



2008

NPRI

Guide for Reporting

To The National Pollutant Release Inventory
Canadian Environmental Protection Act, 1999



Environment
Canada

Environnement
Canada

Canada

National Pollutant Release Inventory (NPRI) Offices

National Office

National Pollutant Release Inventory
Environment Canada
Fontaine Building, 9th Floor
200 Sacré Coeur Blvd.
Gatineau, QC
K1A 0H3
Tel: 1-877-877-8375
Fax: (819) 953-0461
E-mail: inrp-npri@ec.gc.ca

Newfoundland and Labrador, Prince Edward Island, New Brunswick and Nova Scotia

National Pollutant Release Inventory
Environment Canada
Queen's Square, 16th Floor
45 Alderney Drive
Dartmouth, NS
B2Y 2N6
Tel: 1-877-877-8375
Fax: (819) 953-0461
E-mail: inrp-npri@ec.gc.ca

Quebec

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

**NPRI/ON MOE Reg. 127/01
Joint Technical Assistance Centre**
Tel: (416) 739-4707

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

**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
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: 1-877-877-8375

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Acknowledgements

Prepared by: Jennifer Underhill

In collaboration with: Sarah Bennett, Kelli Dawson, Terry Mah, Henry Quon, Jody Rosenberger and Nancy Tremblay.

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Disclaimer

Should any inconsistencies be found between this *Guide* and the official *Canada Gazette* notice, the notice published on February 16, 2008 in the *Canada Gazette*, Part I, and any errata and amendments published in the *Canada Gazette*, Part I, will prevail.

Preface

The National Pollutant Release Inventory (NPRI) is at the centre of the Government of Canada's efforts to track toxic substances. It is the only nation-wide, publicly accessible program of its type in Canada that provides information on 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/inrp-npri> in the form of downloadable databases, reports and analyses, and through a query site that allows the user to view information submitted by individual facilities. Environment Canada normally releases the un-reviewed data shortly after the annual June 1st reporting deadline; reporters are encouraged to check the Web site frequently to peruse the data.

The NPRI lists 367 substances for the 2008 reporting year. Among them, 232 substances are listed with the original NPRI reporting criteria (10-tonne manufacture, process and otherwise 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 furans
- hexachlorobenzene
- seven criteria air contaminants
- 75 selected volatile organic compounds

This *Guide*, together with its companion documents (listed below), enables facility owners or operators to review the NPRI reporting criteria and determine if they are required to report to the NPRI for the 2008 reporting year.

Companion documents include:

- *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector*
- *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory*
- *Criteria Air Contaminants (CACs) Technical Source Guide for Reporting to the National Pollutant Release Inventory (NPRI)*

These documents and other tools and resources can be found on the NPRI website at <<http://www.ec.gc.ca/inrp-npri>>

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) also enables reporting to Metro Vancouver, also 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 – 2008 ».

1. Highlights and Important Changes for 2008

1.1 Report Due Dates

| Canada Gazette notice | Reporting Year | Reporting Deadline |
|-----------------------|--------------------|--------------------|
| February 16, 2008 | 2008 calendar year | June 1, 2009 |

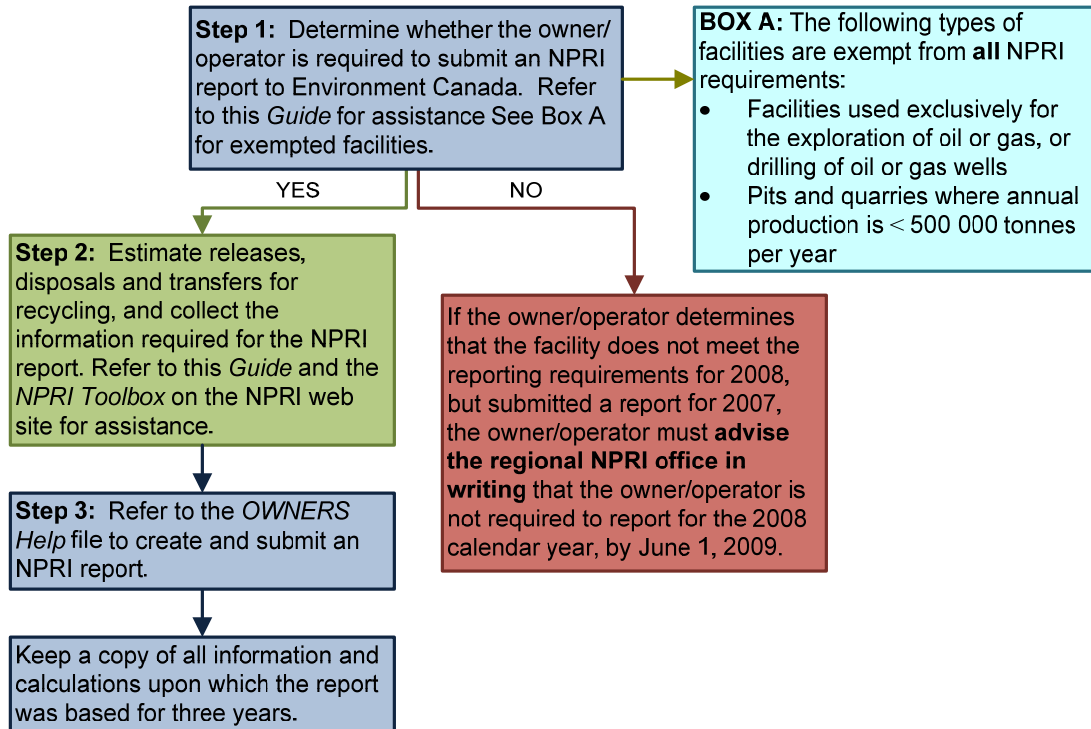
1.2 Correspondence

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* assists you in determining if you are required to report and, if so, what you are required to report to the NPRI for 2008. Refer to the *NPRI Toolbox* (available on the NPRI website at: <http://www.ec.gc.ca/inrp-npri>) 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 2008



1.4 Changes to Reporting Requirements for 2008

Only one change was made to the NPRI for 2008:

- **Addition to the List of Activities for Reporting Dioxins and Furans, and Hexachlorobenzene**
 - Titanium dioxide pigment production using chloride process

If your facility is engaged in this activity then reporting to the NPRI for dioxins and furans and hexachlorobenzene are now required.

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 that have been negotiated among parties to achieve specific environmental results. For more information on EPAs, visit Environment Canada's Web site at <<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 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

Holders of permits issued under Metro Vancouver Air Quality Management Bylaw No. 1082 should visit Metro Vancouver's website at <<http://www.metrovancouver.org/services/permits/Pages/default.aspx>> (available in English only) to report information pertaining to various facility activities as required by their permit.

2. Reporting to the National Pollutant Release Inventory for 2008

2.1 Introduction

This *Guide* provides a general overview of the reporting requirements for all NPRI substances. This *Guide* helps you to determine whether you are required to report and, if so, what you have to report. The *NPRI Toolbox* assists you with your calculations. Finally, the *OWNERS Help* file guides you through preparing and submitting an NPRI report for the 2008 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 2008 NPRI reporting year.

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

The legal basis for the 2008 NPRI is the “*Notice with Respect to Substances in the National Pollutant Release Inventory for 2008*” and any errata and amendments published in the *Canada Gazette, Part I*. The notice was published on February 16, 2008, 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 2008 calendar year, under the conditions prescribed in the notice, must provide certain information to the Minister of the Environment no later than June 1, 2009.

The *Canada Gazette* notice for the 2008 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 2008 NPRI

| |
|--|
| <p>Schedule 1 – National Pollutant Release Inventory Substances – Complete Substance Lists Available in Appendices 1 and 2</p> <p>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:</p> <p>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;</p> <p>Part 2 lists 29 individual polycyclic aromatic hydrocarbons (PAHs);</p> <p>Part 3 lists seven dioxins, ten furans and hexachlorobenzene (HCB);</p> <p>Part 4 lists seven criteria air contaminants (CACs); and</p> <p>Part 5 lists 75 selected volatile organic compounds (VOCs) with additional reporting requirements (speciated VOCs).</p> |
| <p>Schedule 2 – Criteria for Reporting</p> <p>Schedule 2 lists general reporting criteria, including the reporting deadline, activities to which the employee threshold does not apply, exclusions and exemptions:</p> <p>Part 1 – reporting criteria for substances listed in Schedule 1, Part 1;</p> <p>Part 2 – reporting criteria for the PAHs listed in Schedule 1, Part 2;</p> <p>Part 3 – reporting criteria for dioxins, furans and HCB listed in Schedule 1, Part 3;</p> <p>Part 4 – reporting criteria for CACs listed in Schedule 1, Part 4; and</p> <p>Part 5 – reporting criteria for speciated VOCs listed in Schedule 1, Part 5.</p> |
| <p>Schedule 3 – Types of Information Subject to Notice and Manner of Reporting</p> <p>Schedule 3 outlines the information that must be submitted by owners/operators whose facilities meet the reporting criteria defined in Schedule 2:</p> <p>Part 1 – facility information to be reported;</p> <p>Part 2 – information to be reported for substances listed in Schedule 1, Parts 1-3;</p> <p>Part 3 – information to be reported for CACs listed in Schedule 1, Part 4; and</p> <p>Part 4 – information to be reported for speciated VOCs listed in Schedule 1, Part 5.</p> |
| <p>Schedule 4 – Definitions</p> <p>Schedule 4 provides definitions of the terms used in the notice.</p> |

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**
- Schedule 1, Part 5 substances as **Part 5 substances**

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 the NPRI for 2008. 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 the 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 2008. Detailed explanations of the reporting criteria and requirements for each group of substances follow the figures. The overview of the list of NPRI substances, divided into the five parts, is provided in Table 2 below.

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 2007, but the facility does not meet the 2008 NPRI criteria, the owner/operator must inform Environment Canada by June 1, 2009, in writing, of the change in reporting status. This notification can also be done by filing a “Does not meet criteria” report using OWNERS.

Table 2: Overview of Substances and Thresholds for Reporting to the NPRI for 2008

| Part # | Threshold Type | Substances | Mass Threshold | Concentration Threshold | Reporting Unit |
|--------|---|---|---|-------------------------|----------------|
| 1A | Quantity manufactured, processed or otherwise used ⁽¹⁾ | 232 core substances | 10 tonnes | 1% by weight | 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⁾ hexavalent chromium compounds lead ⁽³⁾ tetraethyl lead | 50 kg | 0.1% | kg |
| | | | | | |
| 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 unspciated” only if information is not available to estimate releases, disposals and transfers of individual PAHs.

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.

Offshore Installation

An offshore installation is defined as 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.

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.

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

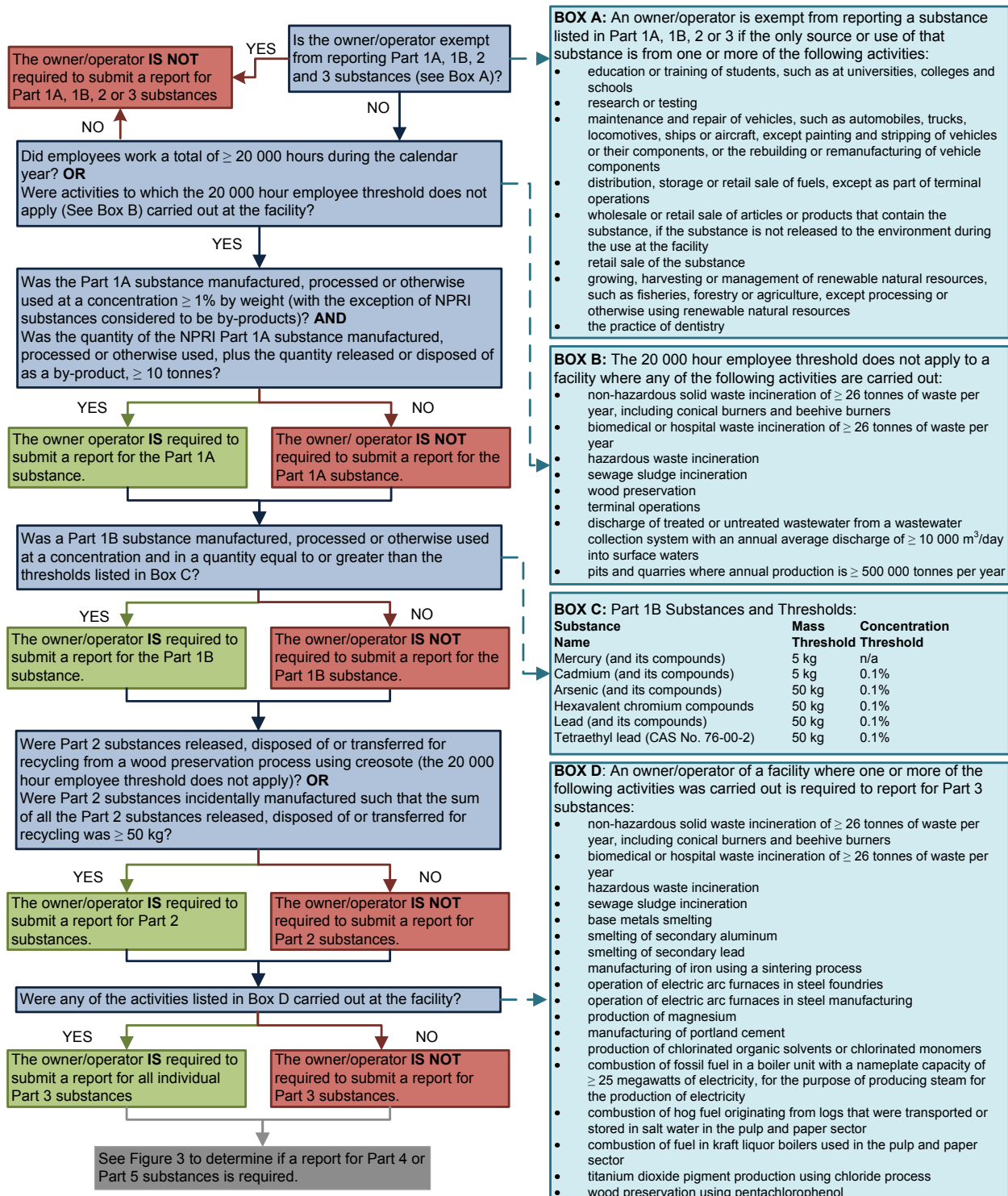
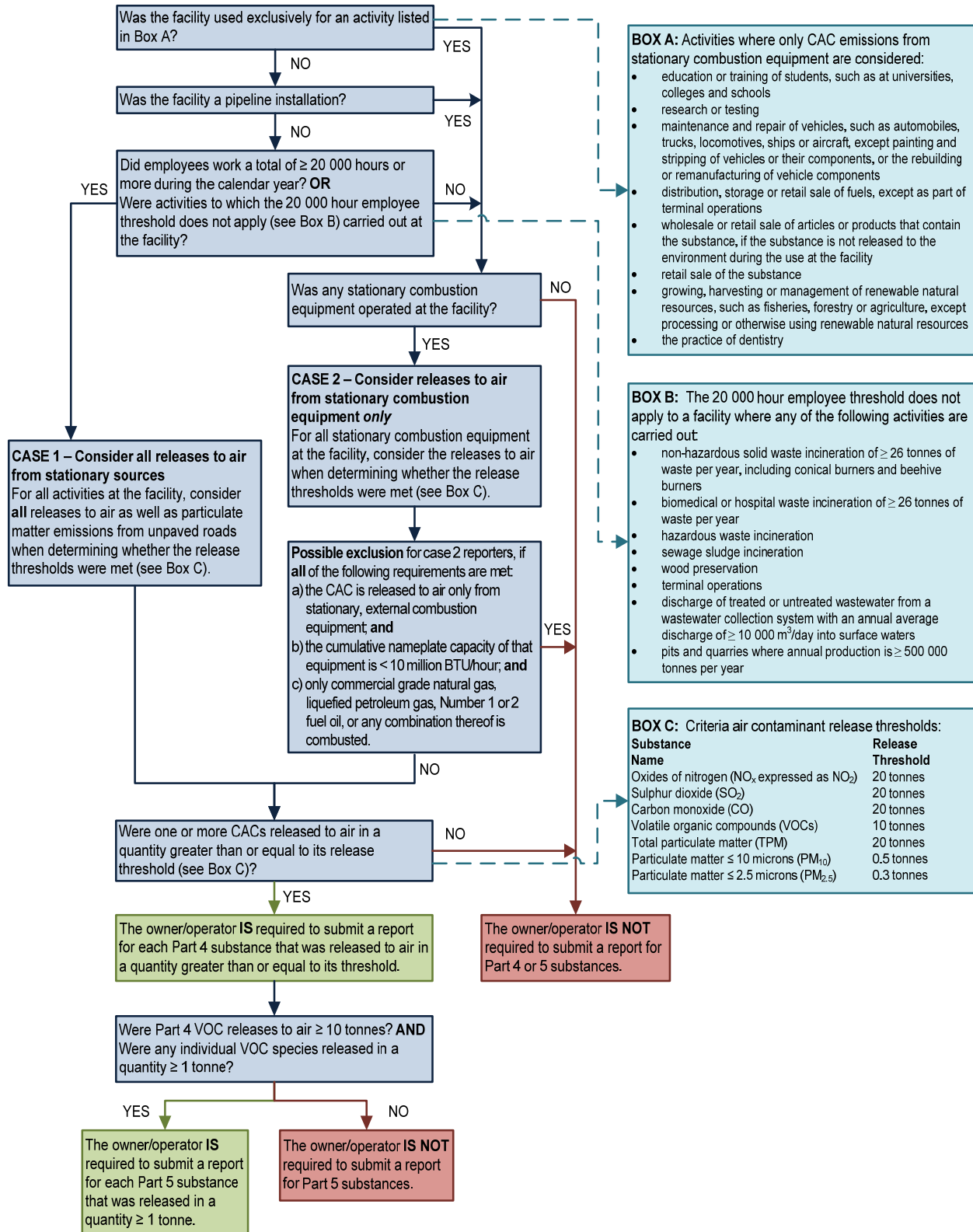


Figure 3: Criteria for Reporting Parts 4 and 5 Substances to the NPRI



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⁾

| |
|--|
| <ul style="list-style-type: none">• education or training of students, such as at universities, colleges and schools |
| <ul style="list-style-type: none">• research or testing |
| <ul style="list-style-type: none">• 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⁾ |
| <ul style="list-style-type: none">• distribution, storage or retail sale of fuels, except as part of terminal operations⁽³⁾ |
| <ul style="list-style-type: none">• 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 |
| <ul style="list-style-type: none">• retail sale of the substance |
| <ul style="list-style-type: none">• growing, harvesting or management of renewable natural resources, such as fisheries, forestry or agriculture, except processing or otherwise using renewable natural resources |
| <ul style="list-style-type: none">• 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 (not including unpaved road dust) 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 per year |

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, which might normally be disposed of in a non-secure manner, such as at a sanitary landfill site, if not incinerated. It includes clean wood waste [i.e., waste from woodworking or forest product operations, including bark, where the wood waste has not been 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 anatomical waste, animal waste, microbiology laboratory waste, human blood and body fluid waste and waste sharps. It does not include waste that is: from animal husbandry, household in origin, or controlled in accordance with the *Health of Animals Act (Canada)*. Household wastes or wastes that are generated in 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. For more information, please visit:
<http://www.ccme.ca/assets/pdf/pn_1060_e.pdf>

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. 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). Hazardous waste incinerated in a mobile incinerator temporarily located at your facility must be included as part of this activity.

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/CEPAREgistry/regulations/detailReg?intReg=84>.

More information on the *Transport of Dangerous Goods Regulations* (TDGR) can be found at <http://www.tc.gc.ca/tdg/clear/tofc.htm>.

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

For wood preservation processes using creosote, the owner/operator of the facility must report for individual PAHs released on site, disposed of or transferred off site for recycling regardless of the number of hours worked by employees.

Wood preservation using pentachlorophenol

For wood preservation using pentachlorophenol, the owner/operator of the facility 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 <http://www.ec.gc.ca/inrp-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
- 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)
- 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 <<http://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 oils 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 <<http://www.ec.gc.ca/inrp-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. 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* (<http://www.ec.gc.ca/inrp-npri>).

- **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 (TRS), expressed in terms of hydrogen sulphide**

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 # |
|---------------------|----------------------------------|-----------|
| Hydrogen sulphide | H_2S | 7783-06-4 |
| Carbon disulphide | CS_2 | 75-15-0 |
| Carbonyl sulphide | COS | 463-58-1 |
| Dimethyl sulphide | $\text{C}_2\text{H}_6\text{S}$ | 75-18-3 |
| Methyl mercaptan | CH_4S | 74-93-1 |
| Dimethyl disulphide | $\text{C}_2\text{H}_6\text{S}_2$ | 624-92-0 |

The equivalency of the individual TRS compounds in tonnes of H_2S 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, H_2S , CS_2 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

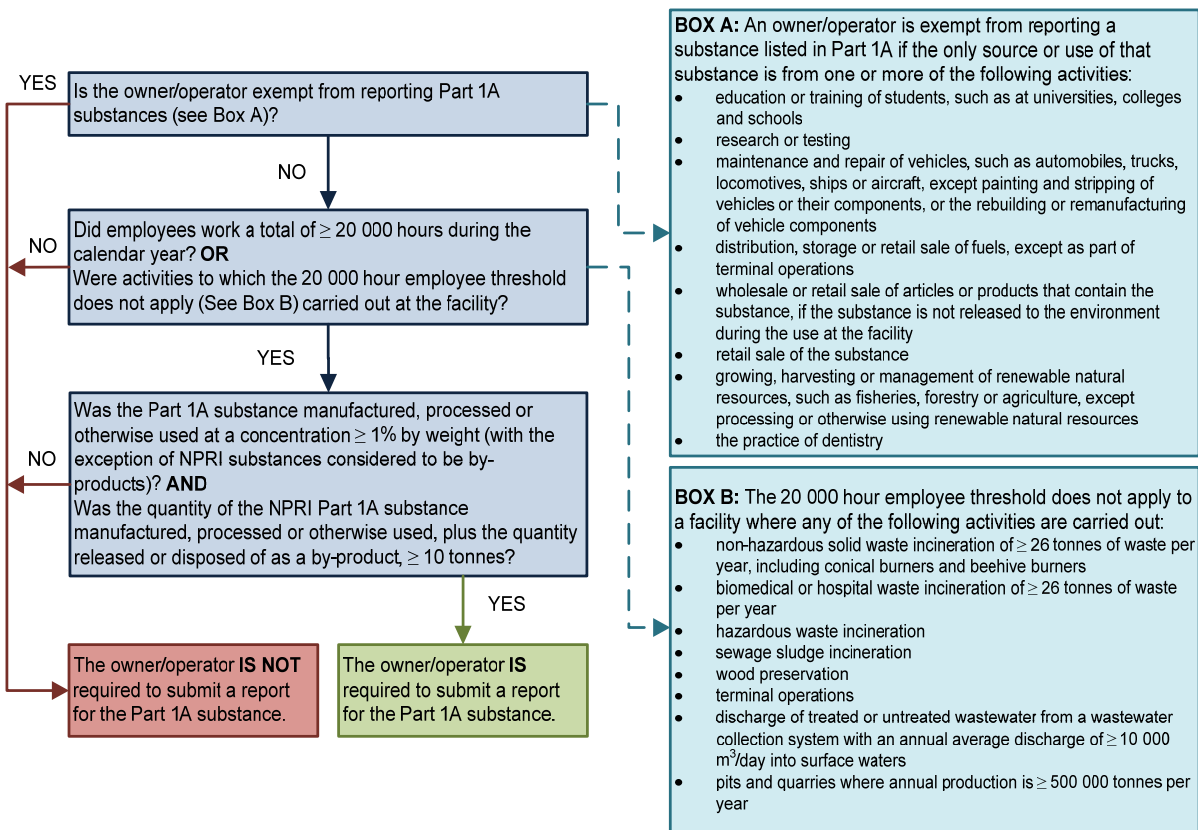
In general, any person who owns or operates a facility must submit a report to the NPRI for a Part 1A substance only if both of the following criteria are met:

- 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), sludge treatment discharges (biosolids/sludges),
- and
- the amount of a Part 1A substance manufactured, processed or otherwise used at a concentration of $\geq 1\%$ 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% by weight 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.

Example:

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).

Example:

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 Greater than or Equal to 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 ≥ 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:

$$6 \text{ tonnes } \text{C}_2\text{H}_6\text{S}_2 \times \frac{34.0803 \text{ g/mol (H}_2\text{S)}}{94.1987 \text{ g/mol (C}_2\text{H}_6\text{S}_2)} \times \frac{2 \text{ sulphur atoms per molecule of C}_2\text{H}_6\text{S}_2}{1} = 4.342 \text{ tonnes H}_2\text{S equivalent}$$

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. As 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 ($2 \times 52 \text{ g/mol}$) in $\text{K}_2\text{Cr}_2\text{O}_7$ 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:

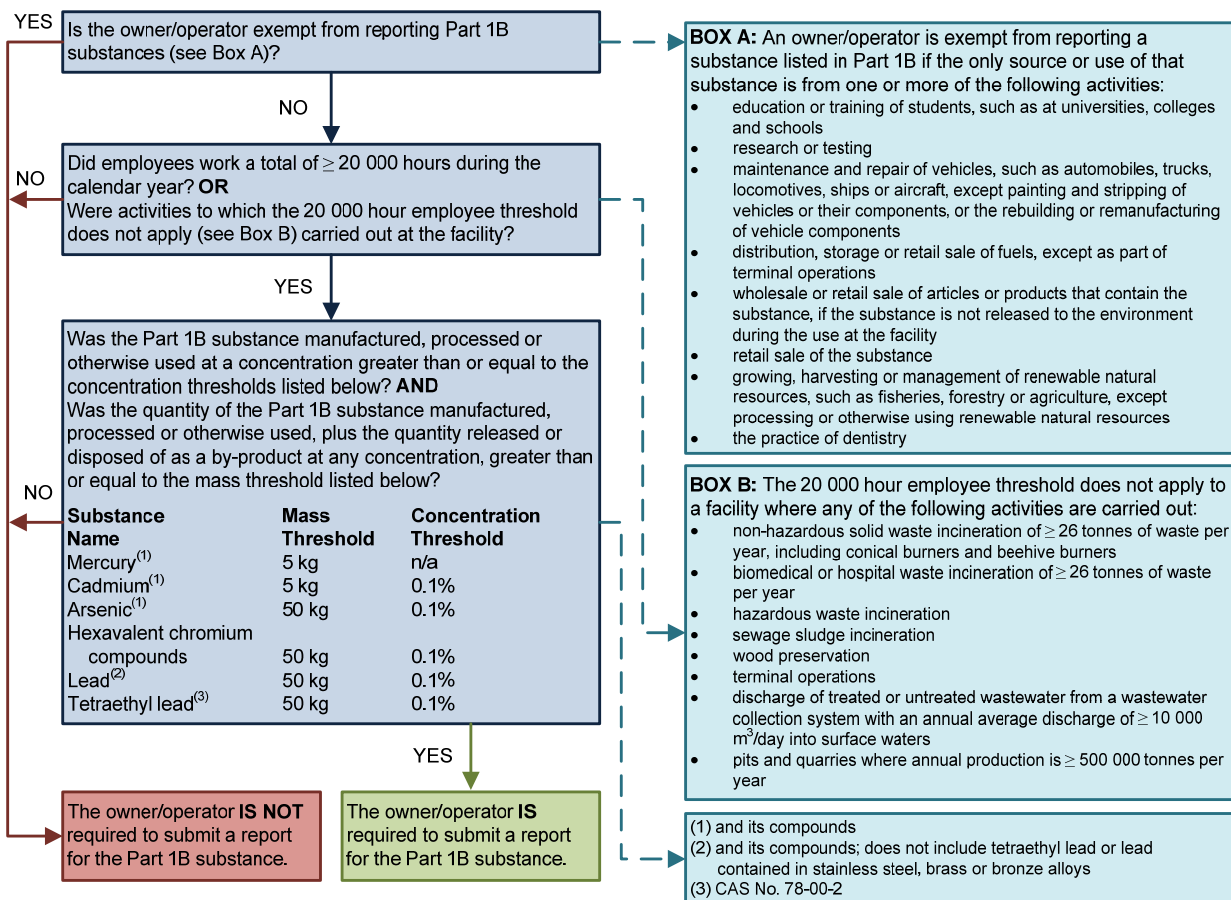
- employees worked a total of 20 000 hours or more or the facility was used for an activity to which the 20 000 hour employee threshold does not apply (listed in Table 5),

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).

Figure 5: Reporting Criteria for Part 1B Substances



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 of this activity, 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.

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 the NPRI 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 | 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 | 1985-01-08 |
| Dibenzo(a,h)acridine | 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 combine the quantities of all 29 individual PAHs incidentally manufactured 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 2008 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.

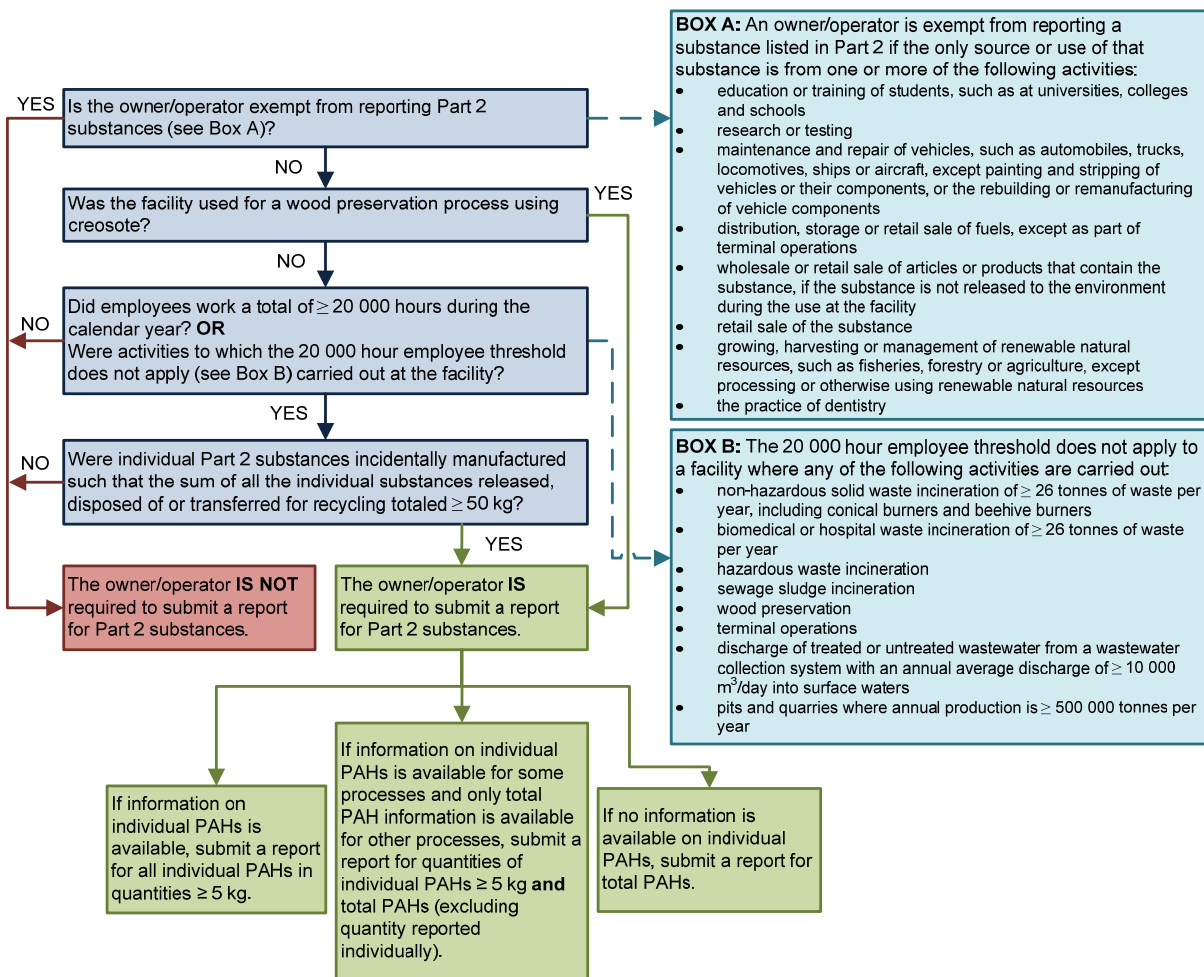
The substance-specific reporting criteria for the 29 PAHs listed in Table 9 are outlined in Figure 6. Releases, disposals and transfers for recycling must be reported for the individual PAH substances even though the 50 kg reporting threshold applies to the aggregate total of all 29 PAHs.

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 reporting threshold and regardless of 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 website at <<http://www.ec.gc.ca/inrp-npri>>.

Figure 6: Reporting Criteria for Part 2 Substances



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

3.7.1 Overview

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

Specific facilities or activities (listed in Table 11) have the potential to incidentally manufacture dioxins and furans or HCB and therefore, the owners/operators of these facilities are 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.

Substance reports are required for the release of each of the individual 17 congeners listed in Table 10.

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 prompt reporting.

Figure 7: Reporting Criteria for Part 3 Substances

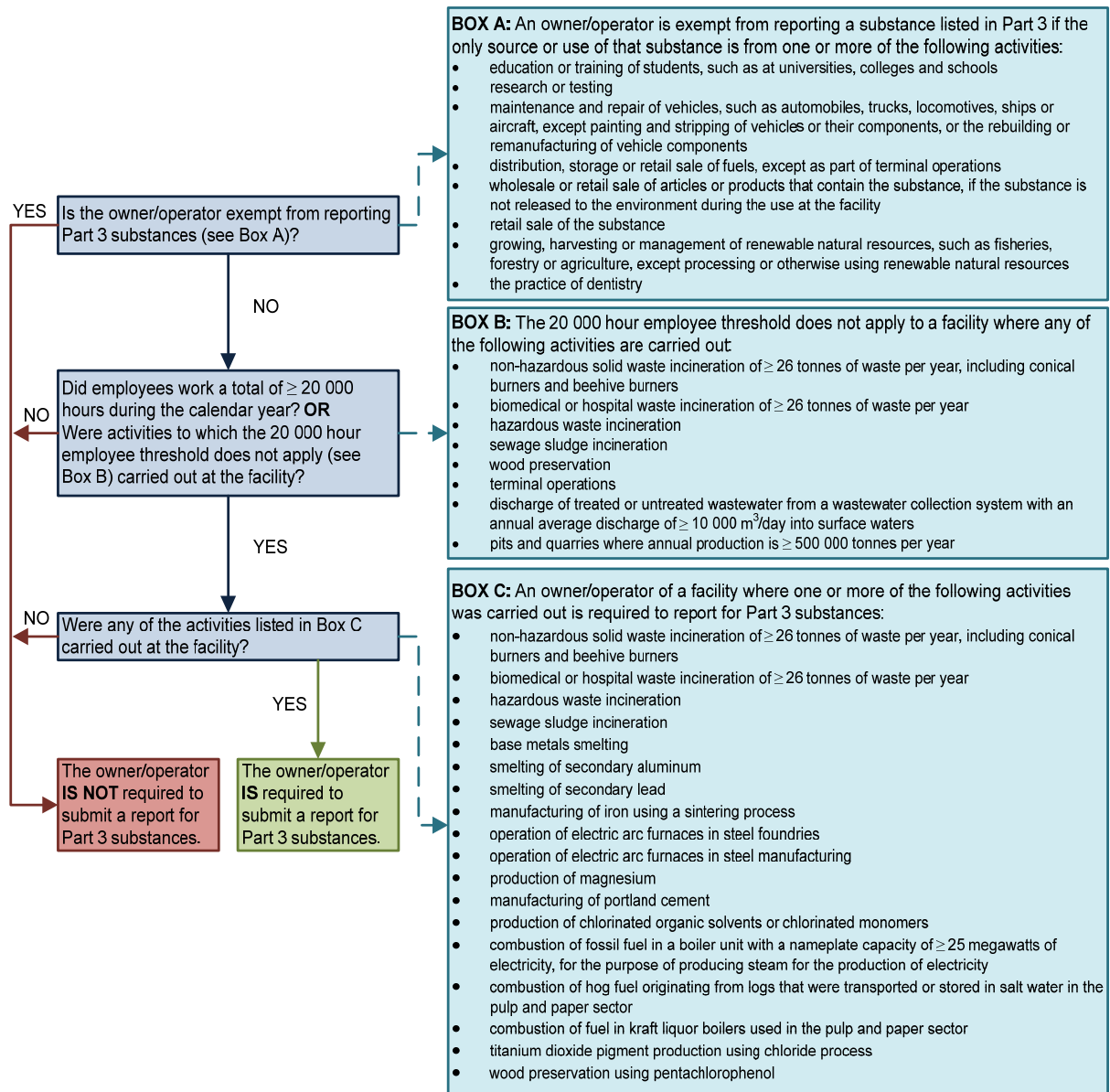


Table 11: Activities for Which Dioxins, Furans and HCB Reports are Required⁽¹⁾

| |
|---|
| 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) titanium dioxide pigment production using chloride process, or |
| r) 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, r) 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) **Titanium dioxide pigment production using chloride process**
This activity is limited to titanium dioxide pigment manufactured by the chloride process and not production using the sulphate process.
- r) **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:

- a) Canada-wide Standards for PM and Ozone,
- b) Canada–US Air Quality Agreement,
- c) Ozone Annex to the Canada–U.S. Air Quality Agreement,
- d) Canada-Wide Acid Rain Strategy,
- e) Convention on the Long-range Transport of Air Pollutants, and
- f) 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. Oxides of nitrogen 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 are 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 you are using emission factors to determine your facility's 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 greater than 1 000 organic substances that readily volatilize. Some VOCs can undergo photochemical reactions in the atmosphere and contribute to the formation of secondary particulate matter (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 the *NPRI Toolbox* (<http://www.ec.gc.ca/inrp-npri>).

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:

- The NPRI lists approximately 100 VOCs as individual substances under Part 1A with 10-tonne manufacture, process or other use and 1% concentration thresholds. If your facility meets the criteria, report these Part 1A substances; you must also include these substances in your threshold calculations for Part 4 VOCs, along with all other VOCs emitted,
- Base the VOC emissions 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

| Example Category | Example Compounds | Example Category | Example Compounds |
|------------------|-------------------|------------------|------------------------|
| Alcohols | Ethanol | Aromatics | Benzene |
| | Isopropyl alcohol | | Benzo(a)pyrene |
| | Methanol | | Fluoranthene |
| Alkanes | <i>n</i> -Butane | | Toluene |
| | Propane | | 1,2,4-Trimethylbenzene |
| | Octane | | Xylene (all isomers) |

| | | | |
|---------|-------------------------|-----------|--------------------------------------|
| Alkenes | Ethylene | Aldehydes | Formaldehyde |
| | Propylene | | Acetaldehyde |
| | Isobutene | Ketones | Methyl isobutyl ketone |
| | <i>trans</i> -2-Pentene | | Methyl <i>tert</i> -butyl ether |
| Alkynes | Acetylene | Ethers | Tripropylene glycol monomethyl ether |
| | | Esters | Dimethyl phthalate |
| | | | Dibutyl phthalate |

Particulate Matter

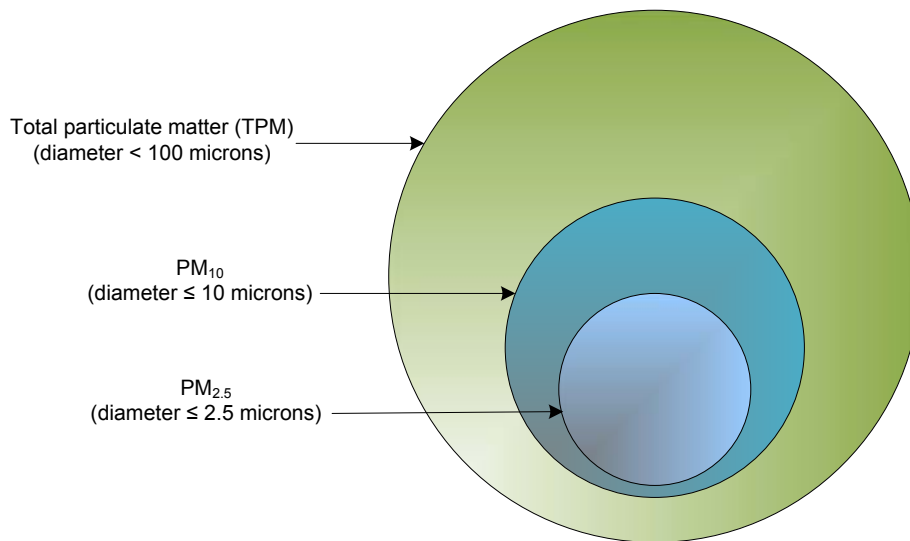
Particulate matter is microscopic solid and liquid particles, of various origins, that remain suspended in the air for any length of time. These particles give smog its colour and affect visibility, and are believed to have adverse affects on vegetation and on various synthetic and natural surfaces. 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 (PM₁₀), 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 PM₁₀ and PM_{2.5}, while PM₁₀ includes PM_{2.5}. For this reason, it is impossible for PM_{2.5} or PM₁₀ releases to exceed TPM releases. It is also impossible for PM_{2.5} releases to exceed PM₁₀ releases. Therefore, a calculation error has occurred if PM_{2.5} releases exceed PM₁₀ 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., PM₁₀ 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, PM₁₀ 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.

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) per year, are required to be included in threshold calculations when reporting to the NPRI.

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 roads 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:

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

If dust suppressants have been applied to the unpaved road, the above formula still applies. Facilities applying dust suppressants should indicate this in the comments section of OWNERS.

Road dust emissions can be calculated using the following formula:

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

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/inrp-npri>>. The background information on developing these tools is available from the US EPA AP-42, Chapter 13, available at <<http://www.epa.gov/ttn/chieff/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 | 4.85 | 15.12 | 19.97 | 20 | No |
| PM ₁₀ | 1.36 | 5.87 | 7.23 | 0.5 | Yes |
| PM _{2.5} | 0.14 | 1.51 | 1.65 | 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 1.65 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

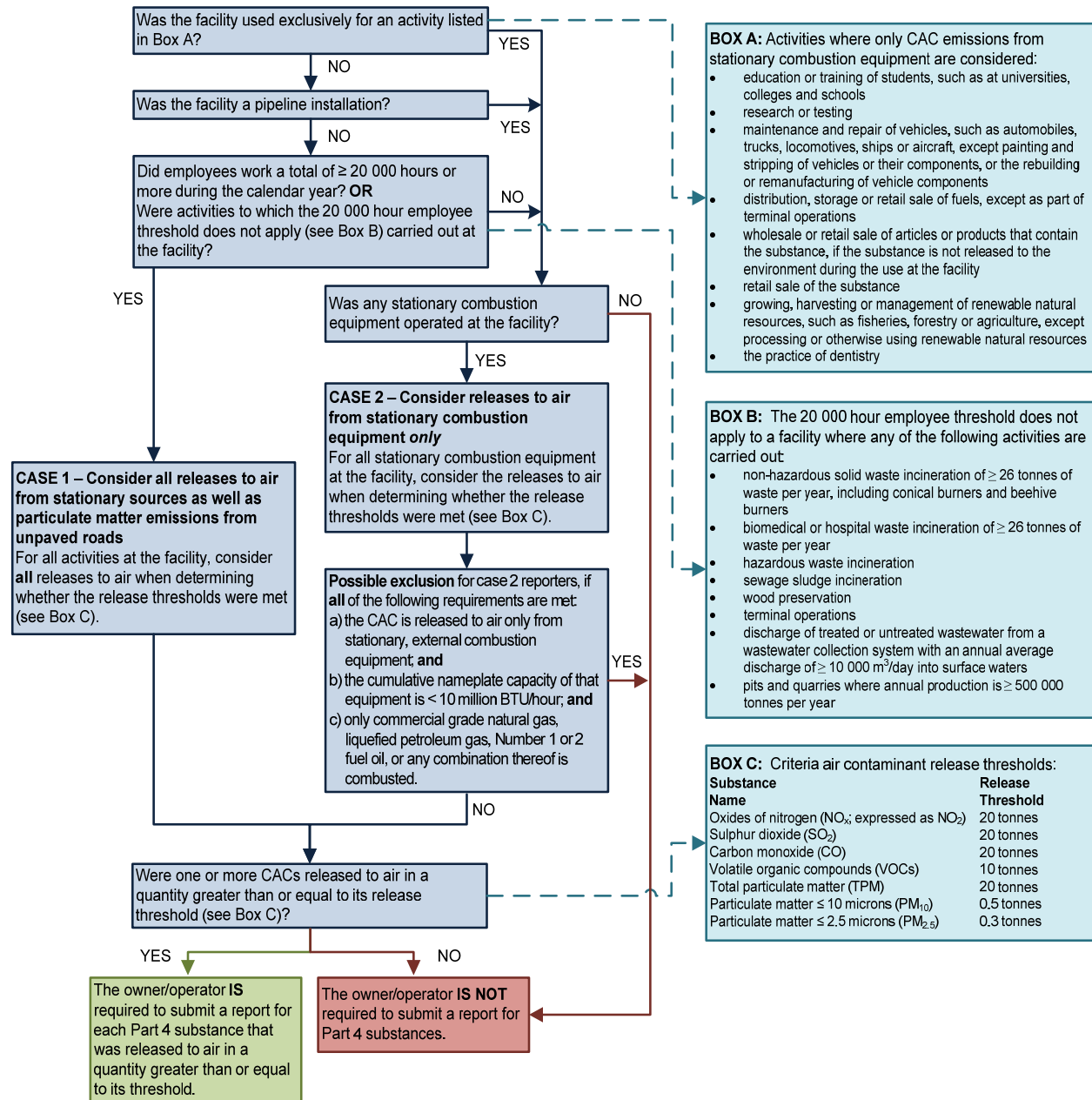
The reporting criteria for CACs are summarized in Figure 9 and the thresholds for CACs are listed in Table 14.

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 still be required to report for CAC emissions from stationary combustion equipment. For the purposes of the 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 the 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 of VOCs, may come 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 and 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 4.

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: <<http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0204.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/chiep/ap42/ch09/final/c9s09-6.pdf>). The 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/chiep/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/chiep/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 CACs from equipment leaks (Reference: <www.epa.gov/ttn/chiep/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/chiep/ap42/ch04/final/c4s06.pdf>).

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

3.9.1 Overview

Report Part 5 substances 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

Appendix 1 lists the 75 speciated VOCs. 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 4.0 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.

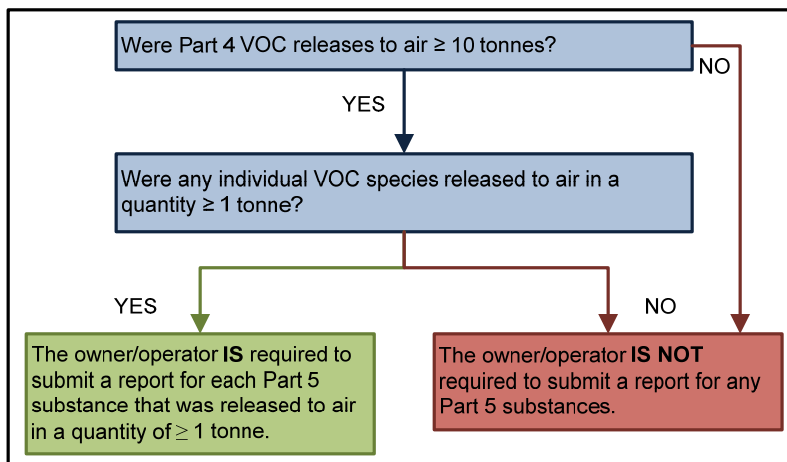
3.9.3 Units

Report quantities for speciated VOCs released to air in tonnes.

3.9.4 Reporting Criteria

If your facility met the 10-tonne total VOC threshold, report 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 the NPRI (see page ii).

You are legally required to submit your NPRI report to your regional NPRI office no later than June 1, 2009.

If You Are Not Required to Report

Persons who submitted a report to the NPRI for the 2007 reporting year are legally required to notify Environment Canada prior to the June 1, 2009 deadline, if they are not required to report for the 2008 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 the NPRI substances which 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 February 16, 2008:**

“If the person is required by federal or provincial legislation or 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 those 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, or sampling, mass balance, published emission factors, site-specific emission factors, and 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. The list 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 and release, disposal and transfer calculations. These are available in electronic format on the *NPRI Toolbox* web page at <<http://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 and release, disposal and transfer 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 4.0) 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)
- 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

Using a mass balance involves applying 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. However, 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 your NPRI 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:

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

Where:

E_x = Emission of contaminant x in kg (or other unit of mass)

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 devices installed, if any)

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 used 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 all 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 all 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 (PAHs)

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 is available for some processes only, while only information on total PAHs is available for other processes, then information on individual PAHs in amounts ≥ 5 kg as well as information on total PAHs (excluding the individually reported quantities) should be reported.

If the only information that is available is for total PAHs, then total PAHs should be reported under "PAHs, total unspciated" 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 unspciated."

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 (this excludes any quantities reported individually). | 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 unspesiated.”

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 unspesiated.”

If your facility is involved in wood preservation using creosote, then a report must be submitted for PAHs released, disposed of or transferred from the 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 (HCB)

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:

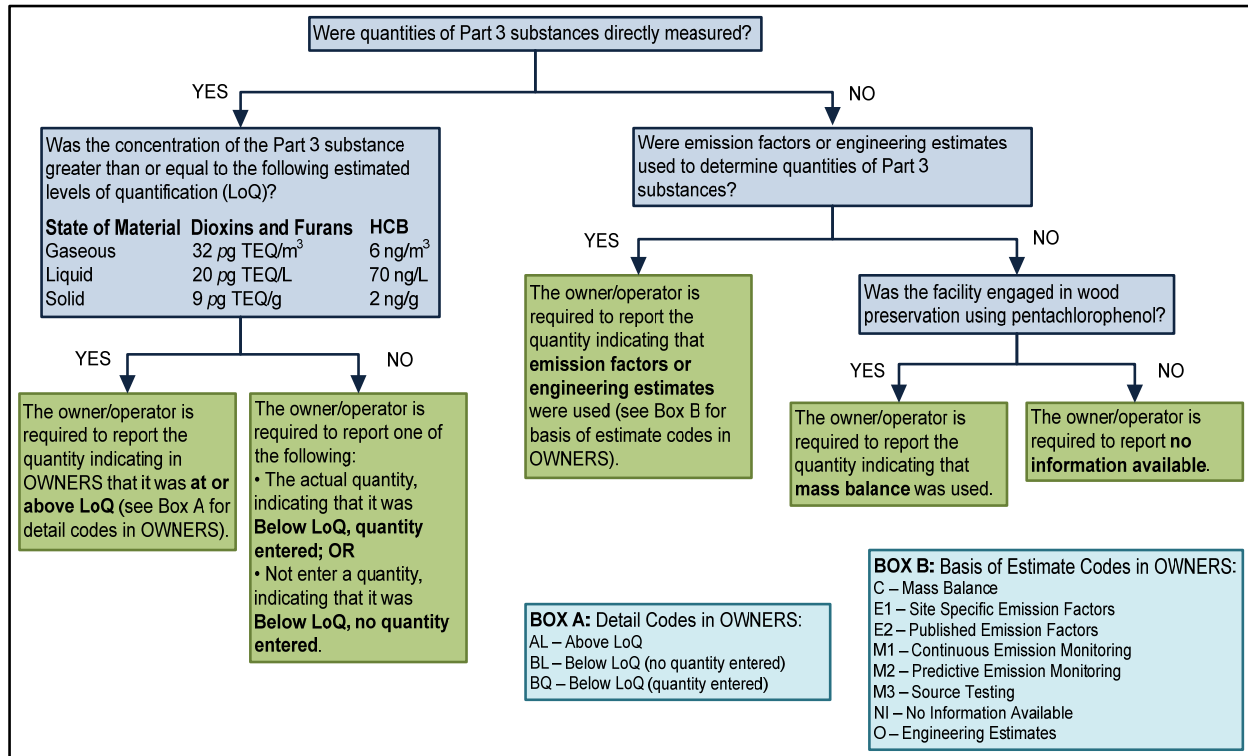
- the quantity released on site, disposed of or transferred off site as the result of incidental manufacture during an activity listed in Tables 5 or 11, and
- whether directly measured releases to a specific medium, disposals or transfers were at concentrations above, equal to or below the level of 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 all on-site 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
- 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 3 “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, or emission factors or engineering estimates, 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 (CACs)

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 5 “Data Requirements for Regional Air Quality Modelling.”

Table 18: Stack-Specific Reporting Thresholds for Stacks ≥ 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; and
- 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 (VOCs)

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 a Part 5 substance was emitted to air in a quantity greater than or equal to 1.0 tonne. Speciated VOCs that are not on the Part 5 substance list may also be reported in the comment field available in OWNERS.

4.9.1 Stack-specific Speciated VOC 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 required for this case is 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 must be reported for 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 for Part 4.
- 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 2008, 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 2008 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 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 the 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 – direct 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
- 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
- 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
- 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 February 16, 2008.

5.4 Requests for Confidentiality

Reporting to NPRI is governed by the requirements of 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 the 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 the NPRI (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 quantities released, disposed of or transferred, even if the quantity 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. It is not a portable facility as “portable facility” means portable PCB destruction equipment, portable asphalt plants, and portable concrete batching plants only. Further, a ship cannot be classified as a pipeline installation. The definition of offshore installation does include ships but 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 (recycling) the chemicals and 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. 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 or terminal operations or was a wastewater collection system discharging an annual average of 10 000 m³ or more per day into surface waters or is a pit or quarry where the annual production exceeds 500 000 tonnes, 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 still 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.

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.

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, the two facilities must be considered separately 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 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 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 that 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 (in excess of 1% concentration 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, you are required under Part 1A substance requirements to report all 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 the 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 (for the stack that emitted 2 tonnes of methanol) are met, 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.

In addition, 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 in particular 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 the NPRI 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, their fuel use is 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 is the one which 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 benefaction of the ore. Are NPRI substances in these greases and fuels reportable?*

Yes. Process equipment maintenance using materials such as grease, oils or lubricants, disinfectants or paint, etc., is not exempt and must be considered for the purposes of NPRI reporting. For the purpose of Part 1 substances, the use of greases and fuels in this situation would be considered "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 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 the NPRI; therefore, it is not reportable. Only free vinyl chloride monomer is reportable. Some formulations of pre-polymers may contain a percentage of free monomer. If you purchase pre-polymers which contain free vinyl chloride monomer, add this to the threshold calculation.

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 otherwise 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 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 2008 calendar year is due on June 1, 2009. 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/CEPARRegistry>.

- 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 the NPRI must include the activities at the wastewater treatment facility.

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

If the companies are owned 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 the 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 threshold calculations.

- 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) have 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 (provided the employee threshold is also met). 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 \$1000000 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.

73. *Our mine operates extraction and processing operations, what are we required to consider for our NPRI report?*

Any NPRI substances manufactured, processed or otherwise used or released to the atmosphere during the processing of the rock or ore, such as primary and secondary crushing, milling, concentrating, smelting and refining, would be reportable if the thresholds were met. This would include, but not be limited to, NPRI substances found in the ore, solvents, acids, flotation agents, flocculation agents, dust suppressants, fuels used in power generation, particulate matter and combustion contaminants (e.g., NO_x, SO₂). Listed substances in tailings or waste rock are not reported unless they are released from the tailings impoundment or any other form of on-site containment. Particulate matter release from vehicular traffic on the unpaved roads within the facility must also be considered if the total number of kilometres traveled on those roads is greater than 10 000 kilometres.

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

alloys are 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).

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 the 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, bacteria, enzymes, etc., 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. More information on hazardous waste is given in section 3.3.1 of this *Guide*.

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 while 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.

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.

oxides of nitrogen (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). Therefore, 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.

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 the air that are 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.

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 for commercial distribution, and includes preparation of a substance in the same physical state or chemical form as that received by the facility, or preparation that produces a change in physical state or chemical form.

quarry includes excavations open to the air that are 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.

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 3 "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 includes roads such as 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 "Definition of VOC" in the *NPRI Toolbox* (<http://www.ec.gc.ca/npri>).

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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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 Tel: (202) 682-8375

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

Canadian Petroleum Products Institute (2006). "Code of Practice for Developing a Refinery Emission Inventory," available at <www.cppi.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 – Alphabetical Listing of NPRI Substances for 2008

Part 1A Substances

| Name | CAS Number ⁽¹⁾ | Name | CAS Number |
|--------------------------------------|---------------------------|--|------------|
| Acetaldehyde | 75-07-0 | Carbonyl sulphide | 463-58-1 |
| Acetonitrile | 75-05-8 | Catechol | 120-80-9 |
| Acetophenone | 98-86-2 | CFC-11 | 75-69-4 |
| Acrolein | 107-02-8 | CFC-12 | 75-71-8 |
| Acrylamide | 79-06-1 | CFC-13 | 75-72-9 |
| Acrylic acid ⁽²⁾ | 79-10-7 | CFC-114 | 76-14-2 |
| Acrylonitrile | 107-13-1 | CFC-115 | 76-15-3 |
| Alkanes, C ₆₋₁₈ , chloro | 68920-70-7 | Chlorendic acid | 115-28-6 |
| Alkanes, C ₁₀₋₁₃ , chloro | 85535-84-8 | Chlorine | 7782-50-5 |
| Allyl alcohol | 107-18-6 | Chlorine dioxide | 10049-04-4 |
| Allyl chloride | 107-05-1 | Chloroacetic acid ⁽²⁾ | 79-11-8 |
| Aluminum ⁽³⁾ | 7429-90-5 | Chlorobenzene | 108-90-7 |
| Aluminum oxide ⁽⁴⁾ | 1344-28-1 | Chloroethane | 75-00-3 |
| Ammonia (total) ⁽⁵⁾ | * | Chloroform | 67-66-3 |
| Aniline ⁽²⁾ | 62-53-3 | Chloromethane | 74-87-3 |
| Anthracene | 120-12-7 | 3-Chloro-2-methyl-1-propene | 563-47-3 |
| Antimony ⁽⁶⁾ | * | 3-Chloropropionitrile | 542-76-7 |
| Asbestos ⁽⁷⁾ | 1332-21-4 | Chromium ⁽⁸⁾ | * |
| Benzene | 71-43-2 | Cobalt ⁽⁶⁾ | * |
| Benzoyl chloride | 98-88-4 | Copper ⁽⁶⁾ | * |
| Benzoyl peroxide | 94-36-0 | Cresol ^(2, 9) | 1319-77-3 |
| Benzyl chloride | 100-44-7 | Crotonaldehyde | 4170-30-3 |
| Biphenyl | 92-52-4 | Cumene | 98-82-8 |
| Bis(2-ethylhexyl) adipate | 103-23-1 | Cumene hydroperoxide | 80-15-9 |
| Bis(2-ethylhexyl) phthalate | 117-81-7 | Cyanides ⁽¹⁰⁾ | * |
| Boron trifluoride | 7637-07-2 | Cyclohexane | 110-82-7 |
| Bromine | 7726-95-6 | Cyclohexanol | 108-93-0 |
| 1-Bromo-2-chloroethane | 107-04-0 | Decabromodiphenyl oxide | 1163-19-5 |
| Bromomethane | 74-83-9 | 2,4-Diaminotoluene ⁽²⁾ | 95-80-7 |
| 1,3-Butadiene | 106-99-0 | 2,6-Di- <i>t</i> -butyl-4-methylphenol | 128-37-0 |
| 2-Butoxyethanol | 111-76-2 | Dibutyl phthalate | 84-74-2 |
| Butyl acrylate | 141-32-2 | <i>o</i> -Dichlorobenzene | 95-50-1 |
| <i>i</i> -Butyl alcohol | 78-83-1 | <i>p</i> -Dichlorobenzene | 106-46-7 |
| <i>n</i> -Butyl alcohol | 71-36-3 | 3,3'-Dichlorobenzidine | 612-83-9 |
| <i>sec</i> -Butyl alcohol | 78-92-2 | dihydrochloride | |
| <i>tert</i> -Butyl alcohol | 75-65-0 | 1,2-Dichloroethane | 107-06-2 |
| Butyl benzyl phthalate | 85-68-7 | Dichloromethane | 75-09-2 |
| 1,2-Butylene oxide | 106-88-7 | 2,4-Dichlorophenol ⁽²⁾ | 120-83-2 |
| Butyraldehyde | 123-72-8 | 1,2-Dichloropropane | 78-87-5 |
| C.I. Acid Green 3 | 4680-78-8 | Dicyclopentadiene | 77-73-6 |
| C.I. Basic Green 4 | 569-64-2 | Diethanolamine ⁽²⁾ | 111-42-2 |
| C.I. Basic Red 1 | 989-38-8 | Diethyl phthalate | 84-66-2 |
| C.I. Direct Blue 218 | 28407-37-6 | Diethyl sulphate | 64-67-5 |
| C.I. Disperse Yellow 3 | 2832-40-8 | Dimethylamine | 124-40-3 |
| C.I. Food Red 15 | 81-88-9 | <i>N,N</i> -Dimethylaniline ⁽²⁾ | 121-69-7 |
| C.I. Solvent Orange 7 | 3118-97-6 | <i>N,N</i> -Dimethylformamide | 68-12-2 |
| C.I. Solvent Yellow 14 | 842-07-9 | Dimethyl phenol | 1300-71-6 |
| Calcium cyanide | 156-62-7 | Dimethyl phthalate | 131-11-3 |
| Calcium fluoride | 7789-75-5 | Dimethyl sulphate | 77-78-1 |
| Carbon disulphide | 75-15-0 | 4,6-Dinitro- <i>o</i> -cresol ⁽²⁾ | 534-52-1 |
| Carbon tetrachloride | 56-23-5 | 2,4-Dinitrotoluene | 121-14-2 |

| Name | CAS Number |
|--|------------|
| 2,6-Dinitrotoluene | 606-20-2 |
| Dinitrotoluene ⁽¹¹⁾ | 25321-14-6 |
| Di-n-octyl phthalate | 117-84-0 |
| 1,4-Dioxane | 123-91-1 |
| Diphenylamine | 122-39-4 |
| Epichlorohydrin | 106-89-8 |
| 2-Ethoxyethanol | 110-80-5 |
| 2-Ethoxyethyl acetate | 111-15-9 |
| Ethyl acrylate | 140-88-5 |
| Ethylbenzene | 100-41-4 |
| Ethyl chloroformate | 541-41-3 |
| Ethylene | 74-85-1 |
| Ethylene glycol | 107-21-1 |
| Ethylene oxide | 75-21-8 |
| Ethylene thiourea | 96-45-7 |
| Fluorine | 7782-41-4 |
| Formaldehyde | 50-00-0 |
| Formic acid | 64-18-6 |
| Halon 1211 | 353-59-3 |
| Halon 1301 | 75-63-8 |
| HCFC-22 | 75-45-6 |
| HCFC-122 and all isomers ⁽¹²⁾ | 41834-16-6 |
| HCFC-123 and all isomers ⁽¹³⁾ | 34077-87-7 |
| HCFC 124 and all isomers ⁽¹⁴⁾ | 63938-10-3 |
| HCFC-141b | 1717-00-6 |
| HCFC-142b | 75-68-3 |
| Hexachlorocyclopentadiene | 77-47-4 |
| Hexachloroethane | 67-72-1 |
| Hexachlorophene | 70-30-4 |
| n-Hexane | 110-54-3 |
| Hydrazine ⁽²⁾ | 302-01-2 |
| Hydrochloric acid | 7647-01-0 |
| Hydrogen cyanide | 74-90-8 |
| Hydrogen fluoride | 7664-39-3 |
| Hydrogen sulphide | 7783-06-4 |
| Hydroquinone ⁽²⁾ | 123-31-9 |
| Iron pentacarbonyl | 13463-40-6 |
| Isobutyraldehyde | 78-84-2 |
| Isophorone diisocyanate | 4098-71-9 |
| Isoprene | 78-79-5 |
| Isopropyl alcohol | 67-63-0 |
| p,p'-Isopropylidenediphenol | 80-05-7 |
| Isosafrole | 120-58-1 |
| Lithium carbonate | 554-13-2 |
| Maleic anhydride | 108-31-6 |
| Manganese ⁽⁶⁾ | * |
| 2-Mercaptobenzothiazole | 149-30-4 |
| Methanol | 67-56-1 |
| 2-Methoxyethanol | 109-86-4 |
| 2-Methoxyethyl acetate | 110-49-6 |
| Methyl acrylate | 96-33-3 |
| Methyl tert-butyl ether | 1634-04-4 |
| p,p'-Methylenebis(2-chloroaniline) | 101-14-4 |

| Name | CAS Number |
|---|------------|
| 1,1-Methylenebis (4-isocyanatocyclohexane) | 5124-30-1 |
| Methