
| Silver [4] | * |
| Total particulate matter [17] | * |
| Volatile organic compounds [18] | * |
| Zinc [4] | * |
| Formaldehyde | 50-00-0 |
| Benzo(a)pyrene | 50-32-8 |
| Dibenzo(a,h)anthracene | 53-70-3 |
| Nitroglycerin | 55-63-0 |
| Carbon tetrachloride | 56-23-5 |
| Benzo(a)anthracene | 56-55-3 |

| Name | CAS No. [1] |
|---|---|
| Aniline [19] | 62-53-3 |
| Thiourea | 62-56-6 |
| **Ethyl alcohol** | **64-17-5** |
| Formic acid | 64-18-6 |
| Diethyl sulphate | 64-67-5 |
| Tetracycline hydrochloride | 64-75-5 |
| Methanol | 67-56-1 |
| Isopropyl alcohol | 67-63-0 |
| Chloroform | 67-66-3 |
| Hexachloroethane | 67-72-1 |
| N,N-Dimethylformamide | 68-12-2 |
| Hexachlorophene | 70-30-4 |
| *n*-Butyl alcohol | 71-36-3 |
| Benzene | 71-43-2 |
| Bromomethane | 74-83-9 |
| Ethylene | 74-85-1 |
| **Acetylene** | **74-86-2** |
| Chloromethane | 74-87-3 |
| Methyl iodide | 74-88-4 |
| Hydrogen cyanide | 74-90-8 |
| **Propane** | **74-98-6** |
| Chloroethane | 75-00-3 |
| Vinyl chloride | 75-01-4 |
| Acetonitrile | 75-05-8 |
| Acetaldehyde | 75-07-0 |
| Dichloromethane | 75-09-2 |
| Carbon disulphide | 75-15-0 |
| Ethylene oxide | 75-21-8 |
| Vinylidene chloride | 75-35-4 |
| Phosgene | 75-44-5 |
| HCFC-22 | 75-45-6 |
| Propylene oxide | 75-56-9 |
| Halon 130 [1] | 75-63-8 |
| *tert*-Butyl alcohol | 75-65-0 |
| HCFC-142b | 75-68-3 |
| CFC-11 | 75-69-4 |
| CFC-12 | 75-71-8 |
| CFC-13 | 75-72-9 |
| Pentachloroethane | 76-01-7 |
| CFC-114 | 76-14-2 |
| CFC-115 | 76-15-3 |
| Hexachlorocyclopentadiene | 77-47-4 |
| Dicyclopentadiene | 77-73-6 |
| Dimethyl sulphate | 77-78-1 |
| Tetraethyl lead | 78-00-2 |

| Name | CAS No. [1] |
|---|---|
| Isoprene | 78-79-5 |
| *i*-Butyl alcohol | 78-83-1 |
| Isobutyraldehyde | 78-84-2 |
| 1,2-Dichloropropane | 78-87-5 |
| *sec*-Butyl alcohol | 78-92-2 |
| Methyl ethyl ketone | 78-93-3 |
| 1,1,2-Trichloroethane | 79-00-5 |
| Trichloroethylene | 79-01-6 |
| Acrylamide | 79-06-1 |
| Acrylic acid [19] | 79-10-7 |
| Chloroacetic acid [19] | 79-11-8 |
| Peracetic acid [19] | 79-21-0 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 |
| 2-Nitropropane | 79-46-9 |
| *p,p*'-Isopropylidenediphenol | 80-05-7 |
| Cumene hydroperoxide | 80-15-9 |
| **Alpha-Pinene** | **80-56-8** |
| Methyl methacrylate | 80-62-6 |
| C.I. Food Red 15 | 81-88-9 |
| Diethyl phthalate | 84-66-2 |
| Dibutyl phthalate | 84-74-2 |
| Phenanthrene | 85-01-8 |
| Phthalic anhydride | 85-44-9 |
| Butyl benzyl phthalate | 85-68-7 |
| N-Nitrosodiphenylamine | 86-30-6 |
| *o*-Phenylphenol [19] | 90-43-7 |
| Michler's ketone [19] | 90-94-8 |
| Toluene-2,6-diisocyanate | 91-08-7 |
| Naphthalene | 91-20-3 |
| Quinoline [19] | 91-22-5 |
| Biphenyl | 92-52-4 |
| Benzoyl peroxide | 94-36-0 |
| Safrole | 94-59-7 |
| *o*-Dichlorobenzene | 95-50-1 |
| 1,2,4-Trimethylbenzene | 95-63-6 |
| 2,4-Diaminotoluene [19] | 95-80-7 |
| Styrene oxide | 96-09-3 |
| Methyl acrylate | 96-33-3 |
| Ethylene thiourea | 96-45-7 |
| Cumene | 98-82-8 |
| Acetophenone | 98-86-2 |
| Benzoyl chloride | 98-88-4 |
| Nitrobenzene | 98-95-3 |
| *p*-Nitroaniline | 100-01-6 |
| *p*-Nitrophenol [19] | 100-02-7 |
| Ethylbenzene | 100-41-4 |
| Styrene | 100-42-5 |
| Benzyl chloride | 100-44-7 |
| *p,p*'-Methylenebis(2-chloroaniline) | 101-14-4 |
| Methylenebis(phenylisocyanate) | 101-68-8 |
| *p,p*'-Methylenedianiline | 101-77-9 |
| *Bis*(2-ethylhexyl) adipate | 103-23-1 |
| **Phenyl isocyanate** | **103-71-9** |
| *p*-Dichlorobenzene | 106-46-7 |
| *p*-Phenylenediamine [19] | 106-50-3 |
| *p*-Quinone | 106-51-4 |
| 1,2-Butylene oxide | 106-88-7 |
| Epichlorohydrin | 106-89-8 |
| 1,3-Butadiene | 106-99-0 |
| Acrolein | 107-02-8 |
| 1-Bromo-2-chloroethane | 107-04-0 |
| Allyl chloride | 107-05-1 |
| 1,2-Dichloroethane | 107-06-2 |
| Acrylonitrile | 107-13-1 |
| Allyl alcohol | 107-18-6 |
| Propargyl alcohol | 107-19-7 |
| Ethylene glycol | 107-21-1 |
| Vinyl acetate | 108-05-4 |
| Methyl isobutyl ketone | 108-10-1 |
| Maleic anhydride | 108-31-6 |
| Toluene | 108-88-3 |
| Chlorobenzene | 108-90-7 |
| Cyclohexanol | 108-93-0 |
| Phenol 19 | 108-95-2 |
| 2-Methylpyridine | 109-06-8 |
| 2-Methoxyethanol | 109-86-4 |
| 2-Methoxyethyl acetate | 110-49-6 |
| *n*-Hexane | 110-54-3 |
| 2-Ethoxyethanol | 110-80-5 |
| Cyclohexane | 110-82-7 |
| Pyridine [19] | 110-86-1 |
| 2-Ethoxyethyl acetate | 111-15-9 |
| Diethanolamine [19] | 111-42-2 |
| 2-Butoxyethanol | 111-76-2 |
| Propylene | 115-07-1 |
| **Dimethylether** | **115-10-6** |
| Chlorendic acid | 115-28-6 |
| *Bis*(2-ethylhexyl) phthalate | 117-81-7 |
| Di-*n*-octyl phthalate | 117-84-0 |
| Hexachlorobenzene | 118-74-1 |
| Anthracene | 120-12-7 |
| Isosafrole | 120-58-1 |
| Catechol | 120-80-9 |
| 1,2,4-Trichlorobenzene | 120-82-1 |
| 2,4-Dichlorophenol [19] | 120-83-2 |
| 2,4-Dinitrotoluene | 121-14-2 |
| Triethylamine | 121-44-8 |
| N,N-Dimethylaniline [19] | 121-69-7 |
| Diphenylamine | 122-39-4 |
| Hydroquinone [19] | 123-31-9 |
| **Myrcene** | **123-35-3** |
| Propionaldehyde | 123-38-6 |
| Paraldehyde | 123-63-7 |
| Butyraldehyde | 123-72-8 |

| Name | CAS No. [1] |
|---|---|
| ***n*-Butyl acetate** | **123-86-4** |
| 1,4-Dioxane | 123-91-1 |
| **Adipic acid** | **124-04-9** |
| Dimethylamine | 124-40-3 |
| Tetrachloroethylene | 127-18-4 |
| **Beta-Pinene** | **127-91-3** |
| 2,6-Di-t-butyl-4-methylphenol | 128-37-0 |
| Pyrene | 129-00-0 |
| Dimethyl phthalate | 131-11-3 |
| Nitrilotriacetic acid [19] | 139-13-9 |
| Ethyl acrylate | 140-88-5 |
| Butyl acrylate | 141-32-2 |
| **Ethyl acetate** | **141-78-6** |
| 2-Mercaptobenzothiazole | 149-30-4 |
| Calcium cyanamide | 156-62-7 |
| Dibenzo(a,i)pyrene | 189-55-9 |
| Benzo(g,h,i)perylene | 191-24-2 |
| Benzo(e)pyrene | 192-97-2 |
| Indeno(1,2,3-c,d)pyrene | 193-39-5 |
| 7H-Dibenzo(c,g)carbazole | 194-59-2 |
| Perylene | 198-55-0 |
| Benzo(j)fluoranthene | 205-82-3 |
| Benzo(b)fluoranthene | 205-99-2 |
| Fluoranthene | 206-44-0 |
| Benzo(k)fluoranthene | 207-08-9 |
| Benzo(a)phenanthrene | 218-01-9 |
| Dibenz(a,j)acridine | 224-42-0 |
| Hydrazine [19] | 302-01-2 |
| Halon 1211 | 353-59-3 |
| **Trimethylfluorosilane** | **420-56-4** |
| **Carbonyl sulphide** | **463-58-1** |
| 4,6-Dinitro-*o*-cresol [19] | 534-52-1 |
| Ethyl chloroformate | 541-41-3 |
| 3-Chloropropionitrile | 542-76-7 |
| Lithium carbonate | 554-13-2 |
| **Beta-Phellandrene** | **555-10-2** |
| 3-Chloro-2-methyl-1-propene | 563-47-3 |
| C.I. Basic Green [4] | 569-64-2 |
| Toluene-2,4-diisocyanate | 584-84-9 |
| 2,6-Dinitrotoluene | 606-20-2 |
| 3,3'-Dichlorobenzidine dihydrochloride | 612-83-9 |
| Carbon monoxide | 630-08-0 |
| 1,1,1,2-Tetrachloroethane | 630-20-6 |
| C.I. Solvent Yellow [14] | 842-07-9 |
| N-Methyl-2-pyrrolidone | 872-50-4 |
| N-Methylolacrylamide | 924-42-5 |
| C.I. Basic Red [1] | 989-38-8 |
| Decabromodiphenyl oxide | 1163-19-5 |
| Dimethyl phenol | 1300-71-6 |
| Molybdenum trioxide | 1313-27-5 |
| Thorium dioxide | 1314-20-1 |
| Cresol [19,20] | 1319-77-3 |

| Name | CAS No. [1] |
|---|---|
| Xylene [21] | 1330-20-7 |
| Asbestos [22] | 1332-21-4 |
| Aluminum oxide [23] | 1344-28-1 |
| Methyl *tert*-butyl ether | 1634-04-4 |
| HCFC-141b | 1717-00-6 |
| Sulphur hexafluoride | 2551-62-4 |
| C.I. Disperse Yellow [3] | 2832-40-8 |
| C.I. Solvent Orange [7] | 3118-97-6 |
| Isophorone diisocyanate | 4098-71-9 |
| Crotonaldehyde | 4170-30-3 |
| C.I. Acid Green [3] | 4680-78-8 |
| 1,1-Methylenebis (4-isocyanatocyclohexane) | 5124-30-1 |
| **D-Limonene** | **5989-27-5** |
| **2-Methyl-3-hexanone** | **7379-12-6** |
| Aluminum [24] | 7429-90-5 |
| Vanadium [25] | 7440-62-2 |
| Sulphur dioxide | 7446-09-5 |
| Titanium tetrachloride | 7550-45-0 |
| Sodium nitrite | 7632-00-0 |
| Boron trifluoride | 7637-07-2 |
| Hydrochloric acid | 7647-01-0 |
| Hydrogen fluoride | 7664-39-3 |
| Sulphuric acid | 7664-93-9 |
| Sodium fluoride | 7681-49-4 |
| Nitric acid | 7697-37-2 |
| Phosphorus [26] | 7723-14-0 |
| Bromine | 7726-95-6 |
| Potassium bromate | 7758-01-2 |
| Fluorine | 7782-41-4 |
| Chlorine | 7782-50-5 |
| Hydrogen sulphide | 7783-06-4 |
| Calcium fluoride | 7789-75-5 |
| **Creosote** | **8001-58-9** |
| **Naphtha** | **8030-30-6** |
| **Stoddard solvent** | **8052-41-3** |
| Polymeric diphenylmethane diisocyanate | 9016-87-9 |
| Chlorine dioxide | 10049-04-4 |
| Oxides of nitrogen (expressed as $NO_2$) | 11104-93-1 |
| Iron pentacarbonyl | 13463-40-6 |
| 2,4,4-Trimethylhexamethylene diisocyanate | 15646-96-5 |
| 2,2,4-Trimethylhexamethylene diisocyanate | 16938-22-0 |
| **Butene** [3] | **25167-67-3** |
| **Hexene** [3] | **25264-93-1** |
| Dinitrotoluene [22] | 25321-14-6 |
| **Trimethylbenzene** [28] | **25551-13-7** |
| Toluenediisocyanate [22] | 26471-62-5 |
| **Methylindan** | **27133-93-3** |
| C.I. Direct Blue 218 | 28407-37-6 |

| Name | CAS No. [1] |
|---|---|
| HCFC-123 and all isomers [29] | 34077-87-7 |
| HCFC-122 and all isomers [30] | 41834-16-6 |
| HCFC 124 and all isomers [31] | 63938-10-3 |
| **Mineral spirits** | **64475-85-0** |
| **Heavy aromatic solvent naphtha** | **64742-94-5** |
| **Light aromatic solvent naphtha** | **64742-95-6** |
| Alkanes, $C_{6-18}$, chloro | 68920-70-7 |
| **Terpene** [3] | **68956-56-9** |
| Alkanes, $C_{10-13}$, chloro | 85535-84-8 |

**[See Step 1 for an explanation of the footnotes and substance qualifiers.]**

* No single CAS number applies to this NPRI listing.
[1] CAS Registry Number denotes the Chemical Abstracts Service Registry Number, as appropriate.
[2] "Ammonia (total)" means the total of both of ammonia ($NH_3$ – CAS No. 7664-41-7) and the ammonium ion ($NH_4$+) in solution.
[3] "all isomers"
[4] "and its compounds"
[5] "and its compounds" except hexavalent chromium compounds
[6] "ionic"
[7] "all isomers", excluding *n*-hexane (CAS No. 110-54-3)
[8] "and its compounds" except tetraethyl lead
[9] Does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys
[10] "in solution at a pH of 6.0 or greater"
[11] Includes nonylphenol, its ethoxylates and derivatives with CAS numbers: 104-40-5; 25154-52-3; 84852-15-3; 1323-65-5; 26523-78-4; 28987-17-9; 68081-86-7; 68515-89-9; 68515-93-5; 68081-86-1; 104-35-8; 20427-84-3; 26027-38-3; 27177-05-5; 27177-08-8; 28679-13-2; 27986-36-3; 37251-69-7; 7311-27-5; 9016-45-9; 27176-93-8; 37340-60-6; 51811-79-1; 51938-25-1; 68412-53-3; 9051-57-4; 37205-87-1; 68412-54-4; 127087-87-01.
[12] Includes octylphenol and its ethoxylates with CAS numbers: 140-66-9; 1806-26-4; 27193-28-8; 68987-90-6; 9002-93-1; 9036-19-5.
[13] Does not include phosphorus (yellow or white) with CAS No. 7723-14-0.
[14] means any particulate matter with a diameter less than or equal to 2.5 microns
[15] means any particulate matter with a diameter less than or equal to 10 microns
[16] This class of substances is restricted to the following congeners:
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (1746-01-6);
1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin (40321-76-4);
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin (39227-28-6);
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin (19408-74-3);
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin (57653-85-7);
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin (35822-46-9);
Octachlorodibenzo-*p*-dioxin (3268-87-9);
2,3,7,8-Tetrachlorodibenzofuran (51207-31-9);
2,3,4,7,8-Pentachlorodibenzofuran (57117-31-4);
1,2,3,7,8-Pentachlorodibenzofuran (57117-41-6);
1,2,3,4,7,8-Hexachlorodibenzofuran (70648-26-9);
1,2,3,7,8,9-Hexachlorodibenzofuran (72918-21-9);
1,2,3,6,7,8-Hexachlorodibenzofuran (57117-44-9);
2,3,4,6,7,8-Hexachlorodibenzofuran (60851-34-5);
1,2,3,4,6,7,8-Heptachlorodibenzofuran (67562-39-4);
1,2,3,4,7,8,9-Heptachlorodibenzofuran (55673-89-7); and
Octachlorodibenzofuran (39001-02-0).
[17] means any particulate matter with a diameter of less than 100 microns.
[18] Refer to Appendix 5 for definition of VOCs.
[19] "and its salts" – The CAS number corresponds to the weak acid or base. However, the substance includes the salts of these weak acids and bases. When calculating the weight of these substances and their salts, use the molecular weight of the acid or base, not the total weight of the salt.
[20] "all isomers" including, but not limited to, the individual isomers of cresol: *m*-cresol (CAS No. 108-39-4), *o*-cresol (CAS No. 95-48-7) and *p*-cresol (CAS No. 106-44-5).
[21] "all isomers" including, but not limited to, the individual isomers of xylene: *m*-xylene (CAS No. 108-38-3), *o*-xylene (CAS No. 95-47-6) and *p*-xylene (CAS No. 106-42-3).
[22] "friable form"
[23] "fibrous forms"
[24] "fume or dust"
[25] "(except when in an alloy) and its compounds".
[26] "yellow or white"
[27] "mixed isomers"
[28] "all isomers" excluding 1,2,4-trimethylbenzene (CAS No. 95-63-6).
[29] "all isomers" including, but not limited to, HCFC-123 (CAS No. 306-83-2) and HCFC 123a (CAS No. 90454-18-5).
[30] "all isomers" including, but not limited to, HCFC-122 (CAS No. 354-21-2).
[31] "all isomers" including, but not limited to, HCFC 124 (CAS No. 2837-89-0) and HCFC 124a (CAS No. 354-25-6).

# Appendix 3 – Definition of Biomedical Waste

The following definition has been taken from the 1992 Canadian Council of Ministers of the Environment's *Guidelines for the Management of Biomedical Waste in Canada*.

**Definition**

This definition does not apply to microbiology laboratory waste, human blood and body fluid waste or waste sharps after these wastes have been disinfected or decontaminated.

Biomedical waste refers to waste that is generated by:

- human or animal health-care facilities
- medical or veterinary research and teaching establishments
- health care teaching establishments
- clinical testing or research laboratories, and
- facilities involved in the production or testing of vaccines.

The following are the types of biomedical waste:

***a) Human Anatomical Waste***

This consists of human tissues, organs and body parts, but does not include teeth, hair and nails.

***b) Animal Waste***

This consists of all animal tissues, organs, body parts, carcasses, bedding, fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood, and body fluids removed for diagnosis or removed during surgery, treatment or autopsy, unless a trained person has certified that the waste does not contain the viruses and agents listed in Risk Group 4 of the *Guidelines*. This excludes teeth, hair, nails, hooves and feathers.

***c) Microbiology Laboratory Waste***

This consists of laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human or animal cell cultures used in research, and laboratory material that has come into contact with any of these.


***d) Human Blood and Body Fluid Waste***

This consists of human fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood and body fluids removed for diagnosis during surgery, treatment or autopsy. This does not include urine or feces.

***e) Waste Sharps***

Waste sharps are clinical and laboratory materials consisting of needles, syringes, blades or laboratory glass capable of causing punctures or cuts.

Biomedical waste does not include waste that is:

- from animal husbandry
- household in origin
- controlled in accordance with the *Health of Animals Act* (Canada), formerly the *Animal Disease Protection Act* (Canada), or
- generated in the food production, general building maintenance and office administration activities of those facilities to which this definition applies.

# Appendix 4 – Definition of Hazardous Waste

Cooperative efforts by federal and provincial environment departments and members of industry have led to the development of the following working definition of hazardous waste:

Hazardous wastes are those wastes that are potentially hazardous to human health and/or the environment due to their nature and quantity, and that require special handling techniques.

According to the *Export and Import of Hazardous Waste Regulations (EIHW)*, hazardous waste means a product, substance or organism that is intended for disposal or recycling, including storage prior to disposal or recycling, and that is:

(a) listed in Schedule III of the *EIHW Regulations*; or

(b) included in any of classes 2 to 6 and 8 and 9 of the *Transportation of Dangerous Goods Regulations*, except a product, substance or organism that is:

(i) household in origin; or

(ii) returned directly to its manufacturer or supplier for reprocessing, repackaging or resale,including a product, substance or organism that is:

(A) defective or otherwise not usable for its original purpose; or

(B) in surplus quantities but still usable for its original purpose.

More information on the *EIHW Regulations* can be found on the Web site
**www.ec.gc.ca/CEPARegistry/regulations/**

Information on the *TDG Regulations* can be found on the Web site
**www.tc.gc.ca/acts-regulations/tdg/tdg1/part_1.htm**

# Appendix 5 – Definition of VOCs

The definition for VOCs comes from the Order adding toxic substances to Schedule 1 to the *Canadian Environmental Protection Act, 1999*, section 1, published in the *Canada Gazette*, Part II, July 2, 2003.

NOTE: This definition excludes substances from consideration, but does not directly name substances that are VOCs. Section 3.8 explains VOCs in greater detail. The substances listed below are not to be considered in calculating VOCs for the purposes of NPRI reporting.

### Definition of VOCs

Volatile organic compounds that participate in atmospheric photochemical reactions, **excluding** the following:

**Substances not considered VOCs**

| Name of substance or group of substances | CAS No. |
|---|---|
| (a) methane | 74-82-8 |
| (b) ethane | 74-84-0 |
| (c) methylene chloride (dichloromethane) | 75-09-2 |
| (d) 1,1,1-trichloroethane (methyl chloroform) | 71-55-6 |
| (e) 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113) | 76-13-1 |
| (f) trichlorofluoromethane (CFC-11) | 75-69-4 |
| (g) dichlorodifluoromethane (CFC-12) | 75-71-8 |
| (h) chlorodifluoromethane (HCFC-22) | 75-45-6 |
| (i) trifluoromethane (HFC-23) | 75-46-7 |
| (j) 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114) | 76-14-2 |
| (k) chloropentafluoroethane (CFC-115) | 76-15-3 |
| (l) 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123) | 306-83-2 |
| (m) 1,1,1,2-tetrafluoroethane (HFC-134a) | 811-97-2 |
| (n) 1,1-dichloro-1-fluoroethane (HCFC-141b) | 1717-00-6 |
| (o) 1-chloro-1,1-difluoroethane (HCFC-142b) | 75-68-3 |
| (p) 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124) | 2837-89-0 |
| (q) pentafluoroethane (HFC-125) | 354-33-6 |
| (r) 1,1,2,2-tetrafluoroethane (HFC-134) | 359-35-3 |
| (s) 1,1,1-trifluoroethane (HFC-143a) | 420-46-2 |
| (t) 1,1-difluoroethane (HFC-152a) | 75-37-6 |
| (u) parachlorobenzotrifluoride (PCBTF) | 98-56-6 |
| (v) cyclic, branched, or linear completely methylated siloxanes | various |
| (w) acetone | 67-64-1 |
| (x) perchloroethylene (tetrachloroethylene) | 127-18-4 |
| (y) 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca) | 422-56-0 |
| (z) 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb) | 507-55-1 |
| (z.1) 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC-43-10mee) | 138495-42-8 |
| (z.2) difluoromethane (HFC-32) | 75-10-5 |
| (z.3) ethylfluoride (HFC-161) | 353-36-6 |
| (z.4) 1,1,1,3,3,3-hexafluoropropane (HFC-236fa) | 690-39-1 |
| (z.5) 1,1,2,2,3-pentafluoropropane (HFC-245ca) | 679-86-7 |
| (z.6) 1,1,2,3,3-pentafluoropropane (HFC-245ea) | 24270-66-4 |
| (z.7) 1,1,1,2,3-pentafluoropropane (HFC-245eb) | 431-31-2 |
| (z.8) 1,1,1,3,3-pentafluoropropane (HFC-245fa) | 460-73-1 |
| (z.9) 1,1,1,2,3,3-hexafluoropropane (HFC-236ea) | 431-63-0 |
| (z.10) 1,1,1,3,3-pentafluorobutane (HFC-365mfc) | 406-58-6 |
| (z.11) chlorofluoromethane (HCFC-31) | 593-70-4 |
| (z.12) 1-chloro-1-fluoroethane (HCFC-151a) | 1615-75-4 |
| (z.13) 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a) | 354-23-4 |
| (z.14) 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane ($C_4F_9OCH_3$) | 163702-07-6 |

**Substances not considered VOCs**

| Name of substance or group of substances | CAS No. |
|---|---|
| (z.15) (difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OCH_3$) | 163702-08-7 |
| (z.16) 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane ($C_4F_9OC_2H_5$) | 163702-05-4 |
| (z.17) (ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OC_2H_5$) | 163702-06-5 |
| (z.18) methyl acetate | 79-20-9 |
| perfluorocarbon compounds which fall into these classes: | |
| (i) cyclic, branched, or linear, completely fluorinated alkanes | various |
| (ii) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations | various |
| (iii) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations, and | various |
| (iv) sulphur containing perfluorocarbons with no unsaturations and with sulphur bonds only to carbon and fluorine. | various |

# Appendix 6 – Storage Tanks and their Evaporation Implications

## Fixed-roof Tanks

This type of tank consists of a cylindrical steel shell with a permanently-affixed roof, varying in design from cone- or dome-shaped to flat. Losses from fixed-roof tanks are caused by changes in temperature, pressure and liquid level.

Of current tank designs, the fixed-roof tank is the least expensive to construct and is generally considered the minimum acceptable equipment for storing organic liquids.

Horizontal fixed-roof tanks are constructed for both above-ground and underground service and are usually built of steel, steel with a fiberglass overlay, or fiberglass-reinforced polyester. They are usually equipped with pressure-vacuum vents, gauge hatches, sample wells, and access points. In addition, underground tanks may be cathodically protected to prevent corrosion of the tank shell. Their capacity is generally less than 150 000 litres.

The potential emission sources for above-ground horizontal tanks are the same as those for vertical fixed-roof tanks. Emissions from underground storage tanks are associated mainly with changes in the liquid level in the tank. Losses caused by changes in temperature or barometric pressure are minimal for underground tanks, because the surrounding earth limits diurnal temperature change; changes in barometric pressure result in only small losses.

### Emissions:

The two significant types of emissions from fixed-roof tanks are storage and working losses. Storage loss is the expulsion of vapour from a tank through vapour expansion and contraction, which is the result of changes in temperature and barometric pressure. This loss occurs without any change in the liquid level in the tank.

The combined loss from filling and emptying is called working loss. Evaporation during filling operations is a result of an increase in the liquid level in the tank. As the liquid level increases, the pressure inside the tank exceeds the relief pressure and vapours are expelled from the tank. Evaporative loss during emptying occurs when air drawn into the tank during liquid removal becomes saturated with organic vapour and expands, thus exceeding the capacity of the vapour space.


Several methods are used to control emissions from fixed-roof tanks. They can be controlled by installing an internal floating roof and seals to minimize evaporation of the product being stored.

Vapour balancing is another means of emission control, and is probably most common in the filling of tanks at gasoline stations. As the storage tank is filled, the vapours expelled are directed to the emptying gasoline tanker truck. The truck then transports the vapours to a central station where a vapour recovery or control system is used to control emissions.

Vapour-recovery systems collect emissions from storage vessels and convert them to liquid product. Several vapour-recovery procedures may be used, including vapour/liquid absorption, vapour compression, vapour cooling, vapour/solid adsorption, or a combination of these.

## Floating-roof Tanks

### External Floating-roof Tanks:

A typical external floating-roof tank consists of an open-topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The floating roof consists of a deck, fittings, and rim seal system. Floating decks currently in use are constructed of welded steel plate and are of two general types – pontoon and double-deck. With all types of external floating-roof tanks, the roof rises and falls with the liquid level in the tank. External floating decks are equipped with a rim seal system, attached to the deck perimeter

and contact the tank wall. The purpose of the floating roof and rim seal system is to reduce evaporative loss of the stored liquid. Some annular space remains between the seal system and the tank wall. The seal system slides against the tank wall as the roof is raised and lowered. The floating deck is also equipped with fittings that penetrate the deck and serve operational functions. The external floating-roof design is such that evaporative losses from the stored liquid are limited to losses from the rim seal system and deck fittings (standing storage loss) and any exposed liquid on the tank walls (withdrawal loss).

**Internal Floating-roof Tanks:**
An internal floating-roof tank has both a permanent fixed roof and a floating roof inside. There are two basic types of internal floating-roof tanks – tanks in which the fixed roof is supported by vertical columns within the tank, and tanks with a self-supporting fixed roof and no internal support columns. Fixed-roof tanks that have been retrofitted to use a floating roof are typically of the first type. External floating-roof tanks that have been converted to internal floating-roof tanks typically have a self-supporting roof. Newly-constructed internal floating-roof tanks may be of either type. The deck in internal floating-roof tanks rises and falls with the liquid level and either floats directly on the liquid surface (contact deck) or rests on pontoons several inches above the liquid surface (non-contact deck).

Non-contact decks are the most common type currently in use. Typical non-contact decks are constructed of an aluminum deck and an aluminum grid framework supported above the liquid surface by tubular aluminum pontoons or some other buoyant structure. Evaporative losses from floating roofs may come from deck fittings, non-welded deck seams, and the annular space between the deck and tank wall. In addition, these tanks are freely vented by circulation vents at the top of the fixed roof. The vents minimize the possibility of organic vapour accumulation in the tank vapour space in concentrations approaching the flammable range.

**Domed External Floating-roof Tanks:**
Domed external (or covered) floating-roof tanks have the heavier type of deck used in external floating-roof tanks as well as a fixed roof at the top of the shell like internal floating-roof tanks. Domed external floating-roof tanks usually result from retrofitting an external floating-roof tank with a fixed roof. This type of tank is similar to an internal floating-roof tank with a welded deck and self-supporting fixed roof.

As with the internal floating-roof tanks, a fixed roof's function is not to act as a vapour barrier, but to block the wind. The type of fixed roof most commonly used is a self-supporting aluminum dome roof, which is of bolted construction. Like the internal floating-roof tanks, these tanks are freely vented by circulation vents at the top of the fixed roof.

**Emissions:**
Total emissions from floating-roof tanks are the sum of withdrawal losses and standing storage losses. Withdrawal losses occur as the liquid level, and thus the floating roof, is lowered. Some liquid remains on the inner tank wall surface and evaporates. For an internal floating-roof tank that has a column supported fixed roof, some liquid also clings to the columns and evaporates. Evaporative loss occurs until the tank is filled and the exposed surfaces are again covered. Standing storage losses from floating-roof tanks include rim seal and deck fitting losses, and for internal floating-roof tanks also include deck seam losses for constructions other than welded decks. Other potential standing storage loss mechanisms include breathing losses as a result of temperature and pressure changes.


## Variable Vapour Space Tanks

Variable vapour space tanks are equipped with expandable vapour reservoirs to accommodate vapour volume fluctuations attributable to temperature and barometric pressure changes. Although variable vapour space tanks are sometimes used independently, they are normally connected to the vapour spaces of one or more fixed-roof tanks. The two most common types of variable vapour space tanks are lifter roof tanks and flexible diaphragm tanks. Lifter roof tanks have a telescoping roof that fits loosely around the outside of the main tank wall. The space between the roof and the wall is closed by either a wet seal, which is a trough filled with liquid, or a dry seal, which uses a flexible coated fabric. Flexible diaphragm tanks use flexible membranes to

provide expandable volume. They may be either separate gas holder units or integral units mounted atop fixed-roof tanks. Variable vapour space tank losses occur during tank filling when vapour is displaced by liquid. Loss of vapour occurs only when the tank's vapour storage capacity is exceeded.

## Pressure Tanks

Two classes of pressure tanks are in general use – low pressure (2.5 to 15 psig) and high pressure (higher than 15 psig). Pressure tanks are generally used for storing organic liquids and gases with high vapour pressures and are found in many sizes and shapes, depending on the operating pressure of the tank. Pressure tanks are equipped with a pressure/vacuum vent that is set to prevent venting loss from boiling and breathing loss from temperature or barometric pressure changes. High-pressure storage tanks can be operated so that virtually no evaporative or working losses occur. In low-pressure tanks, working losses can occur with atmospheric venting of the tank during filling operations. No appropriate correlations are available to estimate vapour losses from pressure tanks.

# Appendix 7 – Data Requirements for Regional Air Quality Modelling

This Appendix explains the data requirements for CAC regional air-quality models, and how that information will be collected through the NPRI. Refer to the *NPRI Software Guide*, for a description of the fields in the facility and substance sections of the reporting form for CACs.

## What Is a Regional Air Quality Model?

A regional air-quality model (RAQM) is a time-dependent mathematical model of air-quality processes in the atmosphere. RAQMs use equations and relationships to simulate/describe the set of atmospheric dynamic, physical and chemical processes that govern air quality. Air-quality models are "prognostic" in that they attempt to simulate the changing air-quality conditions that would occur naturally for a given set of time dependent pollutant emissions and meteorological conditions.

## Operating Schedule (Temporal Variation)

Information on temporal variation of emissions of CACs from individual facilities is required for RAQMs to represent the physical and chemical processes that occur over a given time and their impacts on concentrations and transport of these substances.

The quantity and concentration of emissions fluctuates over time at a facility as a result of its operation schedules, which include considerations such as changes in level of operations, shutdowns for routine maintenance and periods of operation. The quantity and concentration of the emissions may also fluctuate because of changes in process throughputs.

While information on temporal variation of actual CAC emissions is ideal for modelling purposes, a general description of the operating schedule of the facility is simpler to report to the NPRI, and will still meet the input needs for most air-quality models.

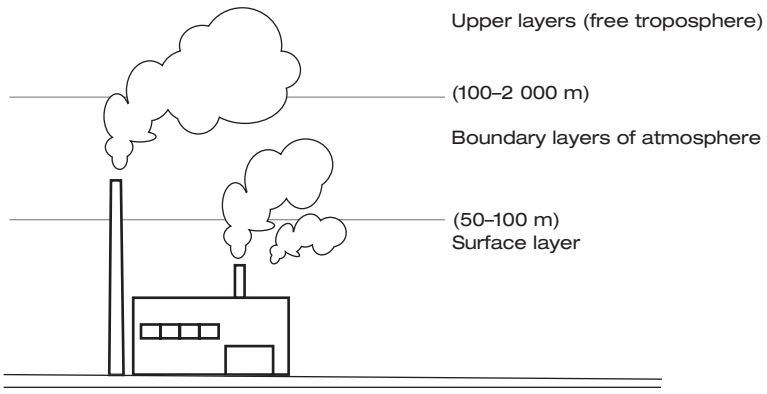
The thresholds for CACs are based on the quantity released to air. Once a threshold is met, only quantities of CACs released to air will be reported. CAC substances are of concern because they contribute to air pollution; therefore Environment Canada does not require information on releases to other media, nor on disposals or transfers for recycling.


## Emissions from Stacks Greater Than 50 Metres Above Grade

The majority of pollutant emissions are essentially at ground level or within the boundary layer (see diagram below). Pollutants within the boundary layer are usually dispersed/mixed quickly as a result of boundary-layer turbulence, whereas pollutants reaching the free troposphere are dispersed more slowly because of greater vertical stability and lower turbulence intensity. Of particular interest to modellers are emissions of CACs from stacks that reach the upper layers of the atmosphere, where the pollutants experience a different transport, diffusion, temperature, and chemical environment than in the atmospheric boundary layer. Complicating the situation is the change of boundary-layer depth that occurs with time of day, time of year and meteorological conditions. Some stacks may therefore emit into the boundary layer part of the time and into the free troposphere at other times.

Rather than require the facility to determine the plume rise from each stack and then report for those that enter the upper troposphere, Environment Canada performed analyses to select a stack height and quantity of CAC emissions that will likely be of significance for modelling purposes.

Specific to CAC substances only, the NPRI requires reporting of CAC releases from stacks > 50 metres above grade if the stack release threshold is met. The emission quantity of the CAC from the stack, together with the stack's physical parameters must be reported to the NPRI.




## Monthly Breakdown of Releases to Air

A monthly breakdown of annual emissions for each CAC that met the reporting threshold is required for regional air-quality modelling. Of particular importance are CAC emissions during the summer months, also known as smog season (May 1–August 31) during which smog creates the greatest health risks.

# Appendix 8 – Four-digit North American Industry Classification System (NAICS) Codes

## 11 Agriculture, Forestry, Fishing & Hunting

111 Crop Production
1111 Oilseed & Grain Farming
1112 Vegetable & Melon Farming
1113 Fruit & Tree Nut Farming
1114 Greenhouse, Nursery & Floriculture Production
1119 Other Crop Farming
112 Animal Production
1121 Cattle Ranching & Farming
1122 Hog & Pig Farming
1123 Poultry & Egg Production
1124 Sheep & Goat Farming
1125 Animal Aquaculture
1129 Other Animal Production
113 Forestry & Logging
1131 Timber Tract Operations
1132 Forest Nurseries & Gathering Forest Products
1133 Logging
114 Fishing, Hunting & Trapping
1141 Fishing
1142 Hunting & Trapping
115 Support Activities for Agriculture & Forestry
1151 Support Activities for Crop Production
1152 Support Activities for Animal Production
1153 Support Activities for Forestry

## 21 Mining & Oil & Gas Extraction

211 Oil & Gas Extraction
2111 Oil & Gas Extraction
212 Mining (exc. Oil & Gas)
2121 Coal Mining
2122 Metal Ore Mining
2123 Non-Metallic Mineral Mining & Quarrying
213 Support Act. – Mining & Oil & Gas Extraction
2131 Support Act. – Mining & Oil & Gas Extraction

## 22 Utilities

221 Utilities
2211 Electricity Generation, Transmission & Dist.
2212 Natural Gas Distribution
2213 Water, Sewage & Other Systems

## 23 Construction

231 Prime Contracting
2311 Land Subdivision & Land Development
2312 Building Construction
2313 Engineering Construction
2314 Construction Management
232 Trade Contracting
2321 Site Preparation Work
2322 Building Structure Work
2323 Building Exterior Finishing Work
2324 Building Interior Finishing Work
2325 Building Equipment Installation
2329 Other Special Trade Contracting

## 31-33 Manufacturing

311 Food Mfg.
3111 Animal Food Mfg.
3112 Grain & Oilseed Milling
3113 Sugar & Confectionery Product Mfg.
3114 Fruit & Veg. Preserving & Specialty Food Mfg.
3115 Dairy Product Mfg.
3116 Meat Product Mfg.
3117 Seafood Product Preparation & Packaging
3118 Bakeries & Tortilla Mfg.
3119 Other Food Mfg.
312 Beverage & Tobacco Product Mfg.
3121 Beverage Mfg.
3122 Tobacco Mfg.
313 Textile Mills
3131 Fibre, Yarn & Thread Mills
3132 Fabric Mills
3133 Textile & Fabric Finishing & Fabric Coating
314 Textile Product Mills
3141 Textile Furnishings Mills
3149 Other Textile Product Mills
315 Clothing Mfg.
3151 Clothing Knitting Mills
3152 Cut & Sew Clothing Mfg.
3159 Clothing Accessories & Other Clothing Mfg.
316 Leather & Allied Product Mfg.
3161 Leather & Hide Tanning & Finishing
3162 Footwear Mfg.
3169 Other Leather & Allied Product Mfg.
321 Wood Product Mfg.
3211 Sawmills & Wood Preservation

3212 Veneer, Plywood & Eng'rd Wood Product Mfg.
3219 Other Wood Product Mfg.
322 Paper Mfg.
3221 Pulp, Paper & Paperboard Mills
3222 Converted Paper Product Mfg.
323 Printing & Related Support Activities
3231 Printing & Related Support Activities
324 Petroleum & Coal Products Mfg.
3241 Petroleum & Coal Products Mfg.
325 Chemical Mfg.
3251 Basic Chemical Mfg.
3252 Resin, Synth. Rubber, & Fibre & Filament Mfg.
3253 Pesticide, Fertilizer & Other Agr. Chem. Mfg.
3254 Pharmaceutical & Medicine Mfg.
3255 Paint, Coating & Adhesive Mfg.
3256 Soap, Cleaning Compound & Toilet Prep. Mfg.
3259 Other Chemical Product Mfg.
326 Plastics & Rubber Products Mfg.
3261 Plastic Product Mfg.
3262 Rubber Product Mfg.
327 Non-Metallic Mineral Product Mfg.
3271 Clay Product & Refractory Mfg.
3272 Glass & Glass Product Mfg.
3273 Cement & Concrete Product Mfg.
3274 Lime & Gypsum Product Mfg.
3279 Other Non-Metallic Mineral Product Mfg.
331 Primary Metal Mfg.
3311 Iron & Steel Mills & Ferro-Alloy Mfg.
3312 Steel Product Mfg. from Purchased Steel
3313 Alumina & Aluminum Production & Processing
3314 Non-Ferrous (exc. Al) Production & Processing
3315 Foundries
332 Fabricated Metal Product Mfg.
3321 Forging & Stamping
3322 Cutlery & Hand Tool Mfg.
3323 Architectural & Structural Metals Mfg.
3324 Boiler, Tank & Shipping Container Mfg.
3325 Hardware Mfg.
3326 Spring & Wire Product Mfg.
3327 Machine Shops, Turned Product & Related Mfg.
3328 Coating, Engraving & Heat Treating Activities
3329 Other Fabricated Metal Product Mfg.
333 Machinery Mfg.
3331 Agr., Construction & Mining Machinery Mfg.
3332 Industrial Machinery Mfg.
3333 Commercial & Service Industry Machinery Mfg.
3334 Ventilation, Heating, AC & Refrig. Equip. Mfg
3335 Metalworking Machinery Mfg.
3336 Engine, Turbine & Power Transmission Mfg.
3339 Other General-Purpose Machinery Mfg.
334 Computer & Electronic Product Mfg.
3341 Computer & Peripheral Equipment Mfg.
3342 Communications Equipment Mfg.
3343 Audio & Video Equipment Mfg.
3344 Semiconductor & Electronic Component Mfg.
3345 Instruments Mfg.
3346 Mfg. & Reproducing Magnetic & Optical Media
335 Electric Equip., Appliance & Component Mfg.
3351 Electric Lighting Equipment Mfg.
3352 Household Appliance Mfg.
3353 Electrical Equipment Mfg.
3359 Other Electrical Equipment & Component Mfg.
336 Transportation Equipment Mfg.
3361 Motor Vehicle Mfg.
3362 Motor Vehicle Body & Trailer Mfg.
3363 Motor Vehicle Parts Mfg.
3364 Aerospace Product & Parts Mfg.
3365 Railroad Rolling Stock Mfg.
3366 Ship & Boat Building
3369 Other Transportation Equipment Mfg.
337 Furniture & Related Product Mfg.
3371 Household & Inst. Furniture & Cabinet Mfg.
3372 Office Furniture (including Fixtures) Mfg.
3379 Other Furniture-Related Product Mfg.
339 Miscellaneous Mfg.
3391 Medical Equipment & Supplies Mfg.
3399 Other Miscellaneous Mfg.

## 41 Wholesale Trade

411 Farm Product Whl.
4111 Farm Product Whl.
412 Petroleum Product Whl.
4121 Petroleum Product Whl.
413 Food, Beverage & Tobacco Whl.
4131 Food Whl.
4132 Beverage Whl.
4133 Cigarette & Tobacco Product Whl.
414 Personal & Household Goods Whl.
4141 Textile, Clothing & Footwear Whl.
4142 Home Ent. Equip & Hhld. Appliance Whl.
4143 Home Furnishings Whl.

4144 Personal Goods Whl.
4145 Pharmaceuticals, Toiletries & Related Whl.
415 Motor Vehicle & Parts Whl.
4151 Motor Vehicle Whl.
4152 New Motor Vehicle Parts & Accessories Whl.
4153 Used Motor Vehicle Parts & Accessories Whl.
416 Building Material & Supplies Whl.
4161 Electrical, Plumbing, Heating & AC Equip. Whl
4162 Metal Service Centres
4163 Lumber & Other Building Supplies Whl.
417 Machinery, Equipment & Supplies Whl.
4171 Farm, Lawn & Garden Machinery & Equip. Whl.
4172 Construction, Forestry & Ind'l Machinery Whl.
4173 Computer & Communications Equipment Whl.
4179 Other Machinery, Equipment & Supplies Whl.
418 Miscellaneous Wholesaler-Distributors
4181 Recyclable Material Whl.
4182 Paper & Disposable Plastic Product Whl.
4183 Agricultural Supplies Whl.
4184 Chemical (exc. Agr.) & Allied Product Whl.
4189 Other Misc. Whl.
419 Wholesale Agents & Brokers
4191 Wholesale Agents & Brokers

## 44-45 Retail Trade

441 Motor Vehicle and Parts Dealers
4411 Automobile Dealers
4412 Other Motor Vehicle Dealers
4413 Automotive Parts, Accessories & Tire Stores
442 Furniture & Home Furnishings Stores
4421 Furniture Stores
4422 Home Furnishings Stores
443 Electronics & Appliance Stores
4431 Electronics & Appliance Stores
444 Building Material & Garden Equipment Dealers
4441 Building Material & Supplies Dealers
4442 Lawn & Garden Equipment & Supplies Stores
445 Food & Beverage Stores
4451 Grocery Stores
4452 Specialty Food Stores
4453 Beer, Wine & Liquor Stores
446 Health & Personal Care Stores
4461 Health & Personal Care Stores
447 Gasoline Stations
4471 Gasoline Stations
448 Clothing & Clothing Accessories Stores
4481 Clothing Stores
4482 Shoe Stores
4483 Jewellery, Luggage & Leather Goods Stores
451 Sporting Goods, Hobby, Book & Music Stores
4511 Sport, Hobby & Musical Instrument Stores
4512 Book, Periodical & Music Stores
452 General Merchandise Stores
4521 Department Stores
4529 Other General Merchandise Stores
453 Misc. Store Retailers
4531 Florists
4532 Office Supply, Stationery & Gift Stores
4533 Used Merchandise Stores
4539 Other Misc. Store Retailers
454 Non-Store Retailers
4541 Electronic Shopping & Mail-Order Houses
4542 Vending Machine Operators
4543 Direct Selling Establishments

## 48-49 Transportation & Warehousing

481 Air Transportation
4811 Scheduled Air Transportation
4812 Non-Scheduled Air Transportation
482 Rail Transportation
4821 Rail Transportation
483 Water Transportation
4831 Deep Water Transportation
4832 Inland Water Transportation
484 Truck Transportation
4841 General Freight Trucking
4842 Specialized Freight Trucking
485 Transit & Ground Passenger Transportation
4851 Urban Transit Systems
4852 Interurban & Rural Bus Transportation
4853 Taxi & Limousine Service
4854 School & Employee Bus Transportation
4855 Charter Bus Industry
4859 Other Transit & Ground Passenger Transport
486 Pipeline Transportation
4861 Pipeline Transportation of Crude Oil
4862 Pipeline Transportation of Natural Gas
4869 Other Pipeline Transportation
487 Scenic & Sightseeing Transportation
4871 Scenic & Sightseeing Transportation, Land
4872 Scenic & Sightseeing Transportation, Water

4879 Scenic & Sightseeing Transportation, Other
488 Support Activities for Transportation
4881 Support Activities for Air Transportation
4882 Support Activities for Rail Transportation
4883 Support Activities for Water Transportation
4884 Support Activities for Road Transportation
4885 Freight Transportation Arrangement
4889 Other Support Activities for Transportation
491 Postal Service
4911 Postal Service
492 Couriers & Messengers
4921 Couriers
4922 Local Messengers & Local Delivery
493 Warehousing & Storage
4931 Warehousing & Storage

## 51 Information & Cultural Industries

511 Publishing Industries
5111 Newspaper, Periodical, Book & DB Publishers
5112 Software Publishers
512 Motion Picture & Sound Recording Industries
5121 Motion Picture & Video Industries
5122 Sound Recording Industries
513 Broadcasting & Telecommunications
5131 Radio & Television Broadcasting
5132 Pay TV, Specialty TV & Program Distribution
5133 Telecommunications
514 Information & Data Processing Services
5141 Information Services
5142 Data Processing Services

## 52 Finance & Insurance

521 Monetary Authorities - Central Bank
5211 Monetary Authorities - Central Bank
522 Credit Intermediation & Related Activities
5221 Depository Credit Intermediation
5222 Non-Depository Credit Intermediation
5223 Activities Related to Credit Intermediation
523 Securities, Commodity Contracts & Related
5231 Securities & Commodity Contracts Intermed.
5232 Securities & Commodity Exchanges
5239 Other Financial Investment Activities
524 Insurance Carriers & Related Activities
5241 Insurance Carriers
5242 Agencies, Brokerages & Other Insurance Act.
526 Funds and Other Financial Vehicles
5261 Pension Funds
5269 Other Funds and Financial Vehicles

## 53 Real Estate & Rental & Leasing

531 Real Estate
5311 Lessors of Real Estate
5312 Offices of Real Estate Agents & Brokers
5313 Activities Related to Real Estate
532 Rental & Leasing Services
5321 Automotive Equipment Rental & Leasing
5322 Consumer Goods Rental
5323 General Rental Centres
5324 Commercial & Ind'l Machinery Rental & Leasing
533 Lessors of Non-Financial Intangible Assets
5331 Lessors of Non-Financial Intangible Assets

## 54 Professional, Scientific & Technical Services

541 Professional, Scientific & Technical Services
5411 Legal Services
5412 Accounting, Tax Prep. & Bookkeeping Services
5413 Architectural, Engineering & Related Services
5414 Specialized Design Services
5415 Computer Systems Design & Related Services
5416 Mgmt., Scientific & Technical Consulting Serv.
5417 Scientific R&D Services
5418 Advertising & Related Services
5419 Other Prof., Scientific & Technical Services

## 55 Management of Companies & Enterprises

551 Management of Companies & Enterprises
5511 Management of Companies & Enterprises

## 56 Admin., Support, Waste Mgmt & Remed. Services

561 Administrative & Support Services
5611 Office Administrative Services
5612 Facilities Support Services
5613 Employment Services
5614 Business Support Services
5615 Travel Arrangement & Reservation Services
5616 Investigation & Security Services
5617 Services to Buildings & Dwellings
5619 Other Support Services

562 Waste Management & Remediation Services
5621 Waste Collection
5622 Waste Treatment & Disposal
5629 Remediation & Other Waste Mgmt. Services

## 61 Educational Services

611 Educational Services
6111 Elementary & Secondary Schools
6112 Community Colleges & C.E.G.E.P.s
6113 Universities
6114 Business Schools & Computer & Mgmt. Training
6115 Technical & Trade Schools
6116 Other Schools & Instruction
6117 Educational Support Services

## 62 Health Care & Social Assistance

621 Ambulatory Health Care Services
6211 Offices of Physicians
6212 Offices of Dentists
6213 Offices of Other Health Practitioners
6214 Out-Patient Care Centres
6215 Medical & Diagnostic Laboratories
6216 Home Health Care Services
6219 Other Ambulatory Health Care Services
622 Hospitals
6221 General Medical & Surgical Hospitals
6222 Psychiatric & Substance Abuse Hospitals
6223 Specialty (exc. Psych., etc.) Hospitals
623 Nursing & Residential Care Facilities
6231 Nursing Care Facilities
6232 Res. Developmental Handicap, etc., Facilities
6233 Community Care Facilities for the Elderly
6239 Other Residential Care Facilities
624 Social Assistance
6241 Individual & Family Services
6242 Community Food & Housing & Emerg., etc. Serv.
6243 Vocational Rehabilitation Services
6244 Child Day-Care Services

## 71 Arts, Entertainment & Recreation

711 Performing Arts, Spectator Sports & Related
7111 Performing Arts Companies
7112 Spectator Sports
7113 Promoters of Performing Arts, Sports, etc.
7114 Agents & Managers for Public Figures
7115 Independent Artists, Writers & Performers
712 Heritage Institutions
7121 Heritage Institutions
713 Amusement, Gambling & Recreation Industries
7131 Amusement Parks & Arcades
7132 Gambling Industries
7139 Other Amusement & Recreation Industries

## 72 Accommodation & Food Services

721 Accommodation Services
7211 Traveller Accommodation
7212 RV Parks & Recreational Camps
7213 Rooming & Boarding Houses
722 Food Services & Drinking Places
7221 Full-Service Restaurants
7222 Limited-Service Eating Places
7223 Special Food Services
7224 Drinking Places (Alcoholic Beverages)

## 81 Other Services (exc. Public Administration)

811 Repair and Maintenance
8111 Automotive R&M
8112 Electronic & Precision Equipment R&M
8113 Commercial & Ind'l Mach. & Equip. R&M
8114 Personal & Household Goods R&M
812 Personal & Laundry Services
8121 Personal Care Services
8122 Funeral Services
8123 Dry Cleaning and Laundry Services
8129 Other Personal Services
813 Religious, Grant-Making, Civic & Similar Orgs.
8131 Religious Organizations
8132 Grant-Making & Giving Services
8133 Social Advocacy Organizations
8134 Civic & Social Organizations
8139 Business, Prof., Labour & Other Member. Orgs.
814 Private Households
8141 Private Households

## 91 Public Administration

911 Federal Government Public Administration
9111 Defence Services
9112 Federal Protective Services
9113 Federal Labour, Employment & Immigration Serv.
9114 Foreign Affairs & International Assistance
9119 Other Fed. Government Public Administration
912 Prov. & Territorial Public Administration
9121 Provincial Protective Services
9122 Provincial Labour & Employment Services

9129 Other Prov. & Terr. Public Administration
913 Municipal Public Administration
9131 Municipal Protective Services
9139 Other Municipal Public Administration
914 Aboriginal Public Administration
9141 Aboriginal Public Administration
919 Extra-Territorial Public Administration
9191 Extra-Territorial Public Administration

# Appendix 9 – Two-digit 1980 Canadian Standard Industrial Classification (SIC) Codes

01 Agricultural Industries
02 Service Industries Incidental to Agriculture
03 Fishing and Trapping Industries
04 Logging Industry
05 Forest Services Industry
06 Mining Industries
07 Crude Petroleum and Natural Gas Industries
08 Quarry and Sand Pit Industries
09 Service Industries Incidental to Mineral Extraction
10 Food Industries
11 Beverage Industries
12 Tobacco Products Industries
15 Rubber Products Industries
16 Plastic Products Industries
17 Leather and Allied Products Industries
18 Primary Textile Industries
19 Textile Products Industries
24 Clothing Industries
25 Wood Industries
26 Furniture and Fixture Industries
27 Paper and Allied Products Industries
28 Printing, Publishing and Allied Industries
29 Primary Metal Industries
30 Fabricated Metal Products Industries (except Machinery and Transportation Equipment Industries)
31 Machinery Industries (except Electrical Machinery)
32 Transportation Equipment Industries
33 Electrical and Electronic Products Industries
35 Non-metallic Mineral Products Industries
36 Refined Petroleum and Coal Products Industries
37 Chemical and Chemical Products Industries
39 Other Manufacturing Industries
40 Building Developing and General Contracting Industries
41 Industrial and Heavy (Engineering) Construction Industries
42 Trade Contracting Industries
44 Service Industries Incidental to Construction
45 Transportation Industries
46 Pipeline Transport Industries
47 Storage and Warehousing Industries
48 Communication Industries
49 Other Utility Industries
50 Farm Products Industries, Wholesale
51 Petroleum Products Industries, Wholesale
52 Food, Beverage, Drug and Tobacco Industries, Wholesale
53 Apparel and Dry Goods Industries, Wholesale
54 Household Goods Industries, Wholesale
55 Motor Vehicle, Parts and Accessories Industries, Wholesale
56 Metals, Hardware, Plumbing, Heating and Building Materials Industries, Wholesale
57 Machinery, Equipment and Supplies, Wholesale
59 Other Products and Industries, Wholesale
60 Food, Beverage and Drug Industries, Retail
61 Shoe, Apparel, Fabric and Yarn Industries, Retail
62 Household Furniture, Appliances and Furnishings Industries, Retail
63 Automotive Vehicles, Parts and Accessories, Sales and Service
64 General Retail Merchandising Industries
65 Other Retail Store Industries
69 Non-store Retail Industries
70 Deposit-accepting Intermediary Industries
71 Consumer and Business Financing Intermediary Industries
72 Investment Intermediary Industries
73 Insurance Industries
74 Other Financial Intermediary Industries
75 Real Estate Operating Industries (except Developers)
76 Insurance and Real Estate Agent Industries
77 Business Service Industries
81 Federal Government Service Industries
82 Provincial and Territorial Government Service Industries
83 Local Government Service Industries
84 International and Extra-territorial Government Service Industries
85 Educational Service Industries
86 Health and Social Service Industries
91 Accommodation Service Industries
92 Food and Beverage Industries
96 Amusement and Recreational Service Industries
97 Personal and Household Service Industries
98 Membership Organization Industries
99 Other Service Industries

# Appendix 10 – Two-digit 1987 U.S. Standard Industrial Classification (SIC) Codes

| | |
|---|---|
| 01 | Agricultural Production Crops |
| 02 | Agricultural Production Livestock |
| 07 | Agricultural Services |
| 08 | Forestry |
| 09 | Fishing, Hunting and Trapping |
| 10 | Metal Mining |
| 12 | Coal Mining |
| 13 | Oil and Gas Extraction |
| 14 | Non-metallic Minerals, except Fuels |
| 15 | General Building Contractors |
| 16 | Heavy Construction, except Building |
| 17 | Special Trade Contractors |
| 20 | Food and Kindred Products |
| 21 | Tobacco Products |
| 22 | Textile Mill Products |
| 23 | Apparel and Other Textile Products |
| 24 | Lumber and Wood Products |
| 25 | Furniture and Fixtures |
| 26 | Paper and Allied Products |
| 27 | Printing and Publishing |
| 28 | Chemicals and Allied Products |
| 29 | Petroleum and Coal Products |
| 30 | Rubber and Miscellaneous Plastics Products |
| 31 | Leather and Leather Products |
| 32 | Stone, Clay, and Glass Products |
| 33 | Primary Metal Industries |
| 34 | Fabricated Metal Products |
| 35 | Industrial Machinery and Equipment |
| 36 | Electronic and Other Electric Equipment |
| 37 | Transportation Equipment |
| 38 | Instruments and Related Products |
| 39 | Miscellaneous Manufacturing Industries |
| 40 | Railroad Transportation |
| 41 | Local and Interurban Passenger Transit |
| 42 | Trucking and Warehousing |
| 43 | U.S. Postal Service |
| 44 | Water Transportation |
| 45 | Transportation by Air |
| 46 | Pipelines, except Natural Gas |
| 47 | Transportation Services |
| 48 | Communications |
| 49 | Electric, Gas, and Sanitary Services |
| 50 | Wholesale Trade Durable Goods |
| 51 | Wholesale Trade Non-durable Goods |
| 52 | Building Materials and Garden Supplies |
| 53 | General Merchandise Stores |
| 54 | Food Stores |
| 55 | Automotive Dealers and Service Stations |
| 56 | Apparel and Accessory Stores |
| 57 | Furniture and Home Furnishings Stores |
| 58 | Eating and Drinking Places |
| 59 | Miscellaneous Retail |
| 60 | Depository Institutions |
| 61 | Non-depository Institutions |
| 62 | Security and Commodity Brokers |
| 63 | Insurance Carriers |
| 64 | Insurance Agents, Brokers, and Service |
| 65 | Real Estate |
| 67 | Holding and Other Investment Offices |
| 70 | Hotels and Other Lodging Places |
| 72 | Personal Services |
| 73 | Business Services |
| 75 | Auto Repair, Services and Parking |
| 76 | Miscellaneous Repair Services |
| 78 | Motion Pictures |
| 79 | Amusement and Recreation Services |
| 80 | Health Services |
| 81 | Legal Services |
| 82 | Educational Services |
| 83 | Social Services |
| 84 | Museums, Botanical, Zoological Gardens |
| 86 | Membership Organizations |
| 87 | Engineering and Management Services |
| 88 | Private Households |
| 89 | Services, n.e.c. |
| 91 | Executive, Legislative and General |
| 92 | Justice, Public Order and Safety |
| 93 | Finance, Taxation and Monetary Policy |
| 94 | Administration of Human Resources |
| 95 | Environmental Quality and Housing |
| 96 | Administration of Economic Programs |
| 97 | National Security and International Affairs |

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# National Pollutant Release Inventory

*Canadian Environmental Protection Act, 1999*