

The background of the entire page is a photograph of an industrial facility, likely a power plant or refinery, silhouetted against a bright orange and yellow sunset sky. A large plume of white smoke or steam rises from one of the buildings on the left side of the image.

www.ec.gc.ca/npri

2007

GUIDE FOR REPORTING

to the National Pollutant Release Inventory

Canadian Environmental Protection Act, 1999



Environment
Canada

Environnement
Canada

Canada

National and Regional

National Pollutant Release Inventory (NPRI) Offices

National Office

National Pollutant Release Inventory
Environment Canada
Place Vincent Massey, 9th Floor
351 St. Joseph Boulevard
Gatineau, QC
K1A 0H3
Tel: (819) 953-1656
Fax: (819) 994-3266
E-mail: NPRI@ec.gc.ca

**Newfoundland and Labrador,
Prince Edward Island,
New Brunswick and Nova Scotia**
National Pollutant Release Inventory
Environment Canada
Queen Square, 16th Floor
45 Alderney Drive
Dartmouth, NS
B2Y 2N6
Tel: (902) 244-6774
Fax: (902) 490-0722
E-mail: NPRI_ATL@ec.gc.ca

Quebec

National Pollutant Release Inventory
Environment Canada
105 McGill Street, 4th Floor
Montreal, QC
H2Y 2E7
Tel: (514) 283-7303 / 283-0248 / 283-0193
Fax: (514) 496-6982
E-mail: INRP_QC@ec.gc.ca

Ontario

National Pollutant Release Inventory
Environment Canada
4905 Dufferin Street, 2nd Floor
Toronto, ON
M3H 5T4
Tel: (416) 739-4707
Fax: (416) 739-4762
E-mail: NPRI_ONAIR@ec.gc.ca

NPRI/ON MOE Reg.127

Joint Technical Assistance Centre
Tel: (416) 739-4707

Manitoba, Saskatchewan, Alberta, Northwest Territories and Nunavut

National Pollutant Release Inventory
Environment Canada
Twin Atria #2, Room 200
4999-98 Avenue
Edmonton, AB
T6B 2X3
Tel: (780) 951-8989
Fax: (780) 951-8808 / 495-2615
E-mail: NPRI_PNR@ec.gc.ca

British Columbia and Yukon

National Pollutant Release Inventory
Environment Canada
#201-401 Burrard Street
Vancouver, BC
V6C 3S5
Tel: (604) 666-3221 / 666-9864 /
666-3890 / 666-1091
Fax: (604) 666-6800
E-mail: NPRI_PYR@ec.gc.ca

OWNERS (NPRI Reporting Software) Help Desk

E-mail: owners_help@ec.gc.ca
Tel: (819) 994-1672 / 1-877-877-8375

Acknowledgements

Prepared by: Anne Monette

In collaboration with: Christa Seaman, Kelli Dawson, Henry Quon, Lisa Swain, Jeff Stobo, Veselin Zatezalo, Cindy Wilson Giguère, and Nancy Tremblay.

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Should any inconsistencies be found between this *Guide* and the official *Canada Gazette* notice and its amendment, the notice published on March 3, 2007 in the *Canada Gazette*, Part I, and any errata and amendments published in the *Canada Gazette*, Part I, will prevail.

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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 the release to the environment, disposal and transfers for recycling of pollutants. Since the NPRI's inception in 1992, its role has expanded to include collecting 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 individual facilities. Environment Canada normally releases the *unreviewed* data shortly after the reporting deadline; reporters are encouraged to check the Web site frequently to peruse the data.

The NPRI lists 367 substances for the 2007 reporting year. Among them, 232 substances are listed with the original NPRI reporting criteria (10 tonne manufacture, process and other use reporting threshold with 1% concentration threshold, except for by-products) and 135 substances are listed with alternate reporting criteria – mercury, cadmium, arsenic, lead, hexavalent chromium compounds, tetraethyl lead, 29 polycyclic aromatic hydrocarbons, seven dioxins, ten individual furans, hexachlorobenzene, seven criteria air contaminants and 75 selected volatile organic compounds.

This *Guide*, together with its companion documents – *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector*, *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory* and *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) 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 2007 reporting year. All of these documents and other tools and resources can be found on the NPRI website at <http://www.ec.gc.ca/pdb/npri/npri_gdocs_e.cfm>

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. In keeping with the spirit of one-window reporting, the online reporting system OWNERS (One Window to National Environmental Reporting System) enables reporting to Alberta Environment (AENV) to support its Environmental Protection and Enhancement Act (EPEA) approvals, and to Metro Vancouver, formerly known as Greater Vancouver Regional District (GVRD).

Cette publication est aussi disponible en français sous le titre de « Guide de déclaration à l'inventaire national des rejets de polluants – 2007 ».

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1. Highlights and Important Changes for 2007

1.1 Report Due Dates

Canada Gazette notice	Reporting Year	Reporting Deadline
March 3, 2007	2007 calendar year	June 1, 2008

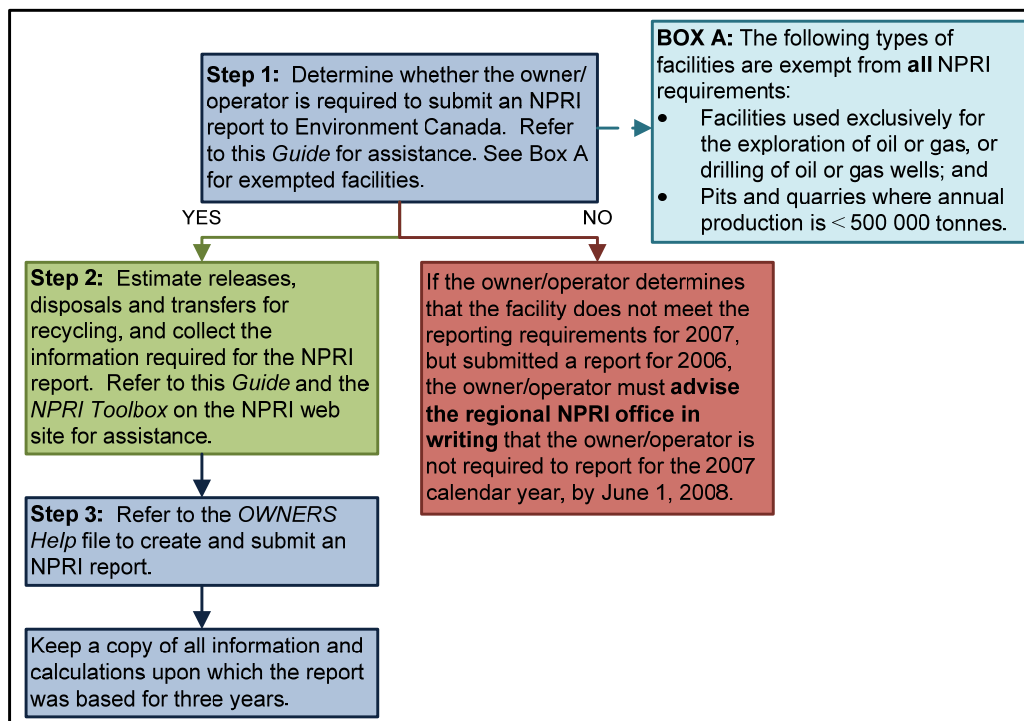
1.2 Correspondence

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 email addresses, telephone and facsimile numbers for the contacts could delay receipt of important notices from NPRI offices.

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 2007. Refer to the *NPRI Toolbox* (available on the NPRI website at: http://www.ec.gc.ca/pdb/npri/npri_gdocs_e.cfm) for guidance on estimating releases, disposals and transfers for recycling. Once you have collected the information required for the NPRI report, refer to the *OWNERS Help* file for assistance on how to enter your information and submit your report. The *OWNERS Help* file is available on the OWNERS website (OWNERS.gc.ca) by clicking on the "OWNERS Help" button on the left-hand side of the home page. The reporting process is outlined below in Figure 1.

Figure 1: Process for Reporting to the NPRI for 2007



1.4 Changes to Reporting Requirements for 2007

A substantial number of changes were made to the NPRI for the 2007 reporting year:

New Substances

1 new core substance was added under Schedule 1, Part 1:

- Total reduced sulphur, expressed as hydrogen sulphide

9 new polycyclic aromatic hydrocarbons (PAHs) were added under Schedule 1, Part 2:

- | | |
|----------------------------------|-------------------|
| • Dibenzo(a,h)acridine | CAS No. 226-36-8 |
| • Dibenzo(a,e)fluoranthene | CAS No. 5385-75-1 |
| • Dibenzo(a,e)pyrene | CAS No. 192-65-4 |
| • Dibenzo(a,h)pyrene | CAS No. 189-64-0 |
| • Dibenzo(a,l)pyrene | CAS No. 191-30-0 |
| • 7,12-Dimethylbenz(a)anthracene | CAS No. 57-97-6 |
| • 3-Methylcholanthrene | CAS No. 56-49-5 |
| • 5-Methylchrysene | CAS No. 3697-24-3 |
| • 1-Nitropyrene | CAS No. 5522-43-0 |

Changes to Exemptions

The exemption for pits and quarries under Schedule 2, Section 3(1) has been removed. Under Schedule 2, Section 1(h), pits and quarries where annual production is 500 000 tonnes or more are now required to report to the NPRI, provided the manufacture, process or other use or release thresholds are met and regardless of the number of hours worked by employees.

The exemption for road dust under Schedule 2, Section 2(b) has been removed. As specified in Schedule 2, Section 12, total particulate matter, PM₁₀ and PM_{2.5} emissions from road dust are now required to be included in threshold calculations where vehicles travel a distance of more than 10,000 vehicle kilometres on unpaved roads at a contiguous facility in 2007.

Changes to Reporting Requirements for Dioxins and Furans

Previously, 17 dioxin and furan congeners were required to be reported as a group, in grams of toxic equivalents (TEQ). Schedule 3, Part 2, Section 18 now requires that seven individual dioxin congeners and ten individual furan congeners be reported separately, in grams.

Changes to Reporting Requirements for PAHs

A *de minimis* threshold for reporting individual PAHs has been added. Previously, individual PAHs were reported, regardless of the amount, provided that the incidental manufacture and release, disposal or transfer for recycling of all PAHs totalled ≥ 50 kg. Beginning in 2007, if the 50 kg threshold is met, only individual PAHs incidentally manufactured and released, disposed of or transferred for recycling in amounts ≥ 5 kg need to be reported.

1.5 Reporting to Other Inventory Programs

Reporting Under Environmental Performance Agreements

To ensure a one-window approach for reporting information to Environment Canada, environmental performance agreement (EPA) reporting requirements have been integrated into OWNERS. EPAs are non-legislative voluntary agreements, which have been negotiated among parties to achieve specific environmental results. For more information on EPAs, visit Environment Canada's Web site at [<www.ec.gc.ca/epa-epe>](http://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. Environment Canada worked with ON MOE to include reporting for O.Reg.127/01 in OWNERS. Refer to the *OWNERS Help* file for instructions on how to complete a report for O.Reg.127/01.

Reporting to Alberta Environment

In 2002, NPRI started collecting emission information for criteria air contaminants (CACs) on behalf of Alberta Environment (AENV) to support its Environmental Protection and Enhancement Act (EPEA) approvals.

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). OWNERS will continue to collect emission information on behalf of NERM. For more information, refer to the *OWNERS Help* file.

Reporting to Metro Vancouver

Air Quality Management Permits issued under Metro Vancouver Bylaw No. 937 require information pertaining to various facility activities that affect emissions to the atmosphere to be reported. Metro Vancouver partnered with Environment Canada to enable holders of Air Quality Management Permits to report using OWNERS. Refer to the *OWNERS Help* file for instructions on how to report to Metro Vancouver.

2. Reporting to the National Pollutant Release Inventory for 2007

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 *OWNERS Help* file will guide you through preparing and submitting an NPRI report for the 2007 reporting year.

Owners/operators of facilities that meet the wastewater reporting criteria, or that fall within the wood preservation sector, are advised to consult the following companion documents – *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector* and *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory*.

This *Guide* should be consulted first by persons who own and/or operate facilities to determine if they must report for any NPRI substances. Supplementary guides, if applicable, can be consulted following an owner or operator's determination that they must report to Environment Canada for the 2007 NPRI reporting year.

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

The legal basis for the 2007 NPRI is the “*Notice with Respect to Substances in the National Pollutant Release Inventory for 2007*” and any errata and amendments published in the *Canada Gazette*, Part I. The notice was published on March 3, 2007, under the authority of subsection 46(1) of the *Canadian Environmental Protection Act*, 1999 (CEPA 1999). The notice specifies that any person who owned or operated a facility during the 2007 calendar year, under the conditions prescribed in the notice, must provide certain information to the Minister of the Environment no later than June 1, 2008.

The *Canada Gazette* notice for the 2007 NPRI encompasses a wide range of substances and groups of substances, reporting criteria and requirements. It is divided into four schedules with several parts in each, as outlined in Table 1. For more information, contact your regional NPRI office listed on page ii of this *Guide*.

Table 1: Overview of the *Canada Gazette* Notice for the 2007 NPRI

Schedule 1 – National Pollutant Release Inventory Substances

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

- Part 1, Groups 1-4 lists the 238 substances with manufacture, process or otherwise use and concentration thresholds and is divided into four groups according to the threshold quantity;
 - Part 2 lists 29 individual polycyclic aromatic hydrocarbons (PAHs);
 - Part 3 lists seven dioxins, ten furans and hexachlorobenzene (HCB);
 - Part 4 lists seven criteria air contaminants (CACs); and
 - Part 5 lists 75 selected volatile organic compounds (VOCs) with additional reporting requirements (speciated VOCs).
-

Schedule 2 – Criteria for Reporting

Schedule 2 lists general reporting criteria, including the reporting deadline, activities to which the 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 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; and
 - 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 owners/operators whose facilities meet the reporting criteria defined in Schedule 2:

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

Schedule 4 – Definitions

Schedule 4 provides definitions of the 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 NPRI for 2007

Part Number	Threshold Type	Substances	Mass Threshold	Concentration Threshold	Reporting Unit
1A	Quantity manufactured, processed or otherwise used ⁽¹⁾	232 core substances	10 tonnes	1%	tonnes
1B	Quantity manufactured, processed or otherwise used ⁽¹⁾	mercury ⁽²⁾	5 kg	n/a ⁽⁴⁾	kg
		cadmium ⁽²⁾	5 kg	0.1%	kg
		arsenic ⁽²⁾	50 kg	0.1%	kg
		hexavalent chromium compounds lead ⁽³⁾ tetraethyl lead			
2	Quantity incidentally manufactured and released, disposed of or transferred for recycling	29 polycyclic aromatic hydrocarbons	50 kg total. Individual PAHs in amounts ≥ 5 kg must be reported ⁽⁵⁾	n/a	kg
3	Mandatory reporting for facilities where specified activities took place or were carried out	7 dioxins 10 furans hexachlorobenzene	n/a	n/a	g
4	Quantity released to air	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
5	Quantity released to air, provided that 10 tonnes of total VOCs were required to be reported under Part 4	75 speciated VOCs including individual substances, isomer groups and other groups and mixtures	1 tonne	n/a	tonnes

- (1) The manufacture, process or otherwise use values calculated for Part 1A and 1B substances *are not necessarily the values to be reported*. These values only determine whether or not a substance needs to be reported. A subsequent calculation must be done to obtain the actual value of releases, disposals, and transfers for recycling to be reported.
- (2) and its compounds.
- (3) 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.
- (4) n/a – not applicable.
- (5) Total PAHs may be reported under the substance listing “PAHs, total Schedule 1, Part 2” only if information is not available to estimate releases, disposals and transfers of individual PAHs.

3. Step 1 – Determine Whether a Report is Required for Your Facility

The first step is to determine whether an NPRI report is required for your facility for any of the listed substances. This section outlines the reporting criteria for all substances listed in NPRI for 2007. If you are required to report, refer to Section 4 of this *Guide* for details on where to find guidance and information on how to estimate releases, disposals and transfers for recycling of the substances listed in NPRI. A number of questions and answers, indexed by subject keyword, are also available at the end of this *Guide* to answer more general NPRI-related inquiries.

3.1 Overview of Reporting Criteria

Figures 2 and 3 provide an overview of the reporting criteria for 2007. Detailed explanations of the reporting criteria and requirements for each group of substances follow the figures. The complete list of NPRI substances, divided into the five parts, is provided in Appendix 1.

It is the obligation of the person who owns or operates the facility to review NPRI reporting criteria annually, as the criteria are subject to change. If a report was filed for 2006, but the facility does not meet the 2007 NPRI criteria, the owner/operator must inform Environment Canada by June 1, 2008, in writing, of the change in reporting status.

3.2 Facility Criteria

3.2.1 Definition of “Facility”

The term “facility,” as defined in the *Canada Gazette* notice, refers to a “contiguous facility,” a “portable facility,” a “pipeline installation,” or an “offshore installation,” as defined below.

Contiguous Facility

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

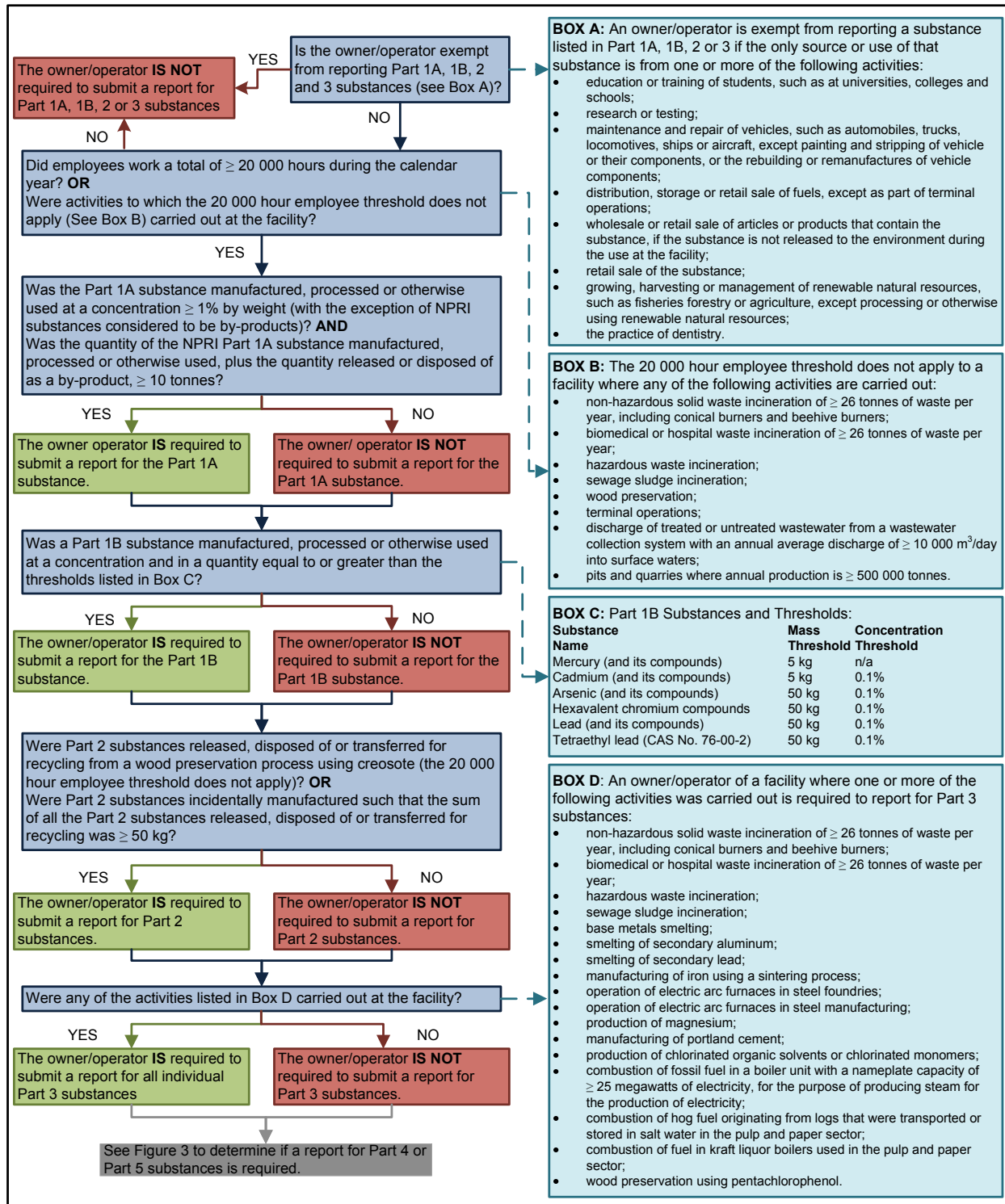
Portable Facility

A *portable facility* is defined as portable PCB destruction equipment, portable asphalt plants, and portable concrete batching plants. The definition applies to a facility that can be entirely relocated for operation.

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

Figure 2: Criteria for Reporting Parts 1 through 3 Substances to the NPRI



3.2.2 Facilities Exempt from All NPRI Reporting Requirements

Oil and Gas Exploration and Drilling

A facility used exclusively for oil and gas exploration or the drilling of oil and gas wells is exempt from NPRI reporting requirements. This is the only type of oil and gas facility exempt from reporting to the NPRI.

Pits and Quarries Where Production is < 500 000 tonnes per year

Pits and quarries where production is < 500 000 tonnes in a calendar year are exempt from reporting to the NPRI.

3.2.3 Activities Exempt from Reporting Parts 1A, 1B, 2 and 3 Substances

A facility is exempt from reporting Parts 1A through 3 substances if the only source or use of that substance 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, the quantity of that same substance from any exempt activities should not be included when reporting releases, disposals or transfers for recycling to the NPRI.

Table 3: Activities Not Considered When Reporting Parts 1 through 3 Substances to the NPRI⁽¹⁾

education or training of students, such as at universities, colleges and schools
research or testing
maintenance and repair of 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 ⁽²⁾
distribution, storage or retail sale of fuels, except as part of terminal operations ⁽³⁾
wholesale or retail sale of articles or products that contain the substance, if the substance is not released to the environment during the use at the facility
retail sale of the substance
growing, harvesting or management of renewable natural resources, such as fisheries, forestry or agriculture, except processing or otherwise using renewable natural resources
the practice of dentistry

(1) Activities listed in this Table are *not exempt from reporting Part 4 or Part 5 substances from stationary combustion equipment*.

(2) Substances used for activities involving routine, scheduled and preventative maintenance of vehicles are exempt (e.g., repair, cleaning, replacement of lubricants/fluids). However, substances used in the painting or stripping of vehicles or vehicle components are subject to reporting. 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.

(3) See Section 3.3.1 and the Glossary for explanation of "terminal operations." The distribution, storage or sale of fuels exemption does not include terminal operations.

3.2.4 Exclusions for All Substances

The quantity of a substance from any sources listed in Table 4 should not be included when calculating and 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 reporting the amount released. For the purpose of NPRI reporting, "vehicle" refers to any mobile equipment that is capable of self-propulsion (e.g., fleet vehicles and earth moving equipment including, but not limited to, loaders, dump trucks, forklifts, excavators and bulldozers).

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 (buildings and other fixed structures) but not process equipment
materials used in janitorial or facility grounds maintenance ⁽²⁾
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, such as water used for process cooling or air used either as compressed air or for combustion

(1) See Section 3.4.5 "Definitions" for an explanation of the term "article."

(2) 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 process equipment* (e.g., manufacturing equipment cleaned with a solvent) *is not excluded*.

3.3 20 000 Hour Employee Threshold

Before determining whether substance-specific thresholds were met and what sources need to be reported, you must determine if the 20 000 hour employee threshold is met. This threshold depends on the number of hours worked by all employees at the facility during the calendar year, including all hours worked by:

- individuals employed at the facility, including students, part-time and term employees,
- owner(s) who performed work on site at the facility, and
- a person, such as a contractor, who performed work at the facility that is related to the operations of the facility, for the period of time that the person performed that work.

The total number of hours worked includes paid vacation and sick leave. The employee threshold must be met by most companies before they need to consider reporting for Parts 1A through 3 substances.

3.3.1 Activities to which the 20 000 hour Employee Threshold Does Not Apply

If the facility was used mainly or exclusively for one or more of the activities listed in Table 5, any NPRI substance that met the respective reporting criteria must be reported, 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, while not necessarily meeting the 20 000 hour employee threshold.

Complete descriptions of these activities are provided below. In addition to the activities in Table 5, facilities where stationary combustion equipment is operated must report for Parts 4 and 5 substances regardless of employee hours, provided the release thresholds are met.

Table 5: Activities to Which the 20 000 Hour Employee Threshold Does Not Apply

Activity Type	Activities
Waste Incineration	a) non-hazardous solid waste incineration of ≥ 26 tonnes of waste per year, including conical burners and beehive burners b) biomedical or hospital waste incineration of ≥ 26 tonnes of waste per year c) hazardous waste incineration d) sewage sludge incineration
Wood Preservation	e) wood preservation (using heat or pressure treatment, or both)
Terminal Operations	f) terminal operations
Wastewater Systems	g) wastewater collection systems discharging $\geq 10\,000\text{ m}^3/\text{day}$ into surface waters
Pits and Quarries	h) pits and quarries where annual production is $\geq 500\,000$ tonnes

Waste Incineration

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 and 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) waste for the purpose of reducing its volume, or destroying hazardous chemicals or pathogens present in the waste. This includes facilities where waste heat is recovered as a by-product from the exhaust gases of an incinerator (e.g., energy-from-waste incinerators), 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.

a) Non-hazardous solid waste incineration of ≥ 26 tonnes of waste per year, including conical burners and beehive burners

Non-hazardous solid waste means any solid waste, regardless of origin, that might normally be disposed of in a non-secure manner, such as at a sanitary landfill site. It includes clean wood waste [i.e., waste from woodworking or forest product operations, including bark, where the wood waste has not been treated with preservative chemicals (e.g., pentachlorophenol) or decorative coatings] and residential and other municipal wastes.

b) Biomedical or hospital waste incineration of ≥ 26 tonnes of waste per year

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 and animal anatomical wastes, 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). For more information, see Appendix 3 “Definition of Biomedical Waste.”

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.

c) Hazardous waste incineration

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 (see Appendix 4 “Definition of Hazardous Waste”). Hazardous waste incinerated in a mobile incinerator temporarily located at your facility must be included as part of this activity.

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 sewer system. The drying of sludge to reduce water content is part of the incineration stage.

Wood Preservation

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.

Wood preservation using creosote

The owner/operator of a facility used for wood preservation must report for 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

The owner/operator of a facility used for wood preservation using pentachlorophenol must report for dioxins, furans and hexachlorobenzene (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, 2002), available at www.ec.gc.ca/npri/.

Terminal Operations

f) Terminal operations

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.

Wastewater Systems

g) Wastewater collection systems discharging $\geq 10\,000\text{ m}^3/\text{day}$ into surface waters

A *wastewater facility* is defined for NPRI as a wastewater collection system that discharges treated or untreated wastewater into surface waters with an annual average discharge of $\geq 10\,000\text{ m}^3/\text{day}$. Therefore, a wastewater system for NPRI reporting purposes includes both the treatment and *collection* components.

A *wastewater collection system* is a 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 a facility meets the flow threshold and substance criteria. Where no treatment facilities exist, the wastewater facility consists of the entire collection system, and may require NPRI reporting if it meets the basic requirements.

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

A *wastewater treatment system* means a plant or process location that accepts collection system flows from 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 that should be included 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.

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* (Environment Canada, 2003a) available at www.ec.gc.ca/npri/.

Pits and Quarries

h) Pits and Quarries Where Production is $\geq 500\,000$ tonnes per year

A *pit* is defined as an excavation that is open to the air and that is operated for the purpose of extracting sand, clay, marl, earth, shale, gravel, stone or other rock but not coal, a coal-bearing substance, oil sands, or oil sands-bearing substance or an ammonite shell and includes any associated infrastructure, but does not include a quarry.

A *quarry* is defined as an excavation that is open to the air and that is operated for the purpose of working, recovering and extracting stone, limestone, sandstone, dolostone, marble, granite, construction materials and any mineral other than coal, a coal-bearing substance, oil sands, or oil sands-bearing substance or an ammonite shell and includes any associated infrastructure but does not include a pit.

For more detailed information on reporting for pits and quarries, consult the pits and quarries guidance available in the NPRI Toolbox at www.ec.gc.ca/npri/.

3.4 Reporting Criteria for Part 1A Substances – Core Substances

3.4.1 Overview

Part 1A lists substances of concern, most of which have been listed 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

The Part 1A substance list includes 232 substances with a manufacture, process or other use (MPO) threshold (see Section 3.4.5 “Definitions” for an explanation of these terms). These substances, along with all other NPRI substances and groups of substances, are listed in alphabetical order in Appendix 1 and by CAS number in Appendix 2. Substances that do not have a unique CAS number are noted with an asterisk (*).

Substance Qualifiers

Some groups of substances and individual substances on the Part 1A list are qualified in terms of their specific physical or chemical form, state or particle size. These qualifiers, described below, determine whether a report will be required for a given substance.

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 that 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.

- **fume or dust**

Fume or dust refers to dry forms of aluminum; the term manufacture includes the generation of aluminum fume or dust as a by-product or impurity. In such cases, you should determine if your facility generated more than 10 tonnes of aluminum fume or dust in the reporting year as a result of its activities. If so, you must report that the facility manufactures “aluminum (fume or dust).” Similarly, there may be specific activities in which aluminum is processed in the form of a fume or dust to make other chemicals or other products for distribution in industry. In reporting releases, you would only report releases of the fume or dust, or transfers for disposal or recycling.

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**

The listing for aluminum oxide is qualified by the term fibrous forms. Fibrous refers to a synthetic form of aluminum oxide that is processed to produce strands or filaments. This includes the form of aluminum oxide found in brake linings, but excludes the more common granular, powdered or fumed forms of alumina. Only aluminum oxide in the fibrous form requires reporting.

- **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 substances must be reported as an equivalent weight of the acid or base.

- **compounds**

Nine NPRI Part 1A substances have this qualifier: antimony, chromium, cobalt, copper, manganese, nickel, selenium, silver and zinc. The pure metal and any substance, alloy or mixture must be reported as the equivalent weight of the metal itself. No CAS number is provided for these substances as a CAS number applies for each compound, alloy or mixture.

For example, a galvanizing facility that uses zinc chloride (ZnCl_2 , molecular weight = 136.3 g/mol) should only consider the mass contribution of Zn (atomic weight = 65.4 g/mol) when determining whether it met the reporting threshold for zinc and for calculating its releases, disposals and transfers. Based on the atomic to molecular weight ratio, for every tonne of ZnCl_2 there are about 0.5 tonnes of Zn. Therefore, if ZnCl_2 was the only source of Zn at this facility, Zn reporting would be triggered if approximately 20 tonnes of ZnCl_2 were used.

- **and its compounds, except for hexavalent chromium compounds**

Chromium appears in the Part 1A list with this qualifier, because hexavalent chromium compounds are reported separately under Part 1B (see section 3.5). 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. A CAS number is not provided for these substances. Do not include vanadium contained in an alloy. An alloy means metal products containing two or more elements as a solid solution, intermetallic compounds and/or mixtures of metallic phases.

- **friable form**

Asbestos is the general name for several fibrous minerals and products. Only asbestos that is brittle and readily crumbled (i.e., friable) 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.

- **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, this does not include “phosphorus (yellow or white),” which is listed separately. Further information is provided in the *Phosphorus Guidance* document available through the *NPRI Toolbox*.

- **yellow or white**

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

- **ion 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” if you meet the threshold criteria. 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 nitric acid neutralized to nitrate ion in solution at a pH of 6.0 or greater.

- **total reduced sulphur, expressed in terms of hydrogen sulphide**
Total reduced sulphur (TRS) has been added to the list of Part 1A substances beginning in 2007.
 TRS refers to a gaseous mixture of compounds containing one or more sulphur atom in its reduced state. For the purposes of reporting to the NPRI, this class of substances is restricted to the following substances:

Substance Name	Chemical Formula	CAS No.
Hydrogen sulphide	H ₂ S	7783-06-4
Carbon disulphide	CS ₂	75-15-0
Carbonyl sulphide	COS	463-58-1
Dimethyl sulphide	C ₂ H ₆ S	75-18-3
Methyl mercaptan	CH ₄ S	74-93-1
Dimethyl disulphide	C ₂ H ₆ S ₂	624-92-0

The equivalency of the individual TRS compounds in tonnes of H₂S must be determined and added together to determine if TRS is required to be reported. An example of a threshold calculation is included in Section 3.4.6 “Calculating the 10 tonne Reporting Threshold.” Three of these compounds, H₂S, CS₂ and COS are also listed individually under Part 1A. If any of these substances meets the 10 tonne reporting threshold alone, then it must also be reported individually.

3.4.3 Units

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

3.4.4 Reporting Criteria

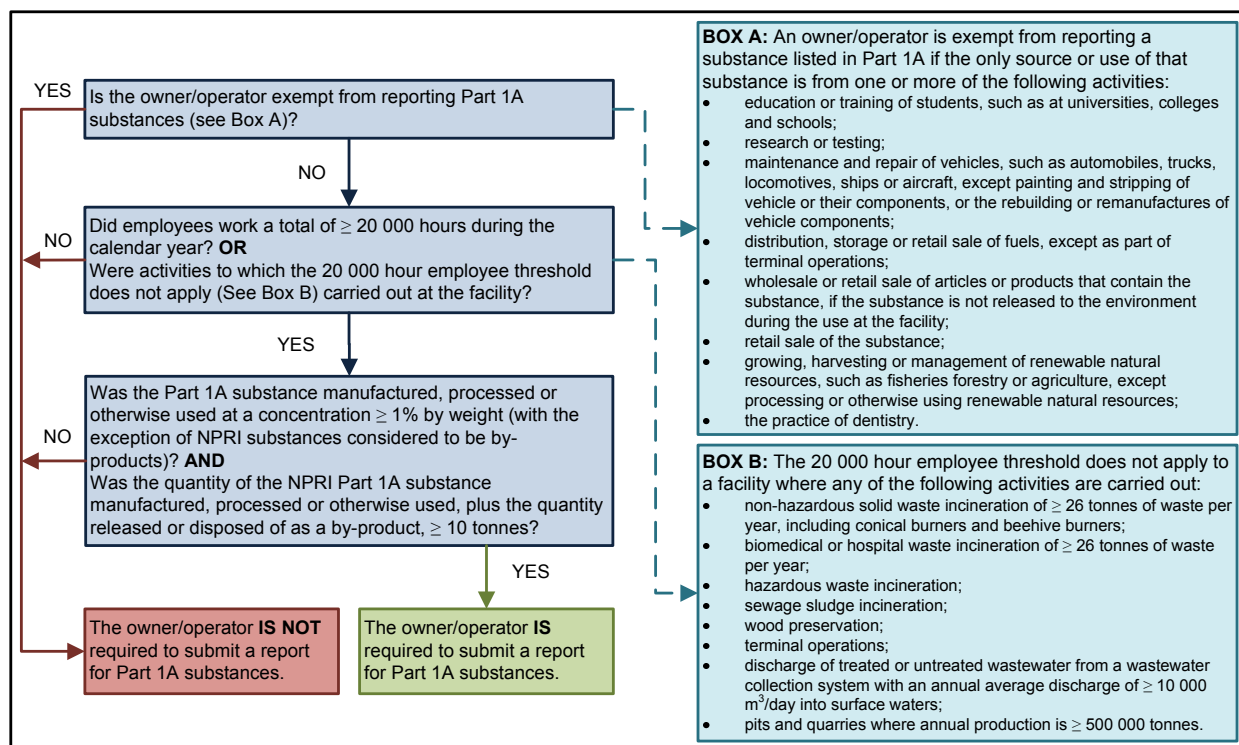
In general, any person who owns or operates a facility must submit a report to the NPRI for a Part 1A substance *only* if all of the following criteria are met:

- 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),
and
- the amount of a Part 1A substance manufactured, processed or otherwise used at a concentration of ≥ 1% by weight, plus the amount of that substance incidentally manufactured as a by-product at any concentration, was ≥ 10 tonnes (10 000 kg).

Figure 4 illustrates the steps for determining if you are required to submit a report for Part 1A substances. A facility must meet **all the reporting criteria** before an NPRI report for releases, disposals or transfers of the Part 1A substance is required.

Once you have determined that a report is required for an NPRI Part 1A substance, all releases, disposals and transfers for recycling of that substance are reportable, regardless of their concentration or quantity (including “zero” releases, disposals and transfers for recycling).

Figure 4: Reporting Criteria for Part 1A Substances



3.4.5 Definitions

The terms *manufacture*, *process* and *other use* are defined below. A Part 1A substance at a concentration equal to or greater than 1% or an NPRI Part 1A by-product (see the definition of a by-product below) at any concentration are included in the calculation of the 10 tonne reporting threshold if they were manufactured, processed or otherwise used.

Manufacture

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

Examples:

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.

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 the definition of “article” below).

Examples:

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

Other Use

The terms *other use* and *otherwise use* encompass any use, disposal or release of an NPRI substance 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. This does not include substances used for routine janitorial or facility grounds maintenance (see Section 3.2.4 “Exclusions for All Substances” and Table 4).

Example:

The use of trichloroethylene in the maintenance of manufacturing and process equipment is considered an “other use.”

By-product

A *by-product* is an NPRI substance that is incidentally manufactured, processed or otherwise used at the facility at any concentration, and released on site to the environment or disposed of. To determine if an NPRI Part 1A substance is a by-product, the following criteria should be considered:

- The Part 1A substance is a non-product output of the manufacture, processing or other use of a Part 1A substance at the facility. It may be generated during extraction of raw materials, processing, production, use or waste disposal of the Part 1A substance or be the output of an unwanted side-reaction or an impurity in a feedstock material.
- 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 a 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 concentrations of the metals in the coal, ash and stack gases.

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 and more detailed information cannot be obtained from the supplier or manufacturer. Although this Part 1A substance is considered a by-product, it is not included in the calculation of the 10 tonne reporting threshold because information on the substance identity, concentration or quantity is not available.

Article

An *article* is defined as a manufactured item that does not release an NPRI substance when it undergoes processing or other 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” means that the facility generated less than 1 kg of the Part 1A substance as waste during the calendar year.

Special reporting guidance has been developed for welding rods and welded materials and can be accessed through the *NPRI Toolbox*.

Example:

A metal reclamation facility accepts spent lead-acid batteries for recycling. The batteries are broken into pieces in a hammer mill and their parts (sulphuric 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. The metal reclamation facility is now required to report any NPRI substances from these batteries if the thresholds are met. For example, the sulphuric acid in the batteries must be included in the facility's calculation of the 10 tonne reporting threshold for this substance.

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 a 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 on site or off site

Any 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 a 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 \geq 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 when calculating 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, contact the supplier of the substance for more detailed information. If no additional information is available, 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:

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 should not be included in the calculation of the 10 tonne reporting threshold.

Example of Calculating the Reporting Threshold for Part 1A Substances

Table 6 illustrates the calculation of the 10 tonne reporting threshold. This facility has several processes in which a Part 1A substance is manufactured, processed or otherwise used. In this example, a report is required (assuming the facility also met the 20 000 hour employee threshold or was used for an activity to which the 20 000 hour employee threshold does not apply), because the total amount of the Part 1A substance manufactured, processed or otherwise used at the facility exceeded 10 tonnes for the calendar year.

Table 6: Example of a Threshold Calculation for Part 1A Substances

Material and Process Containing Part 1A Substance	Total weight of Material Containing Part 1A Substance (tonnes)	Concentration or Equivalent Weight of Part 1A Substance in Material or Process (%)	Net Weight of Part 1A Substance (tonnes)
Compound material in process stream A ⁽¹⁾	150	5	7.5
Raw material in process B ⁽²⁾	2	100	2.0
Raw material in process C ⁽³⁾	45	0.20	n/a
By-product released from process D ⁽⁴⁾	10 000	0.01	1.0
Total weight of the Part 1A substance⁽⁵⁾			10.5

- (1) In process A, the NPRI Part 1A substance is present at 5% concentration or equivalent weight (for metallic compounds) and is included in the threshold calculation.
- (2) In process B, the raw material added to the process is a pure Part 1A substance. It is also included in the threshold calculation, regardless of any subsequent dilution in the process.
- (3) The weight of the Part 1A substance in the raw material used in process C is not included in the threshold calculation because the concentration is less than 1%. Note, however, that since the owner/operator of the facility in this example must report, the owner/operator is required to report releases, disposals and transfers for recycling from all processes including those, such as process C, that were not used in the threshold calculations.
- (4) The weight of the Part 1A substance produced and released from process D is included in the calculation because it is a by-product, and the concentration threshold does not apply.
- (5) This is the manufacture, process or otherwise use value and *is not the value to be reported*. This value is only used to determine that a report is required for the Part 1A substance. A subsequent calculation must be done to obtain the actual value of releases, disposals, and transfers for recycling to be reported.

Example of Calculating the Reporting Threshold for Total Reduced Sulphur

Table 7 illustrates the calculation of the reporting threshold for total reduced sulphur. In this example, a report is required (assuming the facility also met the 20 000 hour employee threshold or the facility was used for an activity to which the employee threshold does not apply), because the total amount of TRS exceeded 10 tonnes for the calendar year. In addition, carbonyl sulphide must be reported separately, since the 10 tonne threshold was met and COS is listed separately in Part 1A.

Table 7: Example of a Threshold Calculation for Total Reduced Sulphur

Substance Name	Chemical Formula	Quantity ⁽¹⁾ (tonnes)	Molecular Weight (g/mol)	Equivalency (S/molecule)	Corrected Emissions ⁽²⁾ (tonnes H ₂ S)
Hydrogen sulphide	H ₂ S	3	34.0803	1	3
Carbon disulphide	CS ₂	2	76.1398	2	1.79
Carbonyl sulphide	COS	22	60.0747	1	12.481
Dimethyl sulphide	C ₂ H ₆ S	4	62.1343	1	2.194
Methyl mercaptan	CH ₄ S	2	48.1073	1	1.417
Dimethyl disulphide	C ₂ H ₆ S ₂	6	94.1987	2	4.342
Total reduced sulphur (expressed as H₂S)					25.223

(1) This is the amount of each substance that is manufactured, processed or otherwise used at a concentration $\geq 1\%$, plus by-products at any concentration.

(2) To calculate corrected emissions, multiply the quantity of the substance by the molecular weight of H₂S, divided by the molecular weight of the substance, and then multiplied by the equivalency. For example, the H₂S equivalent of 6 tonnes of dimethyl disulphide is calculated as follows:

$$6 \text{ tonnes } \text{C}_2\text{H}_6\text{S}_2 \times \frac{34.0803 \text{ g/mol (H}_2\text{S)}}{94.1987 \text{ g/mol (C}_2\text{H}_6\text{S}_2)} \times 2 \text{ sulphur atoms per molecule of C}_2\text{H}_6\text{S}_2 = 4.342 \text{ tonnes H}_2\text{S}$$

3.5 Reporting Criteria for Part 1B Substances – Alternate Threshold Substances

3.5.1 Overview

Part 1B substances are pollutants that 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, the reporting thresholds for Part 1B substances are lower than those for Part 1A substances.

3.5.2 Substances

The Part 1B substances and their reporting criteria are listed in Table 8. The pure element and any substance, alloy or mixture of any Part 1B substance must be reported as the equivalent weight of the metal itself, with the exception of tetraethyl lead which is reported as the pure compound. For example, a facility that uses potassium dichromate (K₂Cr₂O₇, molecular weight = 294 g/mol) should only consider the mass contribution of hexavalent chromium (2 x 52 g/mol) in K₂Cr₂O₇ when determining whether it met the reporting threshold for hexavalent chromium.

Note that tetraethyl lead and lead (and its compounds) both appear on the NPRI Part 1B list. Lead (and its compounds) has the additional qualifier “does not include lead (and its compounds) in stainless steel, brass or bronze alloys.” 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)**.

Table 8: Mass and Concentration Thresholds for Part 1B Substances

Substance	CAS No.	Mass Threshold (kg)	Concentration Threshold (by weight)
Mercury ⁽¹⁾	*	5	n/a ⁽²⁾
Cadmium ⁽¹⁾	*	5	0.1%
Arsenic ⁽¹⁾	*	50	0.1%
Hexavalent chromium compounds	*	50	0.1%
Lead ⁽³⁾	*	50	0.1%
Tetraethyl lead	78-00-2	50	0.1%

* No single CAS Number applies to this substance.

(1) and its compounds.

(2) n/a – not applicable.

(3) and its compounds, does not include tetraethyl lead or lead contained in stainless steel, brass or bronze alloys.

3.5.4 Reporting Criteria

The reporting criteria for Part 1B substances are outlined in Figure 5. You are required to report on site releases, disposals and transfers for recycling of a Part 1B substance if, during the 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 8. 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.

Once you determine that a report is required for a Part 1B substance, all releases, disposals or transfers for recycling of that substance are reportable, regardless of the concentration or quantity (including “zero” releases, disposals and transfers for recycling).

3.5.5 Definitions

The terms manufacture, process and other use are defined in Section 3.4.5 “Definitions.”

Article

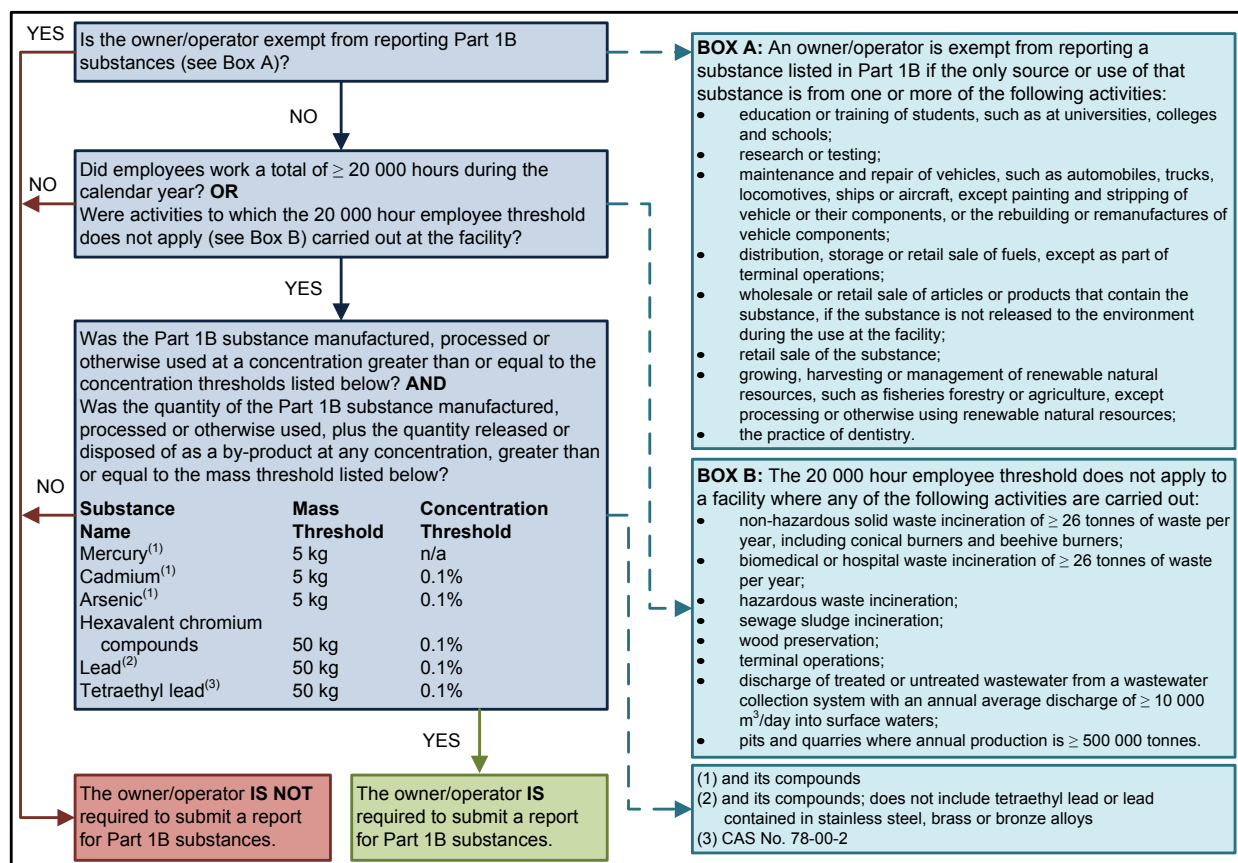
An *article* is defined as a manufactured item that does not release an NPRI substance when it undergoes processing or other use. This is further explained in Section 3.4.5 “Definitions.” However, there is no quantitative measure of “due care” in recycling Part 1B substances, because even minimal releases 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 otherwise used and there were releases, the Part 1B substance *must* be included in the threshold calculation.

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

Example:

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, (e.g., the bulb is broken during waste management operations, 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.

Figure 5: Reporting Criteria for Part 1B Substances



3.6 Reporting Criteria for Part 2 Substances – Polycyclic Aromatic Hydrocarbons

3.6.1 Overview

Polycyclic aromatic hydrocarbons (PAHs) may be used as commercial chemicals or incidentally manufactured in certain industrial processes.

Since the 29 PAHs listed in Part 2 of NPRI are mostly incidentally manufactured rather than used as commercial chemicals, reporting criteria are based on the total cumulative amount of PAHs incidentally manufactured at the facility.

3.6.2 Substances

The 29 PAHs listed in Part 2 of NPRI, including the 9 newly listed PAHs, are presented in Table 9. Two PAHs are listed in Part 1A – anthracene (CAS No. 120-12-7) and naphthalene (CAS No. 91-20-3). These substances are commercial chemicals used in significant quantities, and have the 10 tonne manufacture, process and other use and 1% concentration reporting thresholds. Do not include anthracene and naphthalene when determining whether your facility met the reporting criteria for PAHs.

Table 9: Polycyclic Aromatic Hydrocarbons Listed in the NPRI

Substance Name	CAS No.	Substance Name	CAS No.
Acenaphthene	83-32-9	Dibenzo(a,h)pyrene NEW	189-64-0
Acenaphthylene	208-96-8	Dibenzo(a,i)pyrene	189-55-9
Benzo(a)anthracene	56-55-3	Dibenzo(a,l)pyrene NEW	191-30-0
Benzo(a)phenanthrene	218-01-9	7H-Dibenzo(c,g)carbazole	194-59-2
Benzo(a)pyrene	50-32-8	7,12-Dimethylbenz(a)anthracene NEW	57-97-6
Benzo(b)fluoranthene	205-99-2	Fluoranthene	206-44-0
Benzo(e)pyrene	192-97-2	Fluorene	86-73-7
Benzo(g,h,i)perylene	191-24-2	Indeno(1,2,3-c,d)pyrene	193-39-5
Benzo(j)fluoranthene	205-82-3	3-Methylcholanthrene NEW	56-49-5
Benzo(k)fluoranthene	207-08-9	5-Methylchrysene NEW	3697-24-3
Dibenz(a,j)acridine	224-42-0	1-Nitropyrene NEW	5522-43-0
Dibenzo(a,e)fluoranthene NEW	5385-75-1	Perylene	198-55-0
Dibenzo(a,e)pyrene NEW	192-65-4	Phenanthrene	1985-01-08
Dibenzo(a,h)acridine NEW	226-36-8	Pyrene	129-00-0
Dibenzo(a,h)anthracene	53-70-3		

3.6.3 Units

The reporting unit for Part 2 substances is **kilograms (kg)**.

3.6.4 Reporting Criteria

With the exception of wood preservation using creosote (see below), PAH reporting is based on the quantities of the substances released, disposed of or transferred for recycling from incidental manufacture. You must aggregate the quantities of **all** 29 individual PAHs incidentally manufactured together to determine if your facility met the 50 kg reporting threshold.

With the exception of wood preservation using creosote, you must submit substance reports for each PAH if, during the 2007 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**
- the sum of all PAHs incidentally manufactured and released on site, disposed of or transferred for recycling totalled 50 kg or more,
- and**
- the individual PAH was incidentally manufactured and released on site, disposed of or transferred for recycling in a quantity of 5 kg or more.

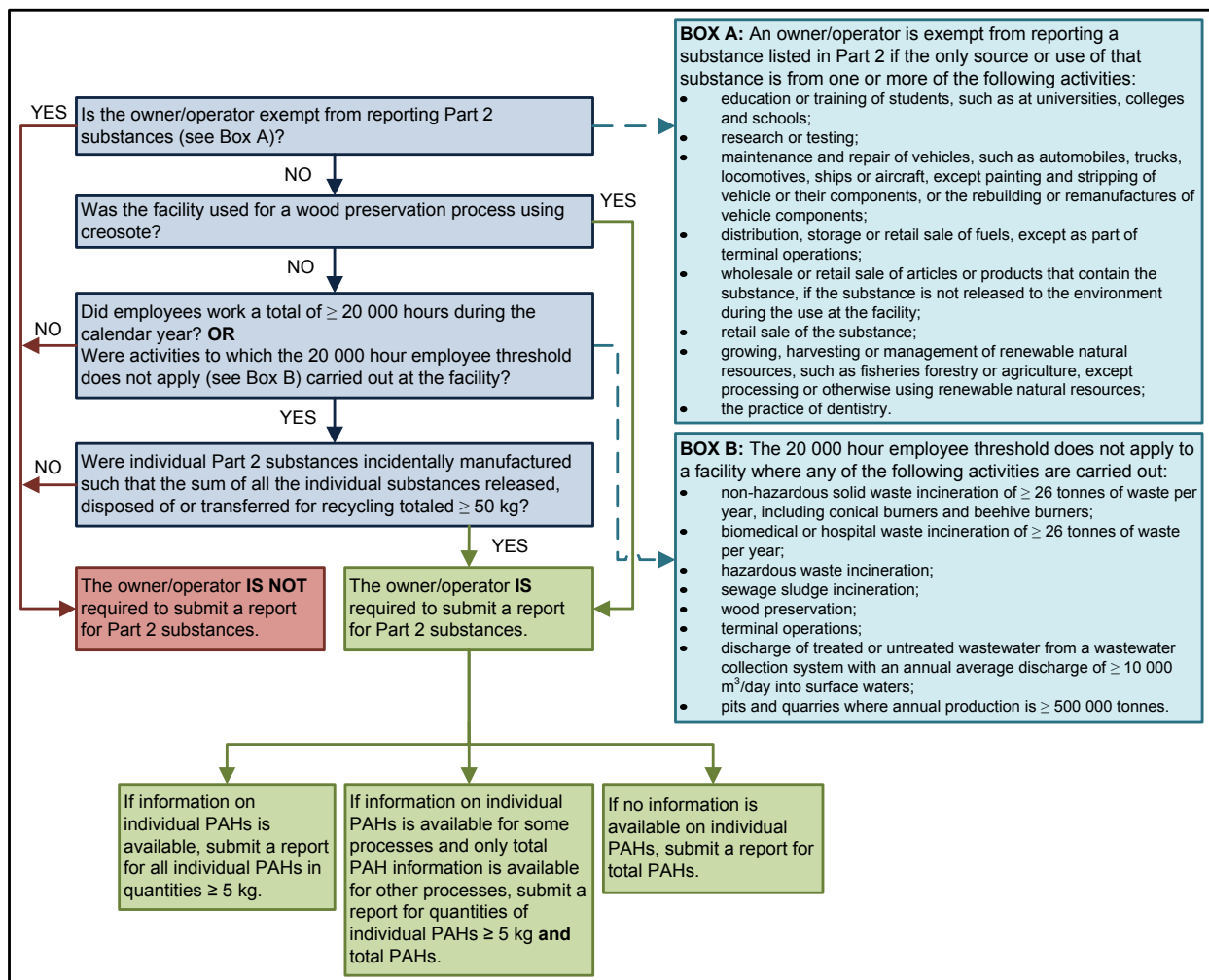
The substance-specific reporting criteria for the 29 PAHs listed in Table 9 are outlined in Figure 6. Releases, disposals and transfers for recycling must be reported for the individual PAH substances that meet the 5 kg *de minimis* threshold, even though the 50 kg reporting threshold applies to the aggregate total of all 29 PAHs.

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. A wood preservation facility using creosote must report PAH releases, disposals and transfers for recycling, **regardless of the 50 kg incidental manufacture and 5 kg *de minimis* reporting thresholds and regardless of the the number of hours worked by employees.**

For more detailed information, see the *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory*, available on the NPRI Web site at http://www.ec.gc.ca/pdb/npri/npri_rep_e.cfm.

Figure 6: Reporting Criteria for Part 2 Substances



3.7 Reporting Criteria for Part 3 Substances – Dioxins, Furans and Hexachlorobenzene

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 CEPA 1999, and are slated for *virtual elimination*.

Owners/operators of facilities where specific activities took place or were carried out (see Section 3.7.4 “Reporting Criteria”) have the potential to incidentally manufacture dioxins and, furans or HCB and are therefore required to submit a report for these substances to the NPRI.

3.7.2 Substances

Dioxins and Furans

The dioxin and furan congeners listed in the NPRI are shown with their respective CAS numbers in Table 10. A congener is a compound belonging to a family of compounds having similar chemical structures, but differing in the number and position of hydrogen substitutes.

Beginning in the 2007 reporting year, **substance reports are required for the release of each of the individual 17 congeners** listed in Table 10. This change was made to improve harmonization between the NPRI and the Ontario Ministry of the Environment Airborne Contaminants Discharge Monitoring and Reporting Regulations (O.Reg 127/01) and to achieve consistency when meeting Canada's international reporting obligations.

Table 10: Dioxin and Furan Congeners Listed in the NPRI

Dioxins		Furans	
Substance Name	CAS No.	Substance Name	CAS No.
2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin	1746-01-6	2,3,7,8-Tetrachlorodibenzofuran	51207-31-9
1,2,3,7,8-Pentachlorodibenzo- <i>p</i> -dioxin	40321-76-4	2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4
1,2,3,4,7,8-Hexachlorodibenzo- <i>p</i> -dioxin	39227-28-6	1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6
1,2,3,7,8,9-Hexachlorodibenzo- <i>p</i> -dioxin	19408-74-3	1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9
1,2,3,6,7,8-Hexachlorodibenzo- <i>p</i> -dioxin	57653-85-7	1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9
1,2,3,4,6,7,8-Heptachlorodibenzo- <i>p</i> -dioxin	35822-46-9	1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9
Octachlorodibenzo- <i>p</i> -dioxin	3268-87-9	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
		Octachlorodibenzofuran	39001-02-0

Hexachlorobenzene (HCB)

Hexachlorobenzene (HCB) has the CAS Number 118-74-1.

3.7.3 Units

Individual dioxin and furan congeners and HCB must be reported in **grams (g)**.

3.7.4 Reporting Criteria

The reporting criteria for dioxins, furans and HCB are summarized in Figure 7. You are required to submit substance reports for dioxins and, furans and HCB if:

- one of the activities identified in Table 5 took place at the facility **or** the 20 000 hour employee threshold was met,
- and**
- one of the activities listed in Table 11 was carried out at the facility.

Owners/operators of 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 and, furan and HCB reporting. Terminal operations and wastewater collection facilities must also have been engaged in one of the activities in Table 11 to trigger reporting.

Figure 7: Reporting Criteria for Part 3 Substances

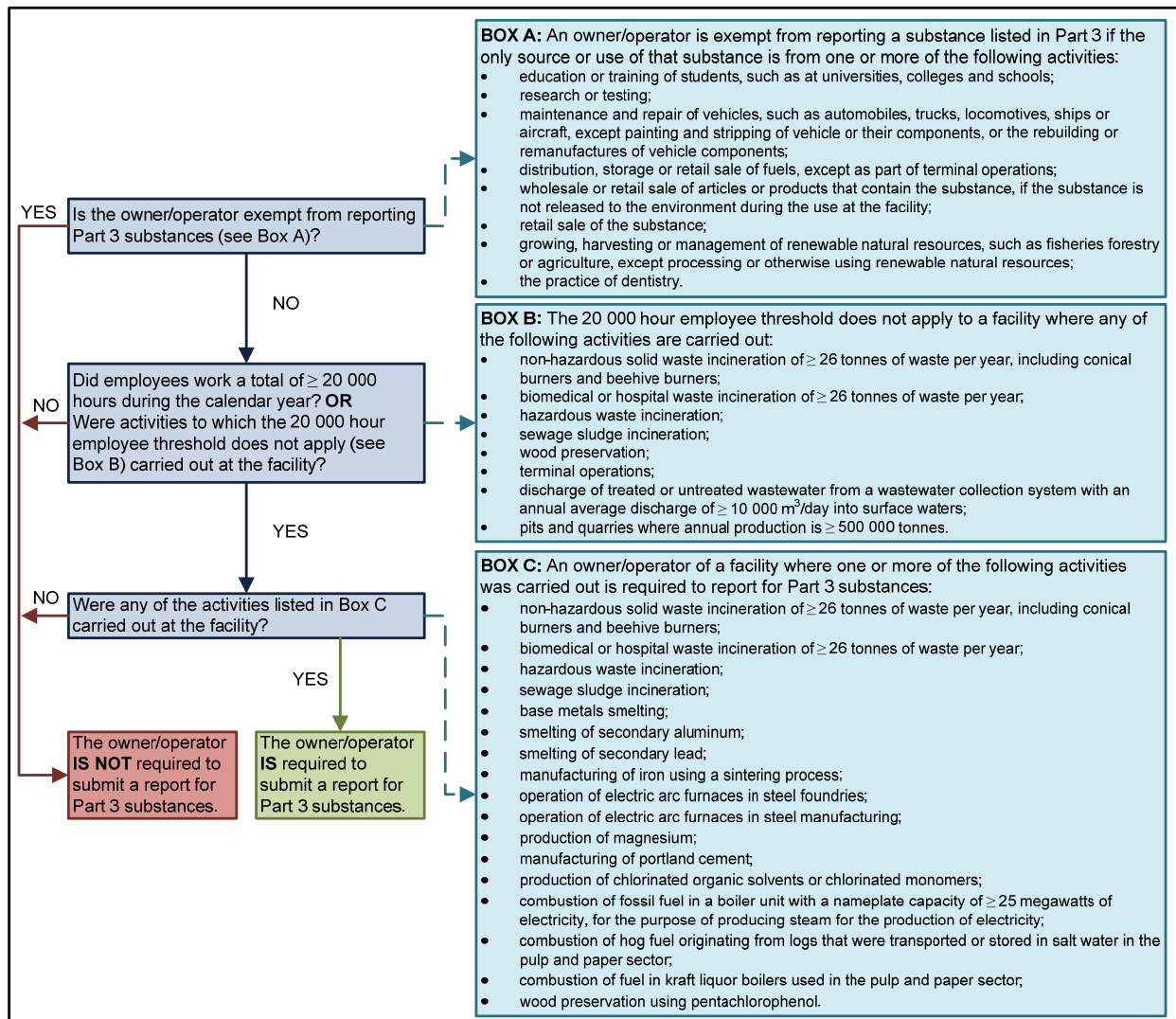


Table 11: Activities for Which Dioxins, Furans and HCB Reports are Required⁽¹⁾

a) non-hazardous solid waste incineration of ≥ 26 tonnes of waste per year, including conical burners and beehive burners
b) biomedical or hospital waste incineration of ≥ 26 tonnes of waste per year
c) hazardous waste incineration
d) sewage sludge incineration
e) base metals smelting (this refers to copper, lead, nickel or zinc). It does not include aluminum or any other metals
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 of electricity or greater, 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

(1) The 20 000 hour employee threshold applies to these activities.

3.7.5 Activities for Which Dioxins, Furans and HCB Reports are Required (20 000 hour employee threshold applies)

The waste incineration and wood preservation activities in Table 11 (a–d, q) were previously described (see Section 3.3.1 “Activities to Which the 20 000 hour Employee Threshold Does Not Apply”). Note that the owner/operator of a facility whose primary business activity is not incineration, but which is nonetheless engaged in some form of incineration at the facility, is required to report for dioxins and, furans and HCB only if the 20 000 hour employee threshold was also met.

The other activities listed in Table 11 are described in the following sections.

Smelting Activities

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

e) Base metals smelting

Base metals refer to copper, lead, nickel or 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 11 (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 pre-cleaning and smelting, both of which may produce emissions of dioxins and furans.

Other Activities

h) Manufacturing of iron using a sintering process

Sintering means to cause something to become a coherent mass by heating without melting or the 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 and 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 and

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. The electric arc is a component of an electric circuit, like a resistor, but with its own peculiar characteristics. Dioxins, furans and HCB may be formed as unwanted by-products during high-temperature decomposition and combustion of raw materials containing chlorine and organic compounds.

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, and 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 of electricity, for the purpose of producing steam for the production of electricity

This activity includes fossil fuel combustion at electric power generation utilities and large industrial facilities co-generating electric power using waste heat from industrial processes. *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, and does not include natural gas or other fuels that are gases at ambient pressure and temperature. Fuel combustion in diesel generators is not captured by this activity.

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 and furans are emitted from the burning of salt-contaminated hog fuel. Chlorine is absorbed by the bark of logs transported and stored in salt water. The bark stripped from logs is 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.

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, which is the residue from the digester in a kraft (sulphate) pulping process. The boiler recovers chemical products, which are later recycled, from the combusted black liquor 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 and furan production (i.e., chlorinated aromatics), the manufacture of PCP often results in the incidental manufacture of HCB, dioxins and 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

3.8.1 Overview

CAC emissions information is required in order to assess whether risk management activities for various industrial sources of CACs are resulting in reduced emissions, and to support the following domestic and international programs:

- 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.

3.8.2 Substances

The seven CACs, listed under Part 4 are listed with their CAS numbers in Table 12.

Table 12: Criteria Air Contaminants Listed in the NPRI

Substance Name	CAS No.
Oxides of nitrogen (NO _x , expressed as NO ₂)	11104-93-1
Sulphur dioxide (SO ₂)	7446-09-5
Carbon monoxide (CO)	630-08-0
Volatile organic compounds (VOCs) ⁽¹⁾	*
Total particulate matter (TPM) ⁽²⁾	*
Particulate matter ≤ 10 microns (PM ₁₀) ⁽²⁾	*
Particulate matter ≤ 2.5 microns (PM _{2.5}) ⁽²⁾	*

* No single CAS Number applies to this substance.

(1) Facilities that meet the reporting threshold for VOCs are required to report their air emissions based on the total mass of all VOC substances emitted annually.

(2) Emissions from road dust must be included in threshold calculations for TPM, PM₁₀ and PM_{2.5} where vehicles travelled more than 10 000 km on unpaved roads within the facility boundaries.

Oxides of nitrogen (expressed as NO₂)

Nitrogen and oxygen in air at high temperatures can combine to form oxides of nitrogen (NO_x). Therefore, fuel combustion and some industrial processes produce NO_x. 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 are also a major component of acid rain.

Oxides of nitrogen (NO_x) include both nitric oxide (NO) and nitrogen dioxide (NO₂). Since NO_x is a mixture, both NO and NO₂ must be expressed on an NO₂-equivalent basis before the individual quantities are combined for the total NO_x release. Do not include nitrous oxide (N₂O) when calculating NO_x releases.

As with other CACs, the release concentration for NO_x (expressed as NO₂) may be in units of parts-per-million volume [ppmv or ppm (volume)]. Before this value is used to estimate emissions, it needs to be converted 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/m³. The second step is to use the stack flow rate to determine an annual release value from that stack (see the *NPRI Toolbox* for more details).

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 and *Compilation of Air Pollutant Emission Factors (AP-42)*. These references are further described in section 4.2 of this *Guide*. If you are using an emission factor to determine your NO_x release, it is important to determine how the emission is expressed. FIRE emission factors, for example, provide the total NO_x released already expressed as NO₂.

Sulphur Dioxide

Sulphur dioxide (SO₂) is a pollutant formed when sulphur is oxidized and emitted to the atmosphere. Fuel containing sulphur emits SO₂ when it is burned. Common sulphur-containing fuels include coal and oil. SO₂ is also released during metal smelting and other industrial processes. Like NO_x, SO₂ 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 SO₂, not SO_x. Therefore the quantity of sulphite or sulphur trioxide (SO₃) and sulphate (SO₄) released should not be considered when calculating SO₂ releases.

If using emission factors to determine SO₂ releases, note that the emission estimation documents and the FIRE database provide emission factors for both SO₂ 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 (CO) is a colourless, odourless, poisonous gas formed during the incomplete combustion of carbon. The rate of CO emissions from combustion sources depends on the overall oxidation efficiency of carbon to carbon dioxide. The presence of CO in the exhaust gases of combustion systems results primarily from incomplete fuel combustion.

Volatile Organic Compounds

Volatile organic compounds (VOCs) are an aggregate grouping of almost 1 000 organic substances that readily volatilize. Some VOCs can undergo photochemical reactions in the atmosphere and contribute to the formation of secondary PM and ground-level ozone. Elevated concentrations of ground-level ozone and PM in turn generate smog.

For NPRI purposes, only photochemically reactive VOCs should be included when calculating VOC emissions. Table 13 provides examples of VOC categories and individual VOCs. The NPRI definition for VOC is derived from CEPA 1999 and is presented in Appendix 5 of this *Guide*.

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 and wood preservatives.

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

- Approximately 100 VOCs are listed in the NPRI as individual substances under Part 1A with 10 tonne manufacture, process or other use and 1% concentration thresholds. You must report these Part 1A substances if criteria are met; you must also include these substances in your threshold calculations for Part 4 VOCs, along with all other VOCs emitted.
- The estimate of VOC emissions must be based on the total mass of all VOC substances emitted annually.
- In addition to total VOCs, facilities may be required to report additional information on speciated VOCs listed in Part 5 (see Section 3.9 “Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds (VOCs)” for more information).

Table 13: Example Categories of Volatile Organic Compounds

Category	Example Compounds
Alcohols	Ethanol
	Isopropyl alcohol
	Methanol
Alkanes	<i>n</i> -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 <i>tert</i> -butyl ether
	Tripropylene glycol monomethyl ether
Esters	Dimethyl phthalate
	Dibutyl phthalate

Particulate Matter

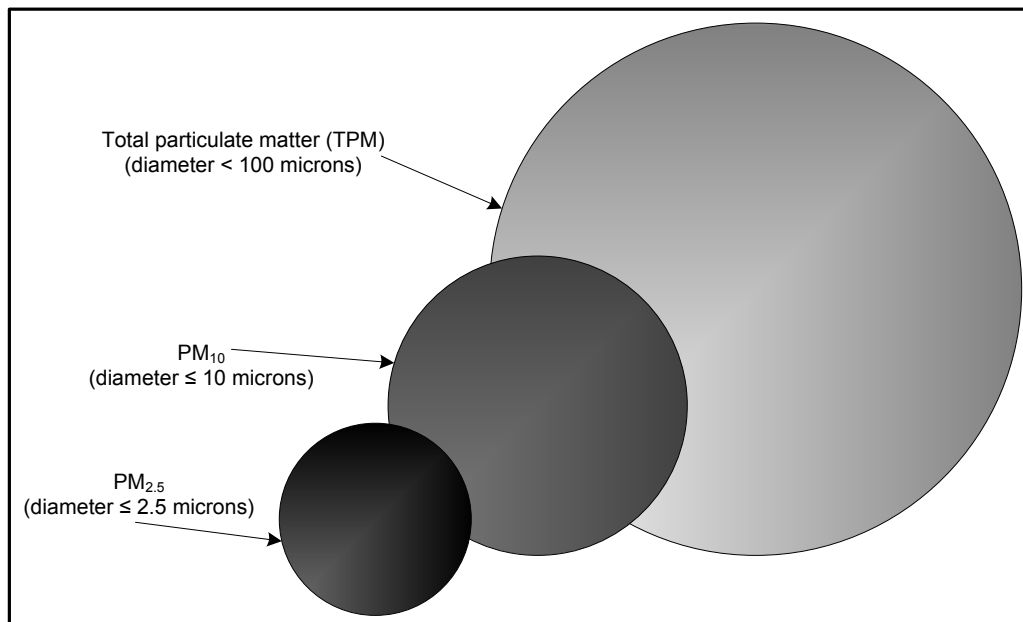
Particulate matter is microscopic solid and liquid particles, of various origins, that remain suspended in the air for any length of time. These particles give smog its colour and affect visibility, and are believed to have adverse affects on vegetation and on various synthetic and natural surfaces. 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 (U.S. EPA, 2000), includes both filterable and condensable PM. Of these, **only filterable PM is reportable** to NPRI. Emission factors exist for primary PM, condensable PM and filterable PM; ensure you are using the correct factor.

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 releases. It is also impossible for $PM_{2.5}$ releases to exceed PM_{10} releases. 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, i.e., PM_{10} and $PM_{2.5}$ should never be added to yield TPM.

Figure 8: Particulate Matter Size Fractions



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 NPRI, TPM, PM_{10} and $PM_{2.5}$ emissions should be reported on a dry basis. Guidance for wet cooling towers and PM reporting is available in the *NPRI Toolbox*.

In some cases, TPM emissions may be available (from testing or emission factors), but size distribution may not. The U.S. EPA software tools PM Calculator and SPECIATE contain particle size distribution information and size-specific control information for control devices. These tools may be used to estimate the PM₁₀ and PM_{2.5} emissions from a process and can be found on the U.S. EPA's Web site at <http://www.epa.gov/ttn/chief/efpac/efsoftware.html>.

In other cases, emission factors are available for PM₁₀ and PM_{2.5}, but not for TPM. In the absence of other information, the PM₁₀ 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 PM₁₀ and TPM estimates.

Beginning in the 2007 reporting year, TPM, PM₁₀ and PM_{2.5} releases from road dust caused by vehicular traffic on unpaved roads within facility boundaries, when travel on these roads exceeds 10 000 vehicle kilometres traveled (VKT), are now required to be included in threshold calculations when reporting to the NPRI. This change was made to harmonize the administration and reporting requirements of the NPRI and O.Reg 127/01.

For purposes of the NPRI a *paved road* is defined as any road that has semi-permanent surface placed on it, such as asphalt or concrete. Gravel surfaced roads, roads with thin membrane bituminous surface treatments and bituminous cold mix surfaces are referred to as *unpaved roads*.

The reporting threshold for TPM, PM₁₀ and PM_{2.5} emissions from road dust is 10 000 VKT on unpaved surfaces within the facility boundaries in a given year. If the VKT threshold is met, emissions of TPM, PM₁₀ and PM_{2.5} must be included when determining if mass release thresholds are met for the facility. VKT can be calculated using the following formula:

$$\text{VKT (km)} = \text{Number of vehicles per day} \times \text{Length of unpaved road} \times \text{Number of operating days per year}$$

The use of dust suppressants does not affect the status of an unpaved road, therefore the above formula should include the length of the unpaved roads to which dust suppressant has been applied. Facilities applying dust suppressants should indicate this in the comments section of OWNERS.

Road dust emissions can be calculated using the following formula:

$$E_x = \text{VKT (EF}_x\text{)} \times \text{ADJ} \times (1 - \text{CE}/100)$$

Where:

E_x = Emission of contaminant x, kg/year

VKT = Annual total vehicle kilometres travelled, km

EF_x = Emission factor of contaminant x, kg/VKT

ADJ = Correction factor for rain and snow and frozen roads (see the calculator)

CE = Control efficiency of applied dust suppressants (%)

For more details, see the *Unpaved Industrial Road Dust Guidance* and the *Unpaved Industrial Road Dust Calculator*, available in the NPRI Toolbox at

http://www.ec.gc.ca/pdb/npri/documents/ToolBox/toolBox_e.cfm. The background information on developing these tools is available from the US EPA AP-42, Chapter 13, available at <http://www.epa.gov/ttn/chief/ap42/ch13/index.html>.

Example:

A facility with more than 10 000 VKT emits the following:

Size fraction	Emissions from road dust (tonnes)	Emissions from other processes (tonnes)	Total (tonnes)	Release Threshold (tonnes)	Release Threshold Exceeded?
TPM	2.73	15.12	17.05	20	No
PM ₁₀	1.36	5.87	7.23	0.5	Yes
PM _{2.5}	0.86	1.51	2.37	0.3	Yes

Because the VKT threshold was met, TPM, PM₁₀ and PM_{2.5} emissions from unpaved road surfaces must be included when calculating emissions. In this example, the release thresholds for PM₁₀ and PM_{2.5} were met and, therefore, the emissions from road dust, plus the emissions from other processes must be reported (7.23 tonnes of PM₁₀ and 2.37 tonnes of PM_{2.5}).

Example:

A facility with less than 10 000 VKT does not need to calculate TPM, PM₁₀ and PM_{2.5} emissions from road dust, and would only need to include the TPM, PM₁₀ and PM_{2.5} emissions from other sources when assessing the PM mass release thresholds.

3.8.3 Units

Report quantities for CACs released to air in **tonnes**.

3.8.4 Reporting Criteria

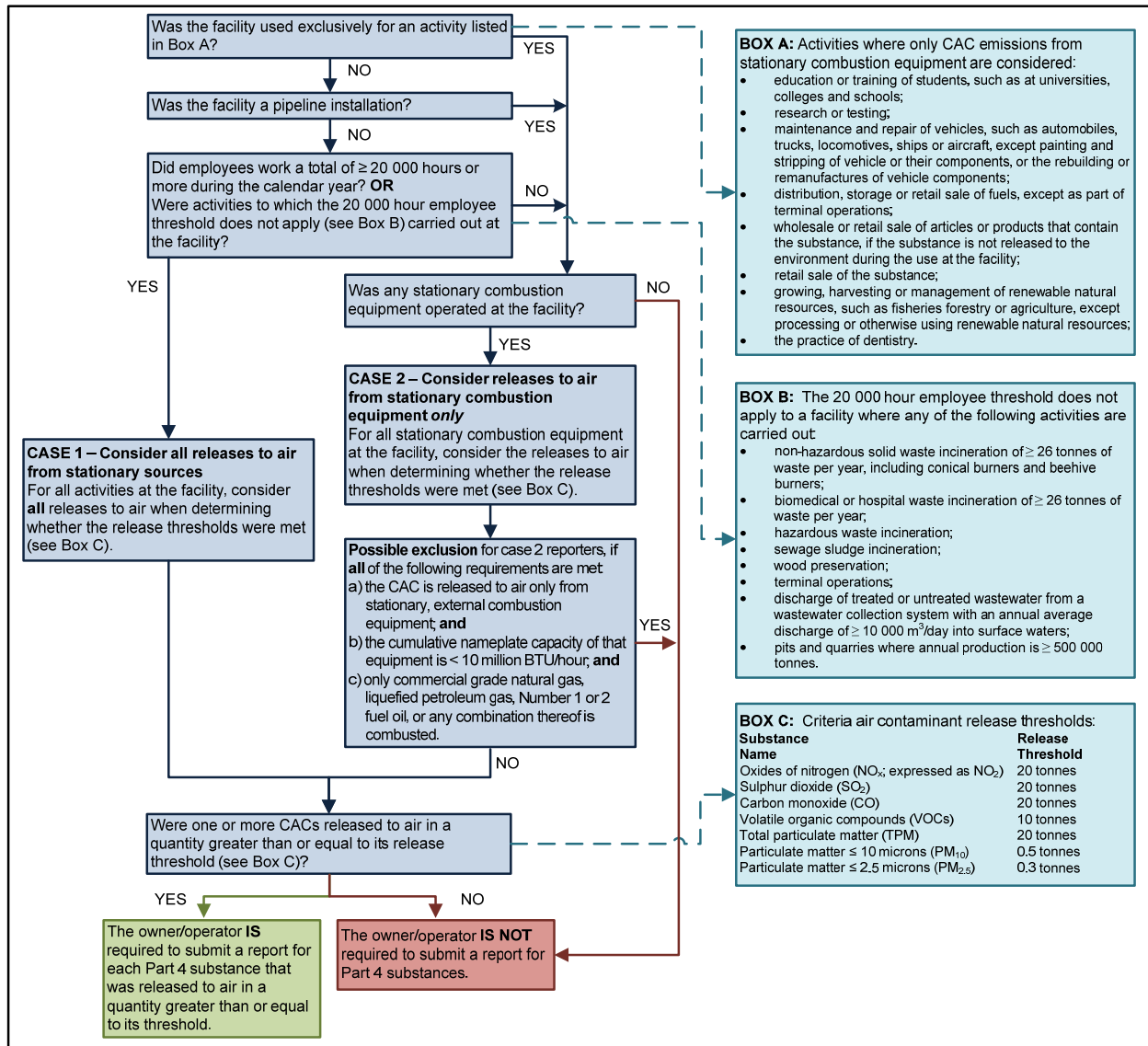
The reporting criteria for CACs are summarized in Figure 9 and the thresholds for CACs are listed in Table 14.

Table 14: Release Thresholds for Criteria Air Contaminants

Substance Name	Release Threshold (tonnes)
Oxides of nitrogen (expressed as NO ₂)	20
Sulphur dioxide	20
Carbon monoxide	20
Volatile organic compounds	10
Total particulate matter	20
PM ₁₀	0.5
PM _{2.5}	0.3

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 NPRI, stationary combustion equipment includes any combustion equipment that needs to be stationary to function or operate properly, or is not capable of self-propulsion. For example, a portable generator that is hard wired into a process and bolted down to eliminate vibrations would be considered stationary. Both internal and external combustion equipment should be considered in the stationary combustion equipment category. Stationary combustion equipment is further described in Section 3.8.6 "Sources of CACs."

Figure 9: Reporting Criteria for Part 4 Substances



3.8.5 Sources of CAC Emissions to Consider in Threshold Calculations

The first step in determining if your facility met the CAC reporting threshold is to identify what emission sources should be included in calculations. As shown in Figure 9, two possible scenarios must be considered. In Case 1, all CAC emission sources at the facility must be included in calculations; in Case 2, only the releases from the stationary combustion equipment at the facility should 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:

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

or

- was 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: Consider Only CAC Emissions from Stationary Combustion Equipment

You need to consider emissions from stationary combustion equipment only if:

- employees worked less than 20 000 hours, or
- the facility was used exclusively for an activity listed in Table 3 (or Box A of Figure 9), 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 was released to air only 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 following section and in the glossary.

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. 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 14.

3.8.6 Sources of CAC Emissions

Stationary Combustion Equipment

For the purpose of reporting to NPRI, *stationary combustion equipment* refers to any combustion equipment that 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 required to calculate your combined release from all sources to determine if you are required to submit a report to NPRI for CACs.

External Combustion Equipment

External combustion equipment is any equipment with a combustion process that occurs at atmospheric pressure and with excess air. This 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. Emission factors for many of these sources can be obtained from FIRE, WebFIRE and AP-42. In addition, Environment Canada has developed spreadsheets to assist with reporting for external combustion of various fuel types. These spreadsheets can be accessed through the *NPRI Toolbox*.

Internal Combustion Equipment

Internal combustion units are identified as those in which combustion 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. Emission factors for many of these sources can be obtained from FIRE, WebFIRE and AP-42. In addition, Environment Canada has developed a spreadsheet to assist with reporting for internal combustion of diesel fuel. This spreadsheet can be accessed through the *NPRI Toolbox*.

Storage Tank Emissions

CAC emissions, particularly VOC emissions, may result from any storage tank containing fuels, solvents, hydrocarbons, paints and other solutions that contain VOCs. These fugitive 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 7.

As noted in Figure 9, **when reporting CACs, do not consider fugitive emissions resulting from the distribution, storage or retail sale of fuels, except as part of terminal operations.**

The U.S. EPA's TANKS software, available at <<http://www.epa.gov/ttn/chief/software/tanks/index.html>>, may be used to estimate emissions from storage tanks at terminal operations. Instructions on how to use TANKS are available in the *NPRI Toolbox*.

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. Other sources are described below. 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 thresholds.

- **Storage Piles**

Storage piles are a source of fugitive CAC emissions, because handling the piles generates particulate matter emissions. Pile moisture content, wind speed and proportion of aggregate fines all influence the total emissions released from a storage pile.

Refer to Chapter 13, Section 13.2.4, in the U.S. EPA's AP-42 document for further information on emissions from storage piles (Reference: <www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-4.pdf>). NPRI has developed a spreadsheet for material handling operations to assist with estimating releases from aggregate storage piles; this spreadsheet is available in the *NPRI Toolbox*.

- **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, including those involved in the production of bread, spirits, pharmaceuticals, fuel, beer, wine and environmental bioremediation processes, use the fermentation process. Emission factors and mass balances can be used to estimate CAC emissions from fermentation (Reference:

<www.epa.gov/ttn/chief/ap42/ch09/final/c9s09-6.pdf>). NPRI has developed a spreadsheet for the fermentation process used in breweries, available through the *NPRI Toolbox*.

- **Painting**

VOCs are released from paint during its application and drying. This category includes, but is not limited to, the painting of vehicles, furniture, storage tanks and any other painted product. PM_{2.5} may also be emitted if paint is applied by pulverization.

It is possible to estimate the VOC release by assuming that the entire VOC content of the paint and solvents is released. The percentage of total or individual VOCs in the paint and solvents used is normally listed on the MSDS for the products. If not, you may obtain this information from your supplier. The total release 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 (References: Chapter 4.2 of AP-42 and

<www.epa.gov/ttn/chief/eiip/techreport/volume02/ii07_july2001.pdf>). The coatings' manufacturer can be consulted to determine if an emission factor specific to the product is available.

- **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 PM₁₀ and PM_{2.5}.

Emission factors and mass balances can be used to estimate CAC emissions from abrasive blasting (Reference: <www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-6.pdf>). An abrasive blasting spreadsheet is also available in the *NPRI Toolbox*.

- **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, the gaseous leak would result in a fugitive CAC release. Depending on the properties of a liquid (such as vapour pressure, temperature and pressure), a liquid release may also result in a fugitive CAC release.

Emission factors are available for estimating the release of CAC substances from equipment leaks (Reference: <www.epa.gov/ttn/chief/eiip/techreport/volume02/ii04.pdf>).

- **Solvent Use**

Solvent use includes, but is not limited to, solvent degreasing, waste solvent reclamation, product formulation and commercial solvent use. Many solvents contain VOCs that are released during 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>).

3.9 Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds

3.9.1 Overview

Part 5 substances (speciated VOCs) only need to be reported if the facility's total VOC releases meet the 10 tonne threshold and are reported under Part 4. The key reason for collecting emission data on speciated VOCs is to assist regional air quality modelling. This data also serves the various domestic and international programs described in Section 3.8 that require information on trends and forecasts of emission data.

3.9.2 Substances

The 75 speciated VOCs are listed in Appendix 1. It should be noted that Total Organic Compounds (TOCs) and VOCs do not have the same definition. All VOCs can be considered TOCs; however, not all TOC species are considered VOCs. For example, acetone is considered a TOC but it does not meet the definition of a VOC. If you are using the SPECIATE 3.2 program to calculate your speciated VOC values for Part 5 substances, ensure that you include in your report only the TOC species that meet the VOC definition.

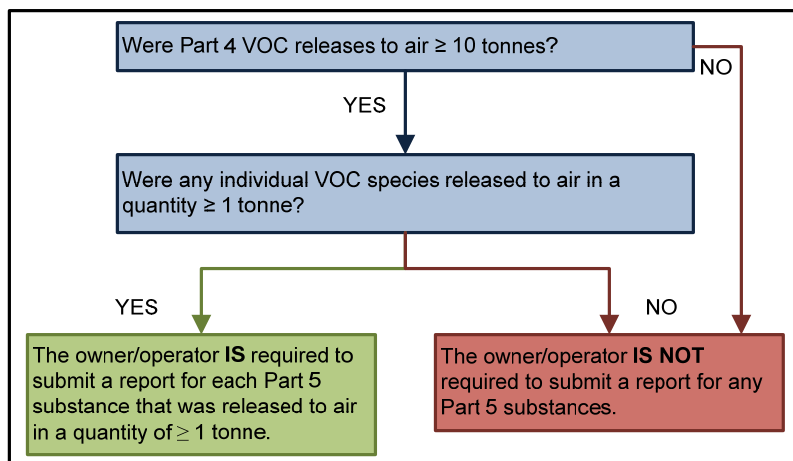
3.9.3 Units

Report quantities for speciated VOCs released to air in tonnes.

3.9.4 Reporting Criteria

If the 10 tonne total VOC threshold was met at your facility, you must report for all VOCs listed in Part 5 that were released to air in a quantity greater than or equal to 1 tonne. Note that if you have reported a speciated VOC listed in Part 5 in a quantity greater than or to equal to 10 tonnes, it may also need to be reported under Part 1A.

Figure 10: Reporting Criteria for Part 5 Substances



You have now 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 releases, disposals and transfers for recycling. Persons reporting to the NPRI are required to retain copies of all information on which their report was based, including any calculations, measurements and other related data, at the facility or at the principal place of business in Canada of the owner/operator of the facility to which the information relates, for a period of three years. That person must inform the Minister of the street address of that place of business and the mailing address, if it is different from the street address.

If You Are Required to Report

If you have determined that you are required to report for your facility, continue to Step 2. Consult the *OWNERS Help* file in order to prepare and submit your NPRI report. If you have questions, contact your regional NPRI office (see page ii).

You are legally required to submit your NPRI report to your regional NPRI office no later than June 1, 2008.

If You Are Not Required to Report

Persons who submitted a report to the NPRI for the 2006 reporting year are legally required to notify Environment Canada prior to the June 1, 2008 deadline, if they are not required to report for the 2007 reporting year.

4. Step 2 – Estimate Releases, Disposals and Transfers for Recycling

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

Information required by the NPRI only needs to be reported if the facility owner/operator possesses the information or may reasonably be expected to have access to the information. **Consequently, NPRI does not require additional monitoring or measurement of the quantities or concentrations of substances released to the environment beyond the monitoring and measurement already required under the provisions of other laws or regulations. If you already monitor or measure emissions under provincial or federal legislation or a municipal by-law, you are required to submit those measurements to the NPRI, as per Schedule 3, Section 1(2) of the *Canada Gazette* notice published March 3, 2007:**

“If the person is required by federal or provincial legislation or by a municipal by-law to measure or monitor releases, disposals and/or transfers for recycling of any of the substances set out in Schedule 1 of this notice [the NPRI substance list], the person shall report that data in response to this notice. If the person is not subject to any of the requirements described, the person shall report information by using one of the following methods: continuous emission monitoring; predictive emission monitoring; source testing; mass balance; published emission factors; site-specific emission factors; or engineering estimates.”

You are, however, required to submit a comprehensive report using the best available data and information in response to the *Canada Gazette* notice.

4.1 Sources of Information

4.1.1 Technical Guides

The References and Bibliography section of this *Guide* 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 example calculations, complete case studies, and calculation spreadsheets for several processes (mainly for estimation of CACs, PAHs, dioxins, furans and HCB), additional guidance (cooling towers, welding, wastewater, wood preservation, CAC estimation, etc.) and descriptions of tools available to assist you with your threshold calculations. These are available in electronic format on the NPRI Web site at www.ec.gc.ca/npri/.

4.1.2 Material Safety Data Sheets

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 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 that may be reportable to the NPRI. Contact your supplier for more detailed information on product composition. If the MSDS sheet lists a range of percentage for a substance (e.g., contains 10-20% nickel) then you should use the mean or average percent when performing your threshold calculations (for the nickel example, you would use 15%).

4.1.3 U.S. EPA Software – FIRE, WebFIRE, AP-42 and SPECIATE

The U.S. EPA's Factor Information RETrieval (FIRE) database contains emission factors for a number of NPRI substances. WebFIRE is the Internet version of FIRE. WebFIRE is located at <http://cfpub.epa.gov/oarweb/index.cfm?action=fire.main>.

In addition, the EPA's *Compilation of Air Pollutant Emission Factors (AP-42)* provides further context for the emission factors listed in the FIRE database. The sector-specific chapters in *AP-42* provide an overview of an industry's processes, its pollution sources and the control measures available to achieve reductions in emissions. These documents can be retrieved at <www.epa.gov/ttn/chief/ap42/index.html>.

SPECIATE (Version 3.2) is the U.S. EPA's repository of TOC and PM speciated profiles for a variety of sources for use in source-apportionment studies. This software can be downloaded at <<http://epa.gov/ttn/chief/software/index.html>>.

4.1.4 Industry Associations

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.

4.1.5 Permits and Certificates of Approval

Municipal, provincial, territorial or regional operating permits and certificates of approval may be another source of information on substances at your facility.

4.2 Method Detection Limit

There are several situations in which the issue of measurements below the method detection limit (MDL) arise 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.

4.2.1 Dealing with Multiple Data Points and Non-detected Values

You 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. You should not estimate releases solely on measurement or monitoring devices; you should also rely on your 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 you have no other reason to believe that the substance was present, you should assume that the concentration of the substance in that process stream was zero.

Where, over a year, multiple measurements were taken and some indicated that the substance was above and some were below the MDL, you have good reason to assume that the substance was present. You should, therefore, use a concentration value of half the MDL for those measurements where the concentration was below the MDL.

4.3 Methods of Estimation

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

- Continuous Emission Monitoring Systems (CEMS) (Code M1 in OWNERS),
- Predictive Emission Monitoring (PEM) (Code M2),
- Source testing (Code M3),
- Mass balance (Code C),
- Site-specific emission factor (Code E1),
- Published emission factor (Code E2), or

- Engineering estimates (Code O).

A description of the available estimation methods is provided below; examples using these estimation methods are provided in the *NPRI Toolbox*.

4.3.1 Continuous Emission Monitoring Systems

Continuous emission monitoring systems (CEMS) record emissions/releases over an extended and uninterrupted period. 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 emissions/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.

4.3.2 Predictive Emission Monitoring

Predictive emission monitoring (PEM) 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 determine 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.

4.3.3 Source Testing

Source testing involves collecting a sample of the emission or effluent, then determining the concentration of one or more substances in the sample. The concentration of the substance(s) of interest is then multiplied by the volumetric flow rate to determine the amount of the substance(s) emitted/released over time. Source testing of air emissions generally involves inserting a sampling probe into the stack or duct to collect a volume of exhaust effluent isokinetically. The contaminants collected in or on various media are 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.

4.3.4 Mass Balance

Mass balance applies 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 differences in input, output, accumulation and depletion of a substance.

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 preferred for some releases, such as solvent use and loss. This method may not be suitable for many other sources, such as cases where chemical transformation of input streams occurs.

Pollution control equipment should be accounted for when mass balance calculations are performed.

4.3.5 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. Government agencies and industry associations publish emission factors to be applied 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 for determining emissions from emission factors are as follows:

$$E_x = BQ \times CEF_x \quad \text{or} \\ E_x = BQ \times EF_x \times \frac{100 - CE_x}{100}$$

Where:

E_x = Emission of contaminant x in kg

BQ = Activity rate or base quantity (BQ), base quantity unit

CEF_x = Controlled emission factors of contaminant x, in kg/BQ (value is dependent on the external control device installed)

EF_x = Uncontrolled emission factors of contaminant x, in kg/BQ

CE_x = Overall emission control efficiency of contaminant x, %

The FIRE database and the *AP-42* are comprehensive repositories of process-specific emission factors, as previously mentioned.

Other emission factors for NPRI substances can be located in the list of Locating and Estimating documents found 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.

4.3.6 Engineering Estimates

In many cases, sound engineering assessment is the most appropriate approach to determining process factors and base quantity values. Releases can be estimated from engineering principles and judgment, by 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, follow these four basic principles:

- 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.
- 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. Review all the default data carefully to ensure that they apply to local conditions. The resulting estimates should also be reviewed to ensure their accuracy. The U.S. EPA's TANKS software, used to estimate VOC releases from storage tanks, is an example of an emission model.

4.4 Part 1A Substances – Core Substances

If the reporting criteria are met for a Part 1A substance, then **all** on site releases, disposals and off site transfers for recycling of that substance must be reported **regardless of the concentration or quantity**. You are 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*.

4.5 Part 1B Substances – Alternate Threshold Substances

If the reporting criteria are met for a Part 1B substance, 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**.

You are required to submit a substance report even if releases, disposals or transfers 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 of some Part 1B substances are provided in the *NPRI Toolbox*.

4.6 Part 2 Substances – Polycyclic Aromatic Hydrocarbons

Depending on the information that is available, there are three options for reporting PAHs. These options are summarized in Table 15. If the 50 kg incidental manufacture reporting threshold for PAHs was met, and information on releases, disposals and transfers for recycling for individual PAHs is available, then those PAHs that are incidentally manufactured and released, disposed of or transferred for recycling in amounts ≥ 5 kg must be reported **individually**.

If information on individual PAHs from some processes is available, and only information on total PAHs from other processes is available, then information on individual PAHs in amounts ≥ 5 kg **and** information on total PAHs should be reported.

If the only information that is available is for total PAHs, then total PAHs should be reported under "PAHs, total Schedule 1, Part 2" in OWNERS.

Example:

A facility has three processes that release PAHs and the total PAH releases are ≥ 50 kg. Emission factors for individual PAHs exist for the first process, an emission factor for total PAHs and a profile for individual PAHs are available for the second process, and an emission factor for total PAHs is available for the third process. Releases of individual PAHs should be calculated for the first process. For the second process, releases should be calculated by using the total PAH emission factor and applying the results to the profile. Releases of individual PAHs from the first and second processes should be added together and

reported. For the third process, releases calculated using the total PAH emission factor should be reported under “PAHs, total Schedule 1, Part 2.”

Table 15: How to Report PAHs

Type of Information Available	Comparison to Thresholds	What to Report
Quantities of individual PAHs	Add quantities of individual PAHs. If the total is ≥ 50 kg, reporting is required. Any individual PAHs in quantities ≥ 5 kg are required to be reported.	Report individual PAH quantities that are ≥ 5 kg. Quantities of individual PAHs < 5 kg are not required to be reported.
Combination of quantities of individual PAHs and quantity of total PAHs	Add quantities of individual and total PAHs. If the total is ≥ 50 kg, reporting is required. Any individual PAHs in quantities ≥ 5 kg are required to be reported. Total PAH quantities must also be reported.	Report total PAHs (do not include quantities of individual PAHs in total PAHs). Report quantities of individual PAHs that are ≥ 5 kg. Quantities of individual PAHs < 5 kg are not required to be reported.
Quantity of total PAHs	If the total is ≥ 50 kg, reporting is required.	Report total PAHs.

In order to avoid double counting when reporting both PAHs individually and total PAHs, the **quantities of individual PAHs that are reported separately should not be included in the quantities reported for “PAHs, total Schedule 1, Part 2.”** Also note that two PAHs are listed separately as Part 1A substances – anthracene (CAS No. 120-12-7) and naphthalene (CAS No. 91-20-3). **Do not include release, disposal and transfer for recycling quantities of anthracene and naphthalene when reporting for “PAHs, total Schedule 1, Part 2.”**

If your facility is involved in wood preservation, then a report must be submitted for PAHs released, disposed of or transferred 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.

An example of estimating releases and disposals of PAHs is provided in the *NPRI Toolbox*.

4.7 Part 3 Substances – Dioxins, Furans and Hexachlorobenzene

The owner/operator of a facility where the criteria for reporting Part 3 substances were met must provide substance reports for dioxins, furans and HCB, indicating the following:

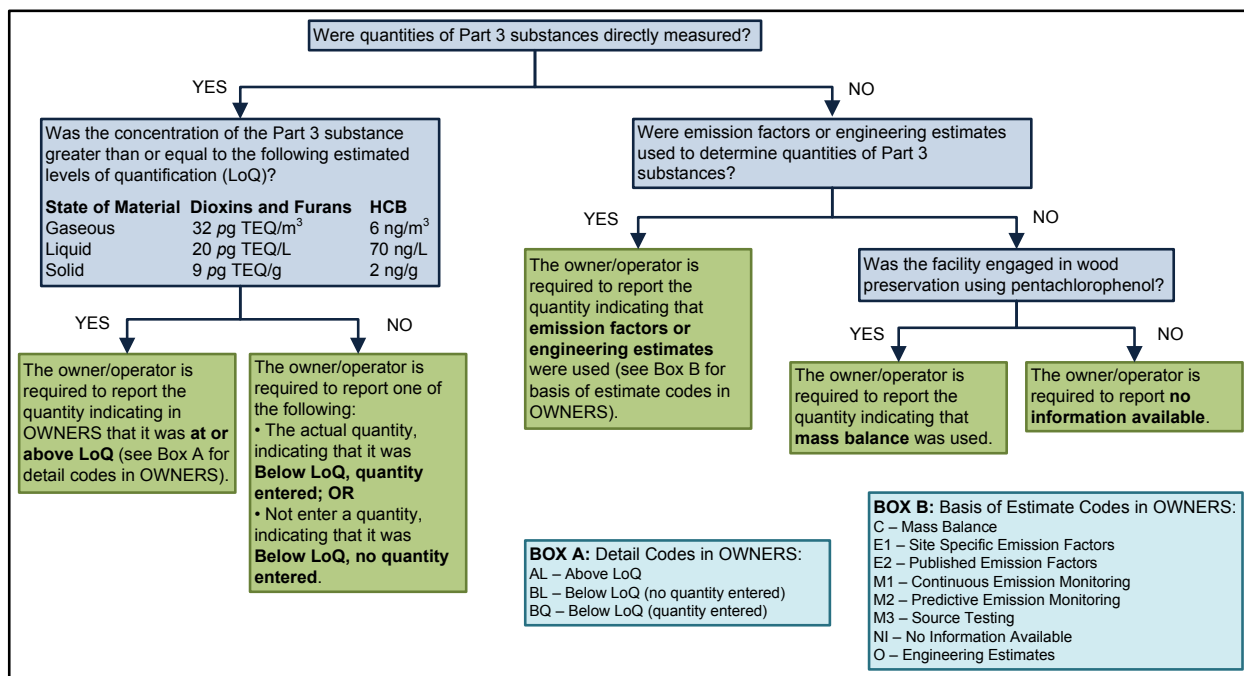
- the **quantity** released on site, disposed of or transferred off site as the result of incidental manufacture during an activity listed in Tables 5 or 11, and
- that **directly measured releases to a specific medium, disposals or transfers** were at concentrations above, equal to or below the level of quantification (LoQ) concentrations set out in Table 17 (this option is available only if estimates were based on CEMS, PEM or source testing), or
- that there were **no releases to a specific medium, no disposals or no transfers**, 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 must be reported unless:

- you directly measure dioxins, furans and HCB resulting from incidental manufacture from an activity listed in Tables 5 or 11, and the concentrations were below the LoQ values as defined in Table 17, or
- you have no information available on which to base estimates of on site releases, disposals and off site transfers.

Use Figure 11 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, as well as disposals and off site transfers.

Figure 11: How to Report Dioxins, Furans and HCB



4.7.1 Methods of Estimation

When you report on site releases, disposals and off site transfers for recycling of dioxins, furans and HCB, one of the following methods of estimation must be selected in OWNERS:

- Continuous Emission Monitoring Systems (CEMS),
- Predictive Emission Monitoring (PEM),
- Source testing,
- Mass balance,
- Site-specific emission factor,
- Published emission factor, or
- Engineering estimates.

In addition to the methods above, another option exists:

- No information available (code NI in OWNERS)

This code is explained below. Table 16 indicates whether or not the quantities of these substances need to be reported based on the method of estimation in combination with the LoQ.

Direct Measurements

Direct measurements include CEMS, PEM and source testing. Direct measurements should be made for on site releases, disposals and off site transfers for recycling that are representative of the facility's normal operating conditions or production levels.

If you have conducted direct measurements of dioxins and furans or HCB at your facility, these data should be used to determine which releases, disposals and transfers for recycling, if any, must be reported. As shown in Table 16, when direct measurements have been conducted, the quantities of dioxins, furans and HCB released to the environment need to be reported only if the measurements were at or above the LoQ. There is a field in OWNERS to indicate whether your measured concentrations were above, equal to or below the LoQ. 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.

Table 16: How to Report Dioxins, Furans and HCB

Method of Estimation	Comparison to LoQ	Report Quantity?
CEMS, PEM or source testing	at or above LoQ	yes
CEMS, 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	n/a	n/a

Level of Quantification

The level of quantification (LoQ) is defined in section 65.1 of the *Canadian Environmental Protection Act, 1999* (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 17 lists estimated LoQs for dioxins, furans and HCB for three types of material or waste streams – gaseous, liquid and solid. The LoQ values include both final and draft values published by Environment Canada. You must compare your 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.

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, indicate in OWNERS that concentrations were at or above LoQ by selecting the detail code “AL.”

Measured Concentrations Below LoQ

If dioxins, furans or HCB in a release, disposal or off site transfer resulting from incidental manufacture during an activity listed in Tables 5 or 11 were directly measured, and the concentrations were below the LoQ, reporting the quantities released, disposed of and transferred for recycling is optional. If you choose to report the values even though they are below LoQ, choose the “BQ” detail code; if you are not entering a quantity because your values were below LoQ, choose the detail code “BL”.

Table 17: Estimated LoQ Values for Concentrations of Dioxins, Furans and HCB

State of Material	Estimated LoQ	
	Dioxins and Furans ⁽¹⁾	HCB
Gaseous ⁽²⁾	32 pg TEQ/m ³	6 ng/m ³
Liquid ⁽³⁾	20 pg TEQ/L	70 ng/L
Solid ⁽⁴⁾	9 pg TEQ/g	2 ng/g

(1) See Appendix 6 “Dioxin and Furan Toxic Equivalents” for an explanation of the LoQ units for dioxins and furans.

(2) Environment Canada, 1999. Use these values to determine whether concentrations in releases to air from stacks and other sources were above, equal to or below the LoQ.

(3) The LoQ for concentrations of dioxins and furans in liquids was extrapolated from the effective LoQ for 2,3,7,8-TCDD in Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations. Use 70 ng/L as the estimated LoQ for concentrations of HCB in liquids (Environment Canada, 1997).

(4) Environment Canada, 2000. Use these values to determine whether concentrations of dioxins and furans or HCB in solid materials were above, equal to or below the LoQ. Incinerator bottom ash, pollution-abatement residues and sludge are examples of solid materials containing dioxins and furans or HCB.

Example:

Total dioxins and furans directly measured at a concentration of 20 pg TEQ/m³ in stack gases is below the LoQ of 32 pg TEQ/m³, so the owner/operator is not required to report the quantities of dioxins and furans released on site from stacks. The owner/operator can report that releases to air of dioxins and furans from the stack were below the LoQ (BL).

Detail Codes

Detail codes are required and only available for dioxins, furans and HCB reports. A detail code is required only if the release, disposal or recycling data were obtained through direct measurement or monitoring. The detail code is used to indicate if your measured concentrations are above, equal to or below the LoQ. The detail code field is adjacent to the “Basis of Estimate” field in OWNERS. Three detail codes are available:

AL: At or Above LoQ – the measured concentration was equal to or greater than the LoQ –

If chosen, you must enter the quantity of the substance that was released, disposed of, or transferred for recycling.

BL: Below LoQ (no quantity entered) – the measured concentration was below the LoQ –

This indicates that the substance may have been present but the facility did not quantify the amount that was released, disposed of, or transferred for recycling.

BQ: Below LoQ (quantity entered) – the measured concentration was below the LoQ –

If chosen, this indicates that you have opted to report the quantity of the substance that was released, disposed of, or transferred for recycling based on a measured concentration that was less than the 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 Section 4.2 “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 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, you should estimate releases, disposals or transfers of dioxins and 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 11 are compiled in the FIRE database (refer to the *NPRI Toolbox*.) In the comments field of OWNERS, you should indicate the source of any emission factor used. If an emission factor for your activity is available in the FIRE database or another reputable source, but is not applicable to your process or equipment, you must provide your reason in the comments field.

If you use emission factors, you must report these amounts. You cannot report that your concentrations were below the LoQ.

No Information Available

If information is not available for releases, disposals or transfers for recycling, either through direct measurements, emission factors or some other source, then you should report "No information available" If you report "No information available" for an activity for which an emission factor is available, you must provide your reason for not using the emission factor in the comments field in OWNERS.

4.8 Part 4 Substances – Criteria Air Contaminants

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

You may be required to break down the releases for each stack greater than or equal to 50 metres above grade **if the stack-specific release threshold is met**. The stack-specific thresholds are provided in Table 18 for all CACs. The rationale for stack-by-stack breakdown of CAC emissions is provided in Appendix 8 "Data Requirements for Regional Air Quality Modelling."

Table 18: Stack-Specific Reporting Thresholds for Stacks \geq 50 m Above Grade

Substance Name	Stack Release Threshold (tonnes)
Oxides of nitrogen (expressed as NO ₂)	5
Sulphur dioxide	5
Carbon monoxide	5
Volatile organic compounds	5
Total particulate matter	5
PM ₁₀	0.25
PM _{2.5}	0.15

Example:

If your facility emissions meet the reporting criteria for NO_x (20 tonnes) by emitting 25 tonnes and there is a stack greater than 50 metres above grade that emitted 7 tonnes of NO_x then:

- 25 tonnes of NO_x must be first reported for total NO_x releases;

- 7 tonnes of NO_x must be reported under the stacks requirement because it exceeded the stack-specific threshold for NO_x (5 tonnes).

4.9 Part 5 Substances – Speciated Volatile Organic Compounds

Reporting for Part 5 substances needs to be considered only if the facility emissions meet the Part 4 total VOC reporting requirements. Reporting is required if the Part 5 substances were emitted to air in a quantity greater than or equal to 1.0 tonne. Speciated VOCs that not on the Part 5 substance list may also be reported in the comment field available in OWNERS.

4.9.1 Stack-specific Speciated Volatile Organic Compound Reporting

Reporting on a stack-by-stack basis for stacks greater than or equal to 50 metres above grade is only required if stack-by-stack reporting is required in Part 4 (i.e., total VOCs ≥ 10 tonnes and stacks ≥ 50 metres above grade with ≥ 5 tonnes VOCs emissions). In this case, Part 5 substance reporting is subdivided into two categories: releases from stacks greater than 50 metres above grade and releases from all other sources.

Example:

A facility emits 28 tonnes of VOC to air, 7 tonnes of which are emitted from a stack 65 m above grade. The remaining 21 tonnes are from storage/handling, fugitive releases, spills and other non-point sources. Three tonnes of styrene are released to air, 0.4 tonnes of which are from the 65 m stack.

The reporting requirements are as follows:

- The reporting threshold for total VOCs is 10 tonnes released to air. Since the facility released 28 tonnes of VOC to air, it exceeds the threshold and a report for VOCs under Part 4 is required.
- VOC emissions from stacks ≥ 50 metres above grade that release ≥ 5 tonnes of VOCs are required to be reported. This facility has a 65 m stack which released 7 tonnes of VOCs. The stack-specific threshold has been met and the 7 tonnes of VOCs released must be included under the facility's stack reporting.
- Styrene is a Part 5 substance. The styrene release of 3 tonnes exceeds the 1 tonne release threshold for a Part 5 substance. Since the total VOCs and stack-specific mass thresholds have been met, the information must be reported as follows: 0.4 tonnes released from the 65 m stack, and 2.6 tonnes released from "Other Sources."

4.9.2 Isomer Groups

Isomer groups listed in Part 5 must be reported as an aggregated total. There are only 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, which is listed separately in the first subgroup, "Individual Substances," of the Part 5 list.
- The listing for trimethylbenzene includes all isomers, except 1,2,4-Trimethylbenzene, which is also listed separately in the first subgroup of the Part 5 list.

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

4.9.3 Other Groups and Mixtures

With respect to "other groups and mixtures," you must report emissions for the mixtures listed on the Part 5 substance list. While not required, if information is available on other individual VOCs contained in a mixture or group (and not listed in Part 5), this information may be provided in the comments field in OWNERS.

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 information in your possession or to which you have reasonable access.

5.1 Facility Information

The facility information required includes the company's legal and trade name, address, business number, the number of employees, the nature of the facility's business, and, if the facility is portable or reporting for the first time in 2007, then latitude and longitude coordinates must be reported. Contact information, including the technical contact and the company official certifying the NPRI report, is also required. In addition, any facility that is reporting for a CAC must provide the facility's operating schedule. Finally, pollution prevention plans implemented or prepared in 2007 can be identified. More information on the facility-related screens in the reporting software is available in the *OWNERS Help* file.

5.1.1 Contacts

A *technical contact* is the person who prepared the report and who will be able to answer any questions pertaining to the contents of the report. Environment Canada will attempt to get in touch with the technical contact (if no coordinator is identified) in regards to any questions about the NPRI report.

A *coordinator* is the person who is responsible for preparing and submitting more than one NPRI report for the same company. This person has the same responsibilities as the technical contact (e.g., answering technical questions about data) but the coordinator is responsible for answering any technical questions concerning **all** of the NPRI reports that the person filed. Environment Canada will contact the coordinator with any questions about the NPRI report.

A *signing official* is the person who signs their name electronically to the NPRI report. **This person is legally responsible for the contents of the NPRI report.**

A *public contact* is the person responsible for answering any questions from the public concerning the report. This person's name will appear on the NPRI website as the contact for the facility. Environment Canada will not get in touch with the public contact unless the contact information for the technical contact or coordinator contact becomes invalid.

5.1.2 Business Number

The company's business number (BN) must be reported. 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 Goods and Services Tax.

5.2 Substance Information

The substance information required 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, 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.

5.2.1 Releases, Disposals and Transfers as Defined by NPRI

While the *OWNERS Help* file goes into greater detail describing the various categories to which NPRI substances are reported, the following information about NPRI reporting categories is provided to give you a general understanding of what constitutes an on site release, disposal or off site transfer for recycling in the context of NPRI reporting. Four categories are described below – on site releases; final disposal activities (on site and off site); off site transfers for treatment prior to final disposal; and off site transfers for recycling and energy recovery.

On Site Releases

An on site release is a discharge of an NPRI-listed substance to the environment within the physical boundaries of the facility. This includes:

- emissions to air – discharges through a stack, vent or other point of release, losses from storage and handling of materials, fugitive emissions (releases that cannot be captured and releases that are unintentional), spills and accidental releases, and other non-point releases,
- releases to surface waters – discharges, spills and leaks, but not including discharges to municipal wastewater treatments plants (which are reported under off site transfers for treatment), and
- releases to land – spills, leaks and other releases.

Final Disposal Activities (On Site and Off Site)

The following are considered to be final disposal:

- landfill, land treatment – for the purpose of land application or land farming,
- underground injection, and
- storage (for off site disposal only).

Off Site Transfers for Treatment Prior to Final Disposal

An NPRI-listed substance may be transferred to a location off the facility site for treatment prior to final disposal. Treatment processes include:

- physical treatment (e.g., drying, evaporation, encapsulation or vitrification),
- chemical treatment (e.g., precipitation, stabilization or neutralization),
- biological treatment (e.g., bio-oxidation),
- incineration or thermal treatment, where energy is not recovered, and
- treatment at a municipal sewage treatment plant.

Off Site Transfers for Recycling and Energy Recovery

An NPRI-listed substance may be transferred to a location off the facility site for recycling and energy recovery. Recycling refers to activities that keep a material or a component of the material from becoming a waste destined for final disposal. Ten types of recycling operations are identified:

- energy recovery,
- recovery of solvents,
- recovery of organic substances (not solvents),
- recovery of metals and metal compounds,
- recovery of inorganic materials (not metals),
- recovery of acids and bases,
- recovery of catalysts,
- recovery of pollution abatement residues,
- refining or re-use of used oil, and
- other recovery, re-use or recycling activities.

An NPRI substance may be sent for energy recovery when the substance or the material containing it has sufficient energy content to allow its use as an alternative to fossil fuels or other forms of energy.

5.3 Retain a Copy of the Information on Which Your NPRI Report was Based

The owner/operator of a facility is required to retain copies of all information on which their report was based, including any calculations, measurements and other related data, at the facility or at the principal place of business in Canada of the owner/operator of the facility to which the information listed previously relates, for a period of three years. Where the owner/operator chooses to keep the information required under the notice, plus any calculations, measurements and other data, at the principal place of business in Canada, that person must inform the Minister of the street address of that place of business and the mailing address, if it is different from the street address. **These are legal requirements**, pursuant to subsection 46(8) of the *Canadian Environmental Protection Act, 1999* (CEPA 1999), and the *Canada Gazette* notice published March 3, 2007.

5.4 Requests for Confidentiality

Reporting to NPRI is governed by the requirements of the CEPA 1999, as well as the *Canada Gazette* notice.

Pursuant to section 51 of CEPA 1999, any person who provides information in response to the *Canada Gazette* notice may submit, with their information, a written request that it be treated as confidential, based on the reasons set out in section 52 of CEPA 1999. With regard to information submitted to NPRI, section 51 of CEPA 1999 allows any person to submit a written request with the information, setting out the reason(s) referred to in section 52 (see below), that the information should be treated as confidential. Section 52 of the CEPA 1999, provides that:

“... 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.”*

The person requesting confidential treatment of the information must indicate which of the reasons in section 52 of CEPA 1999 applies to their request. The person 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 will be denied if the data are already in the public domain.**

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.**

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 documentation that would justify that the information submitted should be confidential as per the criteria outlined in section 52 of CEPA 1999.

If documentation is not provided with the claim or if the documentation 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 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 section 53(3) of CEPA 1999.

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 should be sent in double envelopes, excluding the courier outer envelope.
- The outside envelope should be unmarked except for mailing and return addresses and postage.
- 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 (see page ii).

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Questions and Answers

- 1. Is the owner/operator of 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 polycyclic aromatic hydrocarbons (PAHs), dioxins, furans, hexachlorobenzene (HCB) and criteria air contaminants (CACs) are all different and may be activity- or release-based. Once the substance-specific reporting criteria are met, you must report regardless of the amounts released, disposed of or transferred, even if the amount is zero.

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

Yes. If the reporting criteria were met and the facility 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. These factories 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 (assuming they are owned by one company) a facility?**

Under NPRI, a facility can be a contiguous facility, a portable facility, a pipeline installation or an offshore installation (see Section 3.2 “Facility Criteria” for the definitions of these facility types). A ship is not a contiguous facility or a portable facility as defined under the notice, because it is not stationary nor is it located on a single site. Portable facility means portable PCB destruction equipment, portable asphalt plants, and portable concrete batching plants. Further, a ship cannot be classified as a pipeline installation. The definition of offshore installation does include ships only if the ship is directly related to the exploitation of oil and gas. Since the ships in question are in the fish 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. Is an NPRI report required?**

The facility is processing the chemicals. Therefore, if the threshold criteria for reporting are met, you 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 vehicle and is therefore exempt, however painting and/or stripping the barge would require reporting NPRI substances.

- 5. Does the determination of a full-time employee “equivalent” include the hours worked by sales staffs 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, including students, part-time and term employees, owners of the facility who performed work on site at the facility, clerical staff, sales staff and persons such as contractors who performed on site work related to the operation of the facility. It also includes paid vacation, overtime and sick leave. **Do not** include contractors that work at the facility on a non-routine basis. However, you must include the NPRI substances they bring on site if you determine that you are required to report.

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

Total the hours worked by all people, including contractors who are performing work related to the operations of the facility. The total number of hours worked includes paid vacation and sick leave. 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 systems discharging an annual average of 10 000 m³ or more per day into surface waters, all NPRI substances must be considered, regardless of the hours worked by employees.

If the facility is a pit or quarry and the production exceeds 500 000 tonnes, all NPRI substances must be considered, regardless of the hours worked by employees.

Furthermore, 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 NPRI for CACs if **all three** of the following criteria are met:

- the only releases to air occurred from stationary external combustion equipment,
and
- the cumulative nameplate capacity of that equipment was less than 10 million BTU/hour;
and
- the only fuel combusted in that equipment was commercial grade natural gas, liquefied petroleum gas, 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. You 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 of the facility who performed work on site at the facility and a person such as a contractor, who, at the facility performs work on site at the facility that is related to the 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 the 20 000 hour threshold is exceeded?

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 person who owns or operates the facility as of December 31 of the calendar year is responsible for submitting the report for that year if the criteria for reporting are met. Transfers of ownership must ensure that information for NPRI reporting for the entire calendar year is available.

In addition a facility is required to notify Environment Canada, in writing, of any changes to contact information or changes in ownership within 30 days following the change. These changes may include telephone numbers, email addresses, mailing addresses, facsimile numbers, change in technical contact, etc.

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

The *Canada Gazette* 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. Who is considered a "parent company"?

The "parent company" means the highest level company or group of companies that owns or directly controls the reporting facility. The parent companies of interest to NPRI are those Canadian companies that have greater than 10% ownership in the company. For example, CNS Corporation has five owners, but one of the owners is American and the other four are Canadian. In this case, only the Canadian 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 owner/operator make threshold determinations and report to NPRI?**

When determining thresholds and reporting, you 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. Should one NPRI report be filed for all three plants or should three separate reports be filed?**

The facilities are not adjacent to one another so a report is required for each facility that met the reporting criteria; their activities cannot be combined. In this case, the plant in Ontario will not have a report for methanol, but the other two will since the 10 tonne threshold is met.

In addition, since methanol is a VOC, you must include any methanol released to air in the calculation of the facility-wide total VOC air emissions reported under Part 4. If the facility-wide total VOC release is greater than or equal to 10 tonnes, you would also be required to report the amount of methanol released to air (if greater than 1.0 tonne) under Part 5.

- 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?**

Yes. You must include in your threshold calculations all quantities of NPRI substances manufactured, processed or otherwise used or released to the atmosphere by contractors if those activities are relevant to the purpose of the facility. You must also include any contractor vehicles brought on site as a result of a request by the facility owner/operator in determining the vehicle kilometres travelled threshold for the reporting of road dust. The road dust created by these vehicles is a result of the facility operations made by the facility and should therefore be included.

- 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 is not considered an article, since NPRI substances can be released under operating conditions. 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. If additional fluid is used in refilling the process equipment it must also 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. 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.

For example, if 100L of an NPRI substance is spilled and 80L is recovered, a release of 20L must be reported. If the 80L is returned to the process, no further action is required. However, if it is sent off site for treatment or disposal, it must be reported accordingly.

- 21. Can we use our own software to report electronically to NPRI?**

Environment Canada supplies an online system for reporting called OWNERS, which must be used to submit an NPRI report.

A copy of the OWNERS XML schema is available upon request for people wishing to develop files to be imported into OWNERS.

- 22. 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 off site of methanol, regardless of the process stream.

In addition, since methanol is a VOC, you must include any methanol released to air in the calculation of the facility-wide total VOC air emissions reported under Part 4. If the facility-wide total VOC release is greater than or equal to 10 tonnes, you would also be required to report the amount of methanol released to air (if greater than 1.0 tonne) under Part 5 of NPRI.

You may be required to break down the releases for each stack greater than or equal to 50 metres above grade **if the stack-specific quantitative threshold is met**. The stack-specific thresholds are provided in Table 18 for all CACs. For example, if a facility has a stack greater than 50 metres above grade, and both the 10 tonne reporting criteria for VOCs as well as the 5 tonne stack threshold are met, which emitted 2 tonnes of methanol, then the emission quantity of the CAC (i.e. the 2 tonnes of VOC as methanol) from the stack, together with the stack's physical parameters must be reported.

- 23. 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. 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.

- 24. 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.

For example, a facility process uses a catalyst that contains an NPRI substance. When the catalyst is spent, it is sent off site for recovery, then returned to the facility for reuse. The NPRI substance in the catalyst would be included in threshold calculations **each time** it was brought on site. So if the catalyst was bought new at the beginning of the reporting year and was sent off site for recovery and returned to the facility twice in the calendar year, the amount of the NPRI substance in the catalyst would be

counted three times. If the reporting threshold is met, then all releases, transfers or disposals of the substance must be reported. Therefore, the owner/operator would need to report the quantity of the NPRI substance in the spent catalyst as an off site transfer for recovery. The amount reported would be calculated by adding the amount of the NPRI substance in the spent catalyst for both transfers.

25. *Our company is engaged in electroplating and 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, we replaced 20 kg of lead anodes. Is an NPRI report for lead required?*

Yes, as the lead mass and concentration thresholds are met (50 kg and 0.1%). 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 kg, must be used in the threshold calculation, not just the 20 kg consumed in the process. You would then be required to submit a report for the amount of lead that was released or transferred from the site.

26. *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 releases to the environment, disposals or transfers for recycling occur.

An article is a manufactured item that does not release an NPRI substance when it undergoes processing or use. When an article is processed or used and there are no resulting releases, disposals or transfers for recycling, the NPRI substances in that article do not need to be included in the threshold calculation.

However, metal parts, sheets or wires containing Part 1A substances that generate waste during processing or use, such as turnings or blanks, will retain their article status if the waste generated is completely recycled with due care. Due care is considered to have been exercised if no more than 1 kg (0.001 tonne) of a Part 1A NPRI substance is released during the calendar 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, and submerged arc welding), soldering, torch cutting, and quenching, etching and dry grinding. Refer to the *Guidance for the Reporting of Welding Activities* available in the *NPRI Toolbox* for more information on reporting to the NPRI for welding activities.

Typical metal-processing activities that do not revoke article status (assuming due care is exercised in ensuring 100% recycling of Part 1A substances) include mechanical cutting, stamping, bending, punching, machining, shearing and cold extrusion.

27. *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?*

In this case, welding rods lose their article status since they are consumed during the welding process and would, therefore, be reportable if the threshold for those substances are met. The welded metal parts retain their article status, so the NPRI substances contained in them do not have to be included in the threshold calculations. Refer to the *Guidance for the Reporting of Welding Activities* for more information on reporting to NPRI for welding activities.

NPRI substances contained in the paints and glues would be reportable if the threshold criteria are 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.

28. *Is the use of fuel exempt from the reporting requirements?*

No. The use of fuel is not implicitly exempt from reporting requirements. If the threshold criteria are met, the 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 as part of a facility; therefore, they are not to be included in the calculation of the reporting threshold.

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

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.

A typical bulk solution of CCA (50% concentrate) contains 12.30% Cr, 7.39% Cu and 11.09% As, by weight. A facility process 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.

30. *Should fugitive dust from tailings dams and tailings impoundments be reported to 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.

31. *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.

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

Yes. Stope filling for ground control is part of the extraction process and is therefore included as a mining activity. All NPRI substances are reportable from mining activities if the thresholds are met.

33. *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 use. However, the refractory bricks lose their article status if during 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.

34. *Our ore-processing facility uses greases and fuels in many machines used in the beneficiation 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 "other use." The air releases emitted by these materials would have to be considered for Parts 4 and 5 substance reporting requirements.

35. *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.

36. 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, transfers or disposals of copper from your facility would also have to be reported.

37. We use zinc sulphate, zinc oxide and zinc separately. 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).”

38. Is fuel used for fire-training purposes reportable to 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, a stationary combustion unit operated at the facility does not qualify for the exemption (see Question 6 for explanation), and CAC releases from the combustion unit must be reported if any of the CAC mass thresholds were met.

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 requirements. 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.

39. 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 does not meet reporting requirements if it does not manufacture, process or otherwise use NPRI substances. Transfer of NPRI substances between containers is considered processing and thresholds would have to be calculated. Wholesale distribution is exempt, provided there are no releases of NPRI substances.

40. 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.

41. 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 a value based on the best available information in your possession if you know that the substance is being released or transferred. You must collect your facility information and identify the substances for which a report is required. You would report “zero” releases, disposals or transfers only if it is known that these substances were not released, disposed of or transferred.

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

42. What needs to be considered when calculating the annual threshold quantity of an NPRI substance for a soaking bath used for metal cleaning, degreasing or metal plating (electroplating) operations?

Metal cleaning and metal plating baths are considered an “other use” of an NPRI substance, relevant to the purpose 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 threshold is

exceeded, you would only report releases, disposals and transfers of the individual NPRI substance(s), even if releases, disposals and transfers are determined to be zero.

43. 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 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.

44. 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), Anthrophyllite (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.

45. 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 (smoke). Because vapours and fumes are different, this process would not be considered a reportable activity unless the condensation creates fumes or dust.

46. 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 NPRI reporting.

47. Our process uses metal grinding wheels which undergo regular abrasion. Would NPRI substances in these wheels or emitted in the air by 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.

48. 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 "other use" (Part 1 substances) or as air releases (Part 4 and 5 substances).

49. 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 nor produce specialty chemicals. However, if the quality control lab operates stationary combustion equipment then you must report for each CAC released from the stationary combustion equipment that exceeded the release threshold.

50. 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.).

51. 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 a concentration of less than 1%. 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 of

chlorine dioxide. The subsequent dilution of the chlorine dioxide does not affect the threshold calculation.

52. 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 use, are considered “articles” and are not subject to reporting. However, the item loses its article status if NPRI substances are released. Also, if you recycle lead-acid batteries by crushing and removing the lead, the batteries cease to be articles and the NPRI substances they contain must be considered in the threshold calculation.

53. 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.

54. We use 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 a location off the facility site 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 of toluene must also be reported. In addition, any toluene released to air must be included in the calculation of the facility-wide total VOC air emissions under Part 4 (Part 4 threshold for total 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 1.0 tonne.

55. 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).

56. 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 portable facility, a pipeline installation or an 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, process or use unrelated products and if they do not share common operations as part of an integrated site. Characteristics of an integrated site include, but are not limited to, common shipping/receiving equipment, common administrative staff, common management or common contact information.

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

If the criteria for reporting to NPRI are met, then reporting to the NPRI is mandatory as per section 46 under 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 for the previous calendar year by June 1 of the following year, if reporting is required. For example, the NPRI report for the 2007 calendar year is due on June 1, 2008. There is a *Compliance and Enforcement Policy* for the CEPA 1999, which dictates how regulations and notices are enforced. The *Canada Gazette* notice, 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>.

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

A wastewater 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 NPRI reporting.

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

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

If the companies are owned or operated by the same person or controlling parties and function as a single integrated site, they must report as one facility. If they do not meet both of the above conditions, they must perform separate threshold calculations and report as separate facilities.

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

There are no exemptions for substances regulated under other legislation.

61. Is a solid-waste landfill required to report to NPRI?

For Parts 1 to 3 substances, the definition of "other use" includes disposals or releases of that substance which is not included in the definition of "manufacture" or "process". For Parts 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 meets 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 VOC releases to the atmosphere. A report is needed for these substances if the threshold criteria are met.

62. 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 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.

63. 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.

64. 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 throughout the calendar year (i.e., during annual leak test). 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.

65. *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.

66. *As part of our process equipment, we have 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 NPRI substances they contain?*

No. An article is “a manufactured item that does not release an NPRI substance, when it undergoes 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.

67. *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.”

68. *What is considered a portable facility and how do I report latitude and longitude coordinates for my portable facility if I move it from one location to another over the calendar year?*

Portable facilities are defined as portable PCB (polychlorinated biphenyls) destruction equipment, portable asphalt plants, and portable concrete batching plants. If you operate any of these three portable facilities, then you are required to look at the NPRI thresholds and report emissions if the thresholds are met. The thresholds shall be based on the cumulative values for all the “portable” locations during the year.

Owners/operators of portable facilities will be required to submit emission/transfer information **once for the entire calendar year** by adding up emissions/transfers from all operating locations, and submitting the totals in OWNERS (one value per substance). In OWNERS, you will create a report for the emissions/transfers from the location where the portable facility **operated for the longest period of time in the year**. This is also the location that you must provide latitude and longitude coordinates in OWNERS. For all other locations where the portable facility operated during the year, you will enter the date, address and latitude/longitude coordinates in the facility level comment section of OWNERS.

69. *Our facility conducted stack tests four (4) years ago and used that information to prepare the emission values for our NPRI report. Our production in the following years has been within 10% of the year in which the testing was conducted, therefore, can the same emission values as 4 years ago be reported for each of the reportable substances?*

No, the NPRI requires that emission values be calculated each year. The stack test data from four (4) years ago can be used to create facility specific emission factors for each substance tested. These emission factors can then be used along with the facility’s current year’s production data to calculate new emission values, provided the stack test data is still the best available and applicable data accessible to the facility.

70. Our facility has a large outdoor firing range where lead and other projectiles are captured in a soil berm at the end of the range. Every three years all the projectiles are removed from the berm and recycled. How does this get reported to the NPRI?

For the two (2) years where the projectiles remain in the berm the facility would report the amount of projectiles fired as a release to land. So if in the first year 1 tonne of lead projectiles were spent and in the second year 3 tonnes of lead projectiles were spent, the facility would report 1 and 3 tonnes respectively as being a release to land, which would be identified in OWNERS as “others”. Then if in the third year an additional 2 tonnes of lead projectiles were spent but the berms were cleaned (yielding 5.5 tonnes of lead projectiles) the facility would report 5.5 tonnes of lead recycled in OWNERS under the “recovery of metal and metal compounds”.

71. Our facility uses many different compounds and substances, all of them contain some concentration of NPRI substances. Although we can look at all the MSDSs we have to determine if an NPRI substance is present at greater than the 1% threshold it is easier for us to include all concentrations in our MPO threshold calculations. This saves us days of effort and reviewing over 10 000 MSDSs. Is this procedure acceptable to the NPRI?

Yes. Although the NPRI has a concentration threshold for a majority of its substances, a facility can always decide to go beyond what is required and include all concentrations in their threshold calculations. Remember that once the MPO threshold is met all concentrations of the substance need to be considered when calculating the releases, disposals and transfers for that substance, not just those greater than or equal to 1%.

72. If June 1 is on either a Saturday or Sunday, is a report still on time if submitted on the next business day (Monday)?

Yes, the reporting deadline is midnight PST on June 1, however if June 1 falls on a Saturday or Sunday the reporting deadline is extended to midnight PST the following business day. Any report submitted after this time is considered late and considered an offence under CEPA 1999. Every person who commits an offence under section 272 of the Act is liable:

- a) on conviction on indictment, to a fine of not more than \$1,000,000 or to imprisonment for a term of not more than three years or to both; and
- b) on summary conviction, to a fine of not more than \$300,000, or to imprisonment for a term of not more than six months, or to both.

Glossary

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

ambient means surrounding, or on all sides. For example: The air outside surrounding the facility or city is ambient.

alloy means 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 I of the *Canada Gazette* notice when it undergoes processing or other use.

base metal means copper, lead, nickel or zinc. It does not include aluminum or any other metals.

biomedical or hospital waste refers to waste 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). See Appendix 3 “Definition of Biomedical Waste” for more information.

boiler is an external combustion unit that 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 or disposed of.

carbon monoxide is a colourless, odourless, poisonous gas 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 inert gases.

contiguous facility means all buildings, equipment, structures and stationary items that are located on a single site; or on contiguous sites or adjacent sites that are owned or operated by the same person and function as a single integrated site, and includes wastewater collection systems that release 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 a substance to landfill, land application or underground injection, either on the facility site or at a location off the facility site, and includes treatment at a location off the facility site prior to final disposal.

emission means, for the purposes of reporting criteria air contaminants (CACs) to NPRI, any discharge of a CAC to air.

emission factors mean numerical values that relate the quantity of substances emitted from a source to a common activity associated with those emissions, and can be categorized as:

- a) **published emission factors**, which are those that have been published by the Government of Canada, or another government or an industry association for application to an emission source that falls under the jurisdiction of the Government of Canada, or another government or to emission sources of a specific industry sector;
- b) **site-specific emission factors**, which are those that have been developed by an individual facility using their own specific emission testing data and source activity information.

employee means an individual employed at the facility, and includes the owner of the facility who performs work on site at the facility, and a person, such as a contractor, who, at the facility, performs work that is related to the operations of the facility, for the period of time the person is performing that work.

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

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

fermentation means the use of yeast to break down complex organic compounds, as 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 individuals employed at the facility, and the total hours of paid vacation and of sick leave taken by individuals 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, such as a contractor, who at the facility, performs work related to the operations of the facility.

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

hazardous waste includes waste substances whose nature and quantity makes them potentially dangerous to human health and/or the environment, 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 uniform 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 I of the *Canada Gazette* notice, and includes the coincidental production of a substance listed in Schedule I, as by-product 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 NO₂) includes nitric oxides (NO) (CAS No. 10102-43-9) and nitrogen dioxide (NO₂) (CAS No. 1012-44-0). Nitrogen and oxygen in air at high temperatures can combine to form nitrogen oxides (NO_x). Furthermore, fuel combustion at high temperatures and industrial processes produce NO_x. In addition, the nitrogen content found in fuels also increases the amount of NO_x produced.

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

number (or Type) 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 vaporizing pot-type burners. Type 2 fuel oil is a heavier distillate than Type 1, and is intended for use in medium-capacity, commercial-industrial burners, where ease of handling and availability justify 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 that is related to the exploitation of oil or natural gas and that is attached or anchored to the continental shelf of Canada or within Canada's exclusive economic zone.

other use means, in respect of a substance listed in Schedule 1 of the *Canada Gazette*, any use, disposal or release of that substance 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.

particulate matter means microscopic solid and liquid particles, of various origins, that remain suspended in the air for any length of time. Only filterable PM is reportable to NPRI.

paved road means any road that has semi-permanent surface placed on it such as asphalt or concrete.

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

pit includes excavations open to air for the purpose of extracting sand, clay, marl, earth, shale, gravel, stone or other rock but not coal, a coal bearing substance, oil sands, or oil sands bearing substance or an ammonite shell and includes any associated infrastructure, but does not include a quarry.

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

PM₁₀ 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.

portable facility means portable polychlorinated biphenyl (PCB) destruction equipment, portable asphalt plants, and portable concrete batching plants.

ppm means the concentration in units of parts per million.

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

quarry includes excavations open to air, for the purpose of working, recovering and extracting stone, limestone, sandstone, dolostone, marble, granite, construction materials and any mineral other than coal, a coal bearing substance, oil sands, or oil sands bearing substance or an ammonite shell and includes any associated infrastructure but does not include a pit.

recycling means 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 land, and includes a spill or leak.

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.

sintering means to cause something to become a coherent mass by heating without melting or the 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).

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

smelting means the melting of raw or scrap materials (containing metals) to produce metal for further processing into metal products (e.g., castings, ingots, sheets).

stationary combustion equipment means any combustion equipment that needs to be stationary in order 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 (SO₂) is formed during oxidation reactions involving sulphur and oxygen. SO₂ 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 (TEQ) means a mass or concentration that 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 Appendix 6 "Dioxin and Furan Toxic Equivalents."

treatment means subjecting the substance to physical, chemical, biological or thermal processes at a location off the facility site 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.

unpaved roads means gravel surfaced roads, roads with thin membrane bituminous surface treatment and roads with bituminous cold mix surfaces.

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 "Definition of Volatile Organic Compound."

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 or destroying hazardous chemicals or pathogens present in the waste.

wastewater collection system is a 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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U.S. EPA SPECIATE 3.2 program <www.epa.gov/ttn/chief/software/speciate/index.html>

U.S. EPA Web site "Technology Transfer Network Clearinghouse for Inventories and Emission Factors," Office of Air Quality Planning and Standards, Emission Factor and Inventory Group.
<www.epa.gov/ttn/chief/>

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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 NPRI.

Estimating Chemical Releases from Monofilament Fiber Manufacturing,
EPA 560/4-88-004a (January, 1988).

Estimating Chemical Releases from Printing Operations,
EPA 560/4-88-004b (January, 1988).

Estimating Chemical Releases from Electrodeposition of Organic Coatings,
EPA 560/4-88-004c (January, 1988).

Estimating Chemical Releases from Spray Application of Organic Coatings,
EPA 560/4-88-004d (January, 1988).

Estimating Chemical Releases from Semi-Conductor Manufacturing,
EPA 560/4-88-004e (January, 1988).

Estimating Chemical Releases from Formulation of Aqueous Solutions,
EPA 560/4-88-004f (March, 1988).

Estimating Chemical Releases from Electroplating Operations,
EPA 560/4-88-004g (January, 1988).

Estimating Chemical Releases from Textile Dyeing,
EPA 560/4-88-004h (February, 1988).

Estimating Chemical Releases from Presswood and Laminated Wood Products Manufacturing,
EPA 560/4-88-004i (March, 1988).

Estimating Chemical Releases from Roller, Knife, and Gravure Coating Operations,
EPA 560/4-88-004j (February, 1988).

Estimating Chemical Releases from Paper and Paperboard Production,
EPA 560/4-88-004k (February, 1988).

Estimating Chemical Releases from Leather Tanning and Finishing,
EPA 560/4-88-0041 (February, 1988).

Estimating Chemical Releases from Wood Preserving Operations,
EPA 560/4-88-004p (February, 1988).

Estimating Chemical Releases from Rubber Production and Compounding Operations,
EPA 560/4-88-004q (March, 1988).

Issue Paper – Clarification and Guidance for the Metal Fabrication Industry,
EPA-560/4-90-012 (January, 1990).

Guidance for Food Processors,
EPA 560/4-90-014 (June, 1990).

EPCRA Section 313 Reporting Guidance For Food Processors (Update),
EPA 745-R-98-011 (September, 1998).

EPCRA Section 313 Reporting Guidance for Spray Application and Electrodeposition of Organic Coatings,
EPA 745-R-98-014 (December, 1998).

Industry Guidance for Coal Mining Facilities,
EPA 745-B-99-002 (January, 1999).

Industry Guidance for Electricity Generating Facilities,
EPA 745-B-99-003 (January, 1999).

Industry Guidance for Metal Mining Facilities,
EPA 745-B-99-001 (January, 1999).

Industry Guidance for Chemical Distribution Facilities,
EPA 745-B-99-005 (January, 1999).

Industry Guidance for RCRA Subtitle C TSD Facilities and Solvent Recovery Facilities,
EPA 745-B-99-004 (January, 1999).

Industry Guidance for Petroleum Terminals and Bulk Storage Facilities,
EPA 745-B-99-006 (January, 1999).

EPCRA Section 313 Reporting Guidance for Semiconductor Manufacturing,
EPA 745-R-99-007 (July, 1999).

EPCRA Section 313 Reporting Guidance for Leather Tanning and Finishing Industry,
EPA 745-B-00-012 (April, 2000).

EPCRA Section 313 Reporting Guidance for the Printing, Publishing, and Packaging Industry,
EPA 745-B-00-005 (May, 2000).

EPCRA Section 313 Reporting Guidance for Rubber and Plastics Manufacturing,
EPA 745-B-00-017 (May, 2000).

EPCRA Section 313 Reporting Guidance for the Textile Processing Industry,
EPA 745-B-00-008 (May, 2000).

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 reporting to NPRI and are listed below.

Guidance for Reporting Aqueous Ammonia – Revised,
EPA 745-R-00-005 (December, 2000).

List of Toxic Chemicals Within The Water Dissociable Nitrate Compounds Category and Guidance for Reporting – Revised,
EPA 745-R-00-006 (December, 2000).

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).

Guidance for Reporting Toxic Chemicals within the Polycyclic Aromatic Compounds Category (Final),
EPA 260-B-01-03 (August, 2001).

List of Toxic Chemicals within the Polychlorinated Alkanes Category and Guidance for Reporting,
EPA 745-B-99-023 (June, 1999).

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).

Guidance for Reporting Toxic Chemicals Within the Dioxin and Dioxin-like Compounds Category (Final),
EPA 260-B-01-004 (August, 2001).

Locating and Estimating 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 locating and estimating (L&E) documents that compile available information on sources and emissions of these substances. Documents in this series are listed below:

Substance	EPA Publication #	Publication Date
Acrylonitrile	EPA-450/4-84-007a	1984
Arsenic and Arsenic Compounds	EPA-454/R-98-013	June 1998
Benzene	EPA-450/4-84-007q	1988
Benzene	EPA-450/R-98-011	June 1998
1,3-Butadiene	EPA-454/R-96-008	November 1996
Cadmium and Cadmium Compounds	EPA-454/R-93-040	September 1993
Carbon Tetrachloride	EPA-450/4-84-007b	March 1984
Chlorobenzenes	EPA-454/R-93-044	March 1994
Chloroform	EPA-450/4-84-007c	March 1984
Chromium	EPA-450/4-84-007g	July 1984
Chromium (Supplement)	EPA-450/2-89-002	August 1989
Coal and Oil Combustion Sources	EPA 450/2-89-001	1989
Cyanide	EPA-454/R-93-041	September 1993
Dioxins and Furans	EPA-454/R-97-003	May 1997
Epichlorohydrin	EPA-450/4-84-007j	March 1984
Ethylene Dichloride	EPA-450/4-84-007d	March 1984
Ethylene Oxide	EPA-450/4-84-0071	September 1986
Formaldehyde	EPA-450/4-91-012	March 1991
Lead	EPA-454/R-98-006	May 1998
Manganese	EPA-450/4-84-007h	1986
Medical Waste Incinerators	EPA-454/R-93-053	1993
Mercury and Mercury Compounds	EPA-454/R-97-012	December 1997
Methylene Chloride	EPA-454/R-93-006	February 1993
Methyl Ethyl Ketone	EPA-454/R-93-046	March 1994

Municipal Waste Combustion	EPA-450/2-89-006	1989
Nickel	EPA-450/4-84-007f	1984
Organic Liquid Storage Tanks	EPA-450/4-88-004	1988
Perc and Trichloroethylene	EPA 450/2-89-013	1989
Phosgene	EPA-450/4-84-007i	1986
Polycyclic Organic Matter	EPA-454/R-98-014	July 1998
Sewage Sludge Incinerators	EPA 450/2-90-009	1990
Styrene	EPA-454/R-93-011	April 1993
Toluene	EPA-454/R-93-047	March 1994
Vinylidene Chloride	EPA-450/4-84-007k	September 1985
Xylene	EPA-454/R-93-048	March 1994

Other Documents from the U.S. EPA

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).

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).

Protocols for Equipment Leak Emission Estimates, U.S. EPA, EPA 453/R-95-017 (November, 1995).

Hot Mix Asphalt Plants – Emission Assessment Report (Draft), U.S. EPA, EPA 454/R-00-0XX (June, 2000).

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 Service Center for Environmental Publications
P.O. Box 42419
Cincinnati, Ohio 45242-0419
U.S.A.
Tel: (513) 489-8190 or 1-800-489-8190, 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	Tel: (703) 605-6000 or 1-800-553-6847
5285 Port Royal Road	Fax: (703) 605-6900
Springfield, VA 22161	E-mail: orders@ntis.gov
U.S.A.	Web site: www.ntis.gov

Documents Produced by Industry Associations

American Petroleum Institute (2000). *Evaporative Loss from Fixed Roof Tanks*, Publication 2516.

American Petroleum Institute (1996). *Evaporation Loss from Internal Floating Roof Tanks*, Publication 2519.

American Petroleum Institute (1994). *Evaporation Loss from External Floating Roof Tanks*, Publication 2517.

American Petroleum Institute (1992). *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*, Publication 2525.

Copies of the above reports can be ordered from:

American Petroleum Institute
1200 L Street Northwest
Washington, DC 20005
U.S.A.

Tel: (202) 682-8375

Canadian Petroleum Products Institute (2006). "Code of Practice for Developing a Refinery Emission Inventory," available at <www.cppei.ca/Technical_Documents.html>

Environment Canada Guidance Documents

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

Environment Canada (2004). "National Pollutant Release Inventory Guidance Manual for the Wastewater Sector." *NPRI Toolbox*. <http://www.ec.gc.ca/pdb/npri/npri_gdocs_e.cfm>.

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

General Information

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

Lide, David R. (1995). *CRC Handbook of Chemistry and Physics*. 75th Edition. Boca Raton, FL: CRC Press, Inc.

Appendix 1 – Overview of Substances and Thresholds for Reporting to the 2007 NPRI

The NPRI substances are listed alphabetically in six parts in this Appendix. The reporting criteria and substance qualifiers are explained in Sections 3.4 through 3.9 of this *Guide*. Table 2 is reproduced below for reference.

Part Number	Threshold Type	Substances	Mass Threshold	Concentration Threshold	Reporting Unit
1A	Quantity manufactured, processed or otherwise used ⁽¹⁾	232 core substances	10 tonnes	1%	tonnes
1B	Quantity manufactured, processed or otherwise used ⁽¹⁾	mercury ⁽²⁾	5 kg	n/a ⁽⁴⁾	kg
		cadmium ⁽²⁾	5 kg	0.1%	kg
		arsenic ⁽²⁾	50 kg	0.1%	kg
		hexavalent chromium compounds			
		lead ⁽³⁾ tetraethyl lead			
2	Quantity incidentally manufactured and released, disposed of or transferred for recycling	29 polycyclic aromatic hydrocarbons	50 kg total. Individual PAHs in amounts ≥ 5 kg must be reported ⁽⁵⁾	n/a	kg
3	Mandatory reporting for facilities where specified activities took place or were carried out	7 dioxins 10 furans hexachlorobenzene	n/a	n/a	g
4	Quantity released to air	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
5	Quantity released to air, provided that 10 tonnes of total VOCs were required to be reported under Part 4	75 speciated VOCs including individual substances, isomer groups and other groups and mixtures	1 tonne	n/a	tonnes

(1) The manufacture, process or otherwise use values calculated for Part 1A and 1B substances *are not necessarily the values to be reported*. These values only determine whether or not a substance needs to be reported. A subsequent calculation must be done to obtain the actual value of releases, disposals, and transfers for recycling to be reported.

(2) and its compounds.

(3) 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.

(4) n/a – not applicable.

(5) Total PAHs may be reported under the substance listing “PAHs, total Schedule 1, Part 2” only if information is not available to estimate releases, disposals and transfers of individual PAHs.

Alphabetical Listing of NPRI Substances for 2007

Part 1A Substances

Name	CAS Number ¹	Name	CAS Number
Acetaldehyde	75-07-0	Calcium cyanide	156-62-7
Acetonitrile	75-05-8	Calcium fluoride	7789-75-5
Acetophenone	98-86-2	Carbon disulphide	75-15-0
Acrolein	107-02-8	Carbon tetrachloride	56-23-5
Acrylamide	79-06-1	Carbonyl sulphide	463-58-1
Acrylic acid ²	79-10-7	Catechol	120-80-9
Acrylonitrile	107-13-1	CFC-11	75-69-4
Alkanes, C ₆₋₁₈ , chloro	68920-70-7	CFC-12	75-71-8
Alkanes, C ₁₀₋₁₃ , chloro	85535-84-8	CFC-13	75-72-9
Allyl alcohol	107-18-6	CFC-114	76-14-2
Allyl chloride	107-05-1	CFC-115	76-15-3
Aluminum ³	7429-90-5	Chlorendic acid	115-28-6
Aluminum oxide ⁴	1344-28-1	Chlorine	7782-50-5
Ammonia (total) ⁵	*	Chlorine dioxide	10049-04-4
Aniline ²	62-53-3	Chloroacetic acid ²	79-11-8
Anthracene	120-12-7	Chlorobenzene	108-90-7
Antimony ⁶	*	Chloroethane	75-00-3
Asbestos ⁷	1332-21-4	Chloroform	67-66-3
Benzene	71-43-2	Chloromethane	74-87-3
Benzoyl chloride	98-88-4	3-Chloro-2-methyl-1-propene	563-47-3
Benzoyl peroxide	94-36-0	3-Chloropropionitrile	542-76-7
Benzyl chloride	100-44-7	Chromium ⁸	*
Biphenyl	92-52-4	Cobalt ⁶	*
Bis(2-ethylhexyl) adipate	103-23-1	Copper ⁶	*
Bis(2-ethylhexyl) phthalate	117-81-7	Cresol ^{2,9}	1319-77-3
Boron trifluoride	7637-07-2	Crotonaldehyde	4170-30-3
Bromine	7726-95-6	Cumene	98-82-8
1-Bromo-2-chloroethane	107-04-0	Cumene hydroperoxide	80-15-9
Bromomethane	74-83-9	Cyanides ¹⁰	*
1,3-Butadiene	106-99-0	Cyclohexane	110-82-7
2-Butoxyethanol	111-76-2	Cyclohexanol	108-93-0
Butyl acrylate	141-32-2	Decabromodiphenyl oxide	1163-19-5
<i>i</i> -Butyl alcohol	78-83-1	2,4-Diaminotoluene ²	95-80-7
<i>n</i> -Butyl alcohol	71-36-3	2,6-Di- <i>t</i> -butyl-4-methylphenol	128-37-0
<i>sec</i> -Butyl alcohol	78-92-2	Dibutyl phthalate	84-74-2
<i>tert</i> -Butyl alcohol	75-65-0	<i>o</i> -Dichlorobenzene	95-50-1
Butyl benzyl phthalate	85-68-7	<i>p</i> -Dichlorobenzene	106-46-7
1,2-Butylene oxide	106-88-7	3,3'-Dichlorobenzidine	612-83-9
Butyraldehyde	123-72-8	dihydrochloride	
C.I. Acid Green 3	4680-78-8	1,2-Dichloroethane	107-06-2
C.I. Basic Green 4	569-64-2	Dichloromethane	75-09-2
C.I. Basic Red 1	989-38-8	2,4-Dichlorophenol ²	120-83-2
C.I. Direct Blue 218	28407-37-6	1,2-Dichloropropane	78-87-5
C.I. Disperse Yellow 3	2832-40-8	Dicyclopentadiene	77-73-6
C.I. Food Red 15	81-88-9	Diethanolamine ²	111-42-2
C.I. Solvent Orange 7	3118-97-6	Diethyl phthalate	84-66-2
C.I. Solvent Yellow 14	842-07-9	Diethyl sulphate	64-67-5

Name	CAS Number
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- <i>o</i> -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
<i>n</i> -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
<i>p,p'</i> -Isopropylidenediphenol	80-05-7
Isosafrole	120-58-1
Lithium carbonate	554-13-2
Maleic anhydride	108-31-6
Manganese ⁶	*

Name	CAS Number
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 <i>tert</i> -butyl ether	1634-04-4
<i>p,p'</i> -Methylenebis(2-chloroaniline)	101-14-4
1,1--Methylenebis	
(4-isocyanatocyclohexane)	5124-30-1
Methylenebis(phenylisocyanate)	101-68-8
<i>p,p'</i> -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
<i>p</i> -Nitroaniline	100-01-6
Nitrobenzene	98-95-3
Nitroglycerin	55-63-0
<i>p</i> -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
<i>p</i> -Phenylenediamine ²	106-50-3
<i>o</i> -Phenylphenol ²	90-43-7
Phosgene	75-44-5
Phosphorus ¹⁸	7723-14-0
Phosphorus (total) ¹⁹	*
Phthalic anhydride	85-44-9
Poly-meric diphenylmethane diisocyanate	9016-87-9
Potassium bromate	7758-01-2
Propargyl alcohol	107-19-7
Propionaldehyde	123-38-6
Propylene	115-07-1
Propylene oxide	75-56-9
Pyridine ²	110-86-1
Quinoline ²	91-22-5
<i>p</i> -Quinone	106-51-4
Safrole	94-59-7

Name	CAS Number	Name	CAS Number
Selenium ⁶	*	Toluenediisocyanate ¹¹	26471-62-5
Silver ⁶	*	Total reduced sulphur ²⁰	*
Sodium fluoride	7681-49-4	1,2,4-Trichlorobenzene	120-82-1
Sodium nitrite	7632-00-0	1,1,2-Trichloroethane	79-00-5
Styrene	100-42-5	Trichloroethylene	79-01-6
Styrene oxide	96-09-3	Triethylamine	121-44-8
Sulphur hexafluoride	2551-62-4	1,2,4-Trimethylbenzene	95-63-6
Sulphuric acid	7664-93-9	2,2,-4-Trimethylhexamethylene diisocyanate	16938-22-0
1,1,1,2-Tetrachloroethane	630-20-6	2,4,-4-Trimethylhexamethylene diisocyanate	15646-96-5
1,1,2,2-Tetrachloroethane	79-34-5	Vanadium ²¹	7440-62-2
Tetrachloroethylene	127-18-4	Vinyl acetate	108-05-4
Tetracycline hydrochloride	64-75-5	Vinyl chloride	75-01-4
Thiourea	62-56-6	Vinylidene chloride	75-35-4
Thorium dioxide	1314-20-1	Xylene ²²	1330-20-7
Titanium tetrachloride	7550-45-0	Zinc ⁶	*
Toluene	108-88-3		
Toluene-2,4-diisocyanate	584-84-9		
Toluene-2,6-diisocyanate	91-08-7		

* 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 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; 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; 127087-87-1.

¹⁷ Includes octylphenol and its ethoxylates with the following 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 Number 7723-14-0.

²⁰ This class of substances, expressed in terms of hydrogen sulphide, is restricted to the following substances: hydrogen sulphide (CAS No. 7783-06-4), carbon disulphide (CAS No. 75-15-0), carbonyl sulphide (CAS No. 463-58-1), dimethyl sulphide (CAS No. 75-18-3), dimethyl disulphide (CAS No. 624-92-0), and methyl mercaptan (CAS No. 74-93-1).

²¹ "(except when in an alloy) and its compounds"

²² "all isomers" including 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 Number	Name	CAS Number
Mercury ⁶	*	Hexavalent chromium compounds	*
Cadmium ⁶	*	Lead ^{23, 24}	*
Arsenic ⁶	*	Tetraethyl lead	78-00-2

²³ "and its compounds" except tetraethyl lead.

²⁴ Does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys.

Part 2 Substances

Name	CAS Number	Name	CAS Number
Acenaphthene	83-32-9	Dibenzo(a,h)pyrene	189-64-0
Acenaphthylene	208-96-8	Dibenzo(a,i)pyrene	189-55-9
Benzo(a)anthracene	56-55-3	Dibenzo(a,l)pyrene	191-30-0
Benzo(a)phenanthrene	218-01-9	7H-Dibenzo(c,g)carbazole	194-59-2
Benzo(a)pyrene	50-32-8	7,12-Dimethylbenz(a)anthracene	57-97-6
Benzo(b)fluoranthene	205-99-2	Fluoranthene	206-44-0
Benzo(e)pyrene	192-97-2	Fluorene	86-73-7
Benzo(g,h,i)perylene	191-24-2	Indeno(1,2,3-c,d)pyrene	193-39-5
Benzo(j)fluoranthene	205-82-3	3-Methylcholanthrene	56-49-5
Benzo(k)fluoranthene	207-08-9	5-Methylchrysene	3697-24-3
Dibenz(a,j)acridine	224-42-0	1-Nitropyrene	5522-43-0
Dibenzo(a,e)fluoranthene	5385-75-1	Perylene	198-55-0
Dibenzo(a,e)pyrene	192-65-4	Phenanthrene	85-01-8
Dibenzo(a,h)acridine	226-36-8	Pyrene	129-00-0
Dibenzo(a,h)anthracene	53-70-3		

Part 3 Substances

Name	CAS Number	Name	CAS Number
Hexachlorobenzene	118-74-1	2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4
2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin	1746-01-6	1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6
1,2,3,7,8-Pentachlorodibenzo- <i>p</i> -dioxin	40321-76-4	1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9
1,2,3,4,7,8-Hexachlorodibenzo- <i>p</i> -dioxin	39227-28-6	1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9
1,2,3,7,8,9-Hexachlorodibenzo- <i>p</i> -dioxin	19408-74-3	1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9
1,2,3,6,7,8-Hexachlorodibenzo- <i>p</i> -dioxin	57653-85-7	2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5
1,2,3,4,6,7,8-Heptachlorodibenzo- <i>p</i> -dioxin	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4
Octachlorodibenzo- <i>p</i> -dioxin	3268-87-9	1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	Octachlorodibenzofuran	39001-02-0

Part 4 Substances

Name	CAS Number	Name	CAS Number
Carbon monoxide	630-08-0	PM ₁₀ ²⁶	*
Oxides of nitrogen (expressed as NO ₂)	11104-93-1	Sulphur dioxide	7446-09-5
PM _{2.5} ²⁵	*	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 a VOC.

Part 5 Substances

Individual Substances

Name	CAS Number	Name	CAS Number
Acetylene	74-86-2	D-Limonene	5989-27-5
Adipic acid	124-04-9	Methanol	67-56-1
Aniline ²	65-53-3	Methyl ethyl ketone	78-93-3
Benzene	71-43-2	2-Methyl-3-hexanone	7379-12-6
1,3-Butadiene	106-99-0	Methyl isobutyl ketone	108-10-1
2-Butoxyethanol	111-76-2	Myrcene	123-35-3
<i>n</i> -Butyl acetate	123-86-4	beta-Phellandrene	555-10-2
Chlorobenzene	108-90-7	Phenyl isocyanate	103-71-9
<i>p</i> -Dichlorobenzene	106-46-7	alpha-Pinene	80-56-8
1,2-Dichloroethane	107-06-2	beta-Pinene	127-91-3
Dimethylether	115-10-6	Propane	74-98-6
Ethyl alcohol	64-17-5	Propylene	115-07-1
Ethyl acetate	141-78-6	Styrene	100-42-5
Ethylene	74-85-1	Tetrahydrofuran	109-99-9
Formaldehyde	50-00-0	1,2,4-Trimethylbenzene	95-63-6
Furfuryl alcohol	98-00-0	Trimethylfluorosilane	420-56-4
<i>n</i> -Hexane	110-54-3	Toluene	108-88-3
Isopropyl alcohol	67-63-0	Vinyl acetate	108-05-4

Isomer Groups

Name	CAS Number	Name	CAS Number
Anthraquinone ²⁹	*	Hexane ³⁰	*
Butane ²⁹	*	Hexene ²⁹	25264-93-1
Butene ²⁹	25167-67-3	Methylindan ²⁹	27133-93-3
Cycloheptane ²⁹	*	Nonane ²⁹	*
Cyclohexene ²⁹	*	Octane ²⁹	*
Cyclooctane ²⁹	*	Pentane ²⁹	*
Decane ²⁹	*	Pentene ²⁹	*
Dihydronaphthalene ²⁹	*	Terpenes ²⁹	68956-56-9
Dodecane ²⁹	*	Trimethylbenzene ³¹	25551-13-7
Heptane ²⁹	*	Xylene ²⁹	1330-20-7

Other Groups and Mixtures

Name	CAS Number	Name	CAS Number
Creosote	8001-58-9	Stoddard solvent	8052-41-3
Heavy alkylate naptha	64741-65-7	VM & P naptha	8032-32-4
Heavy aromatic solvent naphtha	64742-94-5	White mineral oil	8042-47-5
Hydrotreated heavy naptha	64742-48-9	Diethylene glycol butyl ether	112-34-5
Hydrotreated light distillate	64742-47-8	Diethylene glycol ethyl ether acetate	112-15-2
Light aromatic solvent naphtha	64742-95-6	Ethylene glycol butyl ether acetate	112-07-2
Mineral spirits	64475-85-0	Ethylene glycol hexyl ether	112-25-4
Naphtha	8030-30-6	Propylene glycol butyl ether	5131-66-8
Solvent naptha light aliphatic	64742-89-8	Propylene glycol methyl ether acetate	108-65-6
Solvent naptha medium aliphatic	64742-88-7		

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 2007, Listed by Chemical Abstracts Service Registry Number

Part 1A Substances

CAS Number ⁽¹⁾	Name	CAS Number	Name
*	Ammonia (total) ⁽²⁾	75-44-5	Phosgene
*	Antimony ⁽³⁾	75-45-6	HCFC-22
*	Chromium ⁽⁴⁾	75-56-9	Propylene oxide
*	Cobalt ⁽³⁾	75-63-8	Halon 1301
*	Copper ⁽³⁾	75-65-0	<i>tert</i> -Butyl alcohol
*	Cyanides ⁽⁵⁾	75-68-3	HCFC-142b
*	Manganese ⁽³⁾	75-69-4	CFC-11
*	Nickel ⁽³⁾	75-71-8	CFC-12
*	Nitrate ion ⁽⁶⁾	75-72-9	CFC-13
*	Nonylphenol and its ethoxylates ⁽⁷⁾	76-01-7	Pentachloroethane
*	Octylphenol and its ethoxylates ⁽⁸⁾	76-14-2	CFC-114
*	Phosphorus (total) ⁽⁹⁾	76-15-3	CFC-115
*	Selenium ⁽³⁾	77-47-4	Hexachlorocyclopentadiene
*	Silver ⁽³⁾	77-73-6	Dicyclopentadiene
*	Total reduced sulphur ⁽¹⁰⁾	77-78-1	Dimethyl sulphate
*	Zinc ⁽³⁾	78-79-5	Isoprene
50-00-0	Formaldehyde	78-83-1	<i>i</i> -Butyl alcohol
55-63-0	Nitroglycerin	78-84-2	Isobutyraldehyde
56-23-5	Carbon tetrachloride	78-87-5	1,2-Dichloropropane
62-53-3	Aniline ⁽¹¹⁾	78-92-2	<i>sec</i> -Butyl alcohol
62-56-6	Thiourea	78-93-3	Methyl ethyl ketone
64-18-6	Formic acid	79-00-5	1,1,2-Trichloroethane
64-67-5	Diethyl sulphate	79-01-6	Trichloroethylene
64-75-5	Tetracycline hydrochloride	79-06-1	Acrylamide
67-56-1	Methanol	79-10-7	Acrylic acid ⁽¹¹⁾
67-63-0	Isopropyl alcohol	79-11-8	Chloroacetic acid ⁽¹¹⁾
67-66-3	Chloroform	79-21-0	Peracetic acid ⁽¹¹⁾
67-72-1	Hexachloroethane	79-34-5	1,1,2,2-Tetrachloroethane
68-12-2	N,N-Dimethylformamide	79-46-9	2-Nitropropane
70-30-4	Hexachlorophene	80-05-7	<i>p,p'</i> -Isopropylidenediphenol
71-36-3	<i>n</i> -Butyl alcohol	80-15-9	Cumene hydroperoxide
71-43-2	Benzene	80-62-6	Methyl methacrylate
74-83-9	Bromomethane	81-88-9	C.I. Food Red 15
74-85-1	Ethylene	84-66-2	Diethyl phthalate
74-87-3	Chloromethane	84-74-2	Dibutyl phthalate
74-88-4	Methyl iodide	85-44-9	Phthalic anhydride
74-90-8	Hydrogen cyanide	85-68-7	Butyl benzyl phthalate
75-00-3	Chloroethane	86-30-6	N-Nitrosodiphenylamine
75-01-4	Vinyl chloride	90-43-7	<i>o</i> -Phenylphenol ⁽¹¹⁾
75-05-8	Acetonitrile	90-94-8	Michler's ketone ⁽¹¹⁾
75-07-0	Acetaldehyde	91-08-7	Toluene-2,6-diisocyanate
75-09-2	Dichloromethane	91-20-3	Naphthalene
75-15-0	Carbon disulphide	91-22-5	Quinoline ⁽¹¹⁾
75-21-8	Ethylene oxide	92-52-4	Biphenyl
75-35-4	Vinylidene chloride	94-36-0	Benzoyl peroxide

CAS Number	Name	CAS Number	Name
94-59-7	Safrole	117-84-0	Di- <i>n</i> -octyl phthalate
95-50-1	<i>o</i> -Dichlorobenzene	120-12-7	Anthracene
95-63-6	1,2,4-Trimethylbenzene	120-58-1	Isosafrole
95-80-7	2,4-Diaminotoluene ⁽¹⁰⁾	120-80-9	Catechol
96-09-3	Styrene oxide	120-82-1	1,2,4-Trichlorobenzene
96-33-3	Methyl acrylate	120-83-2	2,4-Dichlorophenol ⁽¹¹⁾
96-45-7	Ethylene thiourea	121-14-2	2,4-Dinitrotoluene
98-82-8	Cumene	121-44-8	Triethylamine
98-86-2	Acetophenone	121-69-7	N,N-Dimethylaniline ⁽¹¹⁾
98-88-4	Benzoyl chloride	122-39-4	Diphenylamine
98-95-3	Nitrobenzene	123-31-9	Hydroquinone ⁽¹¹⁾
100-01-6	<i>p</i> -Nitroaniline	123-38-6	Propionaldehyde
100-02-7	<i>p</i> -Nitrophenol ⁽¹¹⁾	123-63-7	Paraldehyde
100-41-4	Ethylbenzene	123-72-8	Butyraldehyde
100-42-5	Styrene	123-91-1	1,4-Dioxane
100-44-7	Benzyl chloride	124-40-3	Dimethylamine
101-14-4	<i>p,p'</i> -Methylenebis(2-chloroaniline)	127-18-4	Tetrachloroethylene
101-68-8	Methylenebis(phenylisocyanate)	128-37-0	2,6-Di- <i>t</i> -butyl-4-methylphenol
101-77-9	<i>p,p'</i> -Methylenedianiline	131-11-3	Dimethyl phthalate
103-23-1	<i>Bis</i> (2-ethylhexyl) adipate	139-13-9	Nitrilotriacetic acid ⁽¹¹⁾
106-46-7	<i>p</i> -Dichlorobenzene	140-88-5	Ethyl acrylate
106-50-3	<i>p</i> -Phenylenediamine ⁽¹¹⁾	141-32-2	Butyl acrylate
106-51-4	<i>p</i> -Quinone	149-30-4	2-Mercaptobenzothiazole
106-88-7	1,2-Butylene oxide	156-62-7	Calcium cyanamide
106-89-8	Epichlorohydrin	302-01-2	Hydrazine ⁽¹¹⁾
106-99-0	1,3-Butadiene	353-59-3	Halon 1211
107-02-8	Acrolein	463-58-1	Carbonyl sulphide
107-04-0	1-Bromo-2-chloroethane	534-52-1	4,6-Dinitro- <i>o</i> -cresol ⁽¹¹⁾
107-05-1	Allyl chloride	541-41-3	Ethyl chloroformate
107-06-2	1,2-Dichloroethane	542-76-7	3-Chloropropionitrile
107-13-1	Acrylonitrile	554-13-2	Lithium carbonate
107-18-6	Allyl alcohol	563-47-3	3-Chloro-2-methyl-1-propene
107-19-7	Propargyl alcohol	569-64-2	C.I. Basic Green 4
107-21-1	Ethylene glycol	584-84-9	Toluene-2,4-diisocyanate
108-05-4	Vinyl acetate	606-20-2	2,6-Dinitrotoluene
108-10-1	Methyl isobutyl ketone	612-83-9	3,3'-Dichlorobenzidine dihydrochloride
108-31-6	Maleic anhydride	630-20-6	1,1,1,2-Tetrachloroethane
108-88-3	Toluene	842-07-9	C.I. Solvent Yellow 14
108-90-7	Chlorobenzene	872-50-4	N-Methyl-2-pyrrolidone
108-93-0	Cyclohexanol	924-42-5	N-Methylolacrylamide
108-95-2	Phenol ⁽¹¹⁾	989-38-8	C.I. Basic Red 1
109-06-8	2-Methylpyridine	1163-19-5	Decabromodiphenyl oxide
109-86-4	2-Methoxyethanol	1300-71-6	Dimethyl phenol
110-49-6	2-Methoxyethyl acetate	1313-27-5	Molybdenum trioxide
110-54-3	<i>n</i> -Hexane	1314-20-1	Thorium dioxide
110-80-5	2-Ethoxyethanol	1319-77-3	Cresol ^(11, 12)
110-82-7	Cyclohexane	1330-20-7	Xylene ⁽¹³⁾
110-86-1	Pyridine ⁽¹¹⁾	1332-21-4	Asbestos ⁽¹⁴⁾
111-15-9	2-Ethoxyethyl acetate	1344-28-1	Aluminum oxide ⁽¹⁵⁾
111-42-2	Diethanolamine ⁽¹¹⁾	1634-04-4	Methyl <i>tert</i> -butyl ether
111-76-2	2-Butoxyethanol	1717-00-6	HCFC-141b
115-07-1	Propylene	2551-62-4	Sulphur hexafluoride
115-28-6	Chlorendic acid	2832-40-8	C.I. Disperse Yellow 3
117-81-7	<i>Bis</i> (2-ethylhexyl) phthalate	3118-97-6	C.I. Solvent Orange 7

CAS Number	Name	CAS Number	Name
4098-71-9	Isophorone diisocyanate	7782-50-5	Chlorine
4170-30-3	Crotonaldehyde	7783-06-4	Hydrogen sulphide
4680-78-8	C.I. Acid Green 3	7789-75-5	Calcium fluoride
5124-30-1	1,1-Methylenebis (4-isocyanatocyclohexane)	9016-87-9	Polymeric diphenylmethane diisocyanate
7429-90-5	Aluminum ⁽¹⁶⁾	10049-04-4	Chlorine dioxide
7440-62-2	Vanadium ⁽¹⁷⁾	13463-40-6	Iron pentacarbonyl
7550-45-0	Titanium tetrachloride	15646-96-5	2,4,4-Trimethylhexamethylene diisocyanate
7632-00-0	Sodium nitrite	16938-22-0	2,2,4-Trimethylhexamethylene diisocyanate
7637-07-2	Boron trifluoride	25321-14-6	Dinitrotoluene ⁽¹⁹⁾
7647-01-0	Hydrochloric acid	26471-62-5	Toluenediisocyanate ⁽¹⁹⁾
7664-39-3	Hydrogen fluoride	28407-37-6	C.I. Direct Blue 218
7664-93-9	Sulphuric acid	34077-87-7	HCFC-123 and all isomers ⁽²⁰⁾
7681-49-4	Sodium fluoride	41834-16-6	HCFC-122 and all isomers ⁽²¹⁾
7697-37-2	Nitric acid	63938-10-3	HCFC 124 and all isomers ⁽²²⁾
7723-14-0	Phosphorus ⁽¹⁸⁾	68920-70-7	Alkanes, C6-18, chloro
7726-95-6	Bromine	85535-84-8	Alkanes, C10-13, chloro
7758-01-2	Potassium bromate		
7782-41-4	Fluorine		

* 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 (NH₃ - CAS No. 7664-41-7) and the ammonium ion (NH₄⁺) in solution.

(3) "and its compounds"

(4) "and its compounds" except hexavalent chromium compounds

(5) "ionic"

(6) "in solution at a pH of 6.0 or greater"

(7) 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; 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; 7205-87-1; 68412-54-4; 127087-87-1.

(8) 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.

(9) Does not include phosphorus (yellow or white) with CAS No. 7723-14-0.

(10) This class of substances, expressed in terms of hydrogen sulphide, is restricted to the following substances: hydrogen sulphide (CAS No. 7783-06-4), carbon disulphide (CAS No. 75-15-0), carbonyl sulphide (CAS No. 463-58-1), dimethyl sulphide (CAS No. 75-18-3), dimethyl disulphide (CAS No. 624-92-0), and methyl mercaptan (CAS No. 74-93-1).

(11) "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.

(12) "all isomers" including 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).

(13) "all isomers" including 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).

(14) "friable form"

(15) "fibrous forms"

(16) "fume or dust"

(17) "(except when in an alloy) and its compounds"

(18) "yellow or white"

(19) "mixed isomers"

(20) "all isomers" including, but not limited to, HCFC-123 (CAS No. 306-83-2) and HCFC 123a (CAS No. 90454-18-5).

(21) "all isomers" including, but not limited to, HCFC-122 (CAS No. 354-21-2).

(22) "all isomers" including, but not limited to, HCFC 124 (CAS No. 2837-89-0), and HCFC 124a (CAS No. 354-25-6).

Part 1B Substances

CAS Number	Name	CAS Number	Name
*	Mercury ⁽³⁾	*	Hexavalent chromium compounds
*	Cadmium ⁽³⁾	*	Lead ^(23, 24)
*	Arsenic ⁽³⁾	78-00-2	Tetraethyl lead

(23) "and its compounds" except tetraethyl lead.

(24) Does not include lead (and its compounds) contained in stainless steel, brass or bronze alloy.

Part 2 Substances

CAS Number	Name	CAS Number	Name
50-32-8	Benzo(a)pyrene	193-39-5	Indeno(1,2,3-c,d)pyrene
53-70-3	Dibenzo(a,h)anthracene	194-59-2	7H-Dibenzo(c,g)carbazole
56-49-5	3-Methylcholanthrene	198-55-0	Perylene
56-55-3	Benzo(a)anthracene	205-82-3	Benzo(j)fluoranthene
57-97-6	7,12-Dimethylbenz(a)anthracene	205-99-2	Benzo(b)fluoranthene
83-32-9	Acenaphthene	206-44-0	Fluoranthene
85-01-8	Phenanthrene	207-08-9	Benzo(k)fluoranthene
86-73-7	Fluorene	208-96-8	Acenaphthylene
129-00-0	Pyrene	218-01-9	Benzo(a)phenanthrene
189-55-9	Dibenzo(a,i)pyrene	224-42-0	Dibenz(a,j)acridine
189-64-0	Dibenzo(a,h)pyrene	226-36-8	Dibenzo(a,h)acridine
191-24-2	Benzo(g,h,i)perylene	3697-24-3	5-Methylchrysene
191-30-0	Dibenzo(a,l)pyrene	5385-75-1	Dibenzo(a,e)fluoranthene
192-65-4	Dibenzo(a,e)pyrene	5522-43-0	1-Nitropyrene
192-97-2	Benzo(e)pyrene		

Part 3 Substances

CAS Number	Name	CAS Number	Name
118-74-1	Hexachlorobenzene	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran
1746-01-6	2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran
3268-87-9	Octachlorodibenzo- <i>p</i> -dioxin	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo- <i>p</i> -dioxin	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo- <i>p</i> -dioxin	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo- <i>p</i> -dioxin
39001-02-0	Octachlorodibenzofuran	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo- <i>p</i> -dioxin	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran
40321-76-4	1,2,3,7,8-Pentachlorodibenzo- <i>p</i> -dioxin	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran

Part 4 Substances

CAS Number	Name	CAS Number	Name
*	PM _{2.5} ⁽²⁵⁾	630-08-0	Carbon monoxide
*	PM ₁₀ ⁽²⁶⁾	7446-09-5	Sulphur dioxide
*	Total particulate matter ⁽²⁷⁾	11104-93-1	Oxides of nitrogen
*	Volatile organic compounds ⁽²⁸⁾		(expressed as NO ₂)

(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

CAS Number	Name	CAS Number	Name
50-00-0	Formaldehyde	108-05-4	Vinyl acetate
64-17-5	Ethyl alcohol	108-10-1	Methyl isobutyl ketone
65-53-3	Aniline ⁽¹⁰⁾	108-88-3	Toluene
67-56-1	Methanol	108-90-7	Chlorobenzene
67-63-0	Isopropyl alcohol	109-99-9	Tetrahydrofuran
71-43-2	Benzene	110-54-3	<i>n</i> -Hexane
74-85-1	Ethylene	111-76-2	2-Butoxyethanol
74-86-2	Acetylene	115-07-1	Propylene
74-98-6	Propane	115-10-6	Dimethylether
78-93-3	Methyl ethyl ketone	123-35-3	Myrcene
80-56-8	Alpha-Pinene	123-86-4	<i>n</i> -Butyl acetate
95-63-6	1,2,4-Trimethylbenzene	124-04-9	Adipic acid
98-00-0	Furfuryl alcohol	127-91-3	Beta-Pinene
100-42-5	Styrene	141-78-6	Ethyl acetate
103-71-9	Phenyl isocyanate	420-56-4	Trimethylfluorosilane
106-46-7	<i>p</i> -Dichlorobenzene	555-10-2	Beta-Phellandrene
106-99-0	1,3-Butadiene	5989-27-5	D-Limonene
107-06-2	1,2-Dichloroethane	7379-12-6	2-Methyl-3-hexanone

Isomer Groups

CAS Number	Name	CAS Number	Name
*	Anthraquinone ⁽²⁹⁾	*	Nonane ⁽²⁹⁾
*	Butane ⁽²⁹⁾	*	Octane ⁽²⁹⁾
*	Cycloheptane ⁽²⁹⁾	*	Pentane ⁽²⁹⁾
*	Cyclohexene ⁽²⁹⁾	*	Pentene ⁽²⁹⁾
*	Cyclooctane ⁽²⁹⁾	1330-20-7	Xylene ⁽²⁹⁾
*	Decane ⁽²⁹⁾	25167-67-3	Butene ⁽²⁹⁾
*	Dihydronaphthalene ⁽²⁹⁾	25264-93-1	Hexene ⁽²⁹⁾
*	Dodecane ⁽²⁹⁾	25551-13-7	Trimethylbenzene ⁽³¹⁾
*	Heptane ⁽²⁹⁾	27133-93-3	Methylindan ⁽²⁹⁾
*	Hexane ⁽³⁰⁾	68956-56-9	Terpenes ⁽²⁹⁾

Other Groups and Mixtures

CAS Number	Name	CAS Number	Name
108-65-6	Propylene glycol methyl ether acetate	8052-41-3	Stoddard solvent
112-07-2	Ethylene glycol butyl ether acetate	64475-85-0	Mineral spirits
112-15-2	Diethylene glycol ethyl ether acetate	64741-65-7	Heavy alkylate naptha
112-25-4	Ethylene glycol hexyl ether	64742-47-8	Hydrotreated light distillate
112-34-5	Diethylene glycol butyl ether	64742-48-9	Hydrotreated heavy naptha
5131-66-8	Propylene glycol butyl ether	64742-88-7	Solvent naptha medium aliphatic
8001-58-9	Creosote	64742-89-8	Solvent naptha light aliphatic
8030-30-6	Naphtha	64742-94-5	Heavy aromatic solvent naphtha
8032-32-4	VM & P naptha	64742-95-6	Light aromatic solvent naphtha
8042-47-5	White mineral oil		

(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 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 micro organisms, 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.

They are defined by taking into account the hazard criteria established under the *Transportation of Dangerous Goods Regulations* (TDGR) as well as specifically listed wastes and materials in the Schedules of the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (EIHWHRMR).

More information on the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (EIHWHRMR) can be found at
<<http://www.ec.gc.ca/CEPARRegistry/regulations/detailReg.cfm?intReg=84>>.

More information on the Transport of Dangerous Goods (TDG) Regulations can be found at
<http://www.tc.gc.ca/acts-regulations/GENERAL/T/tdg/regulations/tdg001/part_1.htm>.

Appendix 5 – Definition of Volatile Organic Compound

The definition for volatile organic compounds (VOC) 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 VOC for the purposes of NPRI reporting.

Definition of VOC

Volatile organic compounds that participate in atmospheric photochemical reactions, **excluding** the following:

Substances not considered to be volatile organic compounds

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 ₄ F ₉ OCH ₃)	163702-07-6
(z.15) 2 (difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF ₃) ₂ CFCF ₂ OCH ₃)	163702-08-7
(z.16) 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane (C ₄ F ₉ OC ₂ H ₅)	163702-05-4
(z.17) 2 (ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF ₃) ₂ CFCF ₂ OC ₂ H ₅)	163702-06-5
(z.18) methyl acetate (CAS No. 79-20-9) and perfluorocarbon compounds that 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	various
(iv) sulphur containing perfluorocarbons with no unsaturations and with sulphur bonds only to carbon and fluorine	various

Appendix 6 – Dioxin and Furan Toxic Equivalents

Prior to the 2007 reporting year, releases, disposals and transfers for recycling of dioxins and furans were required to be reported as a total of the 17 congeners in units of grams toxic equivalent (TEQ). Beginning in 2007, individual dioxin and furan congeners are required to be reported in grams. Information on TEQs is provided in this Appendix since the units of the estimated levels of quantification (LoQs) are in grams TEQ.

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, toxic equivalency factors (TEFs) have been assigned to each dioxin and 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 one.

To apply and compare TEQs, the values must be calculated using the same set of TEFs. Most of the release data on dioxins and 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 also for mammals, fish and birds. However, since most of the emission factors currently available are in international TEQs, the TEF values listed in Table 19 should be used.

To calculate TEQ, you must first multiply the concentration of an individual congener by its respective TEF, or weighting factor, to obtain the congener-specific TEQ concentration. For example, 1,2,3,4,7,8-HxCDF has a TEF of 0.1 (i.e., it is 10 times less toxic than 2,3,7,8-TCDD) and a sample concentration of 30 ng/kg 1,2,3,4,7,8-HxCDF is equal to 3 ng TEQ/kg.

Table 19: Toxic Equivalency Factors for Dioxins and Furans

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

Source: NATO/CCMS, 1998.

Appendix 7 – 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 fibreglass overlay or fibreglass-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 in contact with 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 tank – 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 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 8 – 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 NPRI. Refer to the *OWNERS Help* file for a description of the fields in the facility and substance sections of the reporting form for CAC.

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.

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 Figure 12 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 CAC emissions 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.

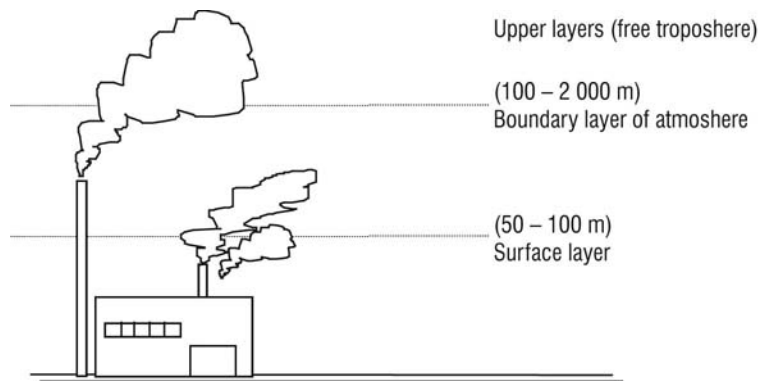
Rather than require the facility to determine the plume rise from each stack and then report for those that enter the upper troposphere, Environment Canada performed analyses to select a stack height and quantity of CAC emissions likely to be significant for modelling purposes.

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 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.

Figure 12: Layers of the Atmosphere



Appendix 9 – 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	Electric Power Generation, Transmission & Distribution
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'd 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 and 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 & Remediation 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 Outpatient 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 10 – Two-Digit 1980 Canadian Standard Industrial Classification Codes

01	Agricultural Industries	56	Metals, Hardware, Plumbing, Heating and Building Materials Industries, Wholesale
02	Service Industries Incidental to Agriculture	57	Machinery, Equipment and Supplies, Wholesale
03	Fishing and Trapping Industries	59	Other Products and Industries, Wholesale
04	Logging Industry	60	Food, Beverage and Drug Industries, Retail
05	Forest Services Industry	61	Shoe, Apparel, Fabric and Yarn Industries, Retail
06	Mining Industries	62	Household Furniture, Appliances and Furnishings Industries, Retail
07	Crude Petroleum and Natural Gas Industries	63	Automotive Vehicles, Parts and Accessories, Sales and Service
08	Quarry and Sand Pit Industries	64	General Retail Merchandising Industries
09	Service Industries Incidental to Mineral Extraction	65	Other Retail Store Industries
10	Food Industries	69	Non-store Retail Industries
11	Beverage Industries	70	Deposit-accepting Intermediary Industries
12	Tobacco Products Industries	71	Consumer and Business Financing Intermediary Industries
15	Rubber Products Industries	72	Investment Intermediary Industries
16	Plastic Products Industries	73	Insurance Industries
17	Leather and Allied Products Industries	74	Other Financial Intermediary Industries
18	Primary Textile Industries	75	Real Estate Operating Industries (except Developers)
19	Textile Products Industries	76	Insurance and Real Estate Agent Industries
24	Clothing Industries	77	Business Service Industries
25	Wood Industries	81	Federal Government Service Industries
26	Furniture and Fixture Industries	82	Provincial and Territorial Government Service Industries
27	Paper and Allied Products Industries	83	Local Government Service Industries
28	Printing, Publishing and Allied Industries	84	International and Extra-territorial Government Service Industries
29	Primary Metal Industries	85	Educational Service Industries
30	Fabricated Metal Products Industries (except Machinery and Transportation Equipment Industries)	86	Health and Social Service Industries
31	Machinery Industries (except Electrical Machinery)	91	Accommodation Service Industries
32	Transportation Equipment Industries	92	Food and Beverage Industries
33	Electrical and Electronic Products Industries	96	Amusement and Recreational Service Industries
35	Non-metallic Mineral Products Industries	97	Personal and Household Service Industries
36	Refined Petroleum and Coal Products Industries	98	Membership Organization Industries
37	Chemical and Chemical Products Industries	99	Other Service 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		

Appendix 11 – Two-Digit 1987 U.S. Standard Industrial Classification Codes

01	Agricultural Production Crops	49	Electric, Gas and Sanitary Services
02	Agricultural Production Livestock	50	Wholesale Trade Durable Goods
07	Agricultural Services	51	Wholesale Trade Non-durable Goods
08	Forestry	52	Building Materials and Garden Supplies
09	Fishing, Hunting and Trapping	53	General Merchandise Stores
10	Metal Mining	54	Food Stores
12	Coal Mining	55	Automotive Dealers and Service Stations
13	Oil and Gas Extraction	56	Apparel and Accessory Stores
14	Non-metallic Minerals, except Fuels	57	Furniture and Home Furnishings Stores
15	General Building Contractors	58	Eating and Drinking Places
16	Heavy Construction, except Building	59	Miscellaneous Retail
17	Special Trade Contractors	60	Depository Institutions
20	Food and Kindred Products	61	Non-depository Institutions
21	Tobacco Products	62	Security and Commodity Brokers
22	Textile Mill Products	63	Insurance Carriers
23	Apparel and Other Textile Products	64	Insurance Agents, Brokers and Service
24	Lumber and Wood Products	65	Real Estate
25	Furniture and Fixtures	67	Holding and Other Investment Offices
26	Paper and Allied Products	70	Hotels and Other Lodging Places
27	Printing and Publishing	72	Personal Services
28	Chemicals and Allied Products	73	Business Services
29	Petroleum and Coal Products	75	Auto Repair, Services and Parking
30	Rubber and Miscellaneous Plastics Products	76	Miscellaneous Repair Services
31	Leather and Leather Products	78	Motion Pictures
32	Stone, Clay and Glass Products	79	Amusement and Recreation Services
33	Primary Metal Industries	80	Health Services
34	Fabricated Metal Products	81	Legal Services
35	Industrial Machinery and Equipment	82	Educational Services
36	Electronic and Other Electric Equipment	83	Social Services
37	Transportation Equipment	84	Museums, Botanical, Zoological Gardens
38	Instruments and Related Products	86	Membership Organizations
39	Miscellaneous Manufacturing Industries	87	Engineering and Management Services
40	Railroad Transportation	88	Private Households
41	Local and Interurban Passenger Transit	89	Services, n.e.c.
42	Trucking and Warehousing	91	Executive, Legislative and General
43	U.S. Postal Service	92	Justice, Public Order and Safety
44	Water Transportation	93	Finance, Taxation and Monetary Policy
45	Transportation by Air	94	Administration of Human Resources
46	Pipelines, except Natural Gas	95	Environmental Quality and Housing
47	Transportation Services	96	Administration of Economic Programs
48	Communications	97	National Security and International Affairs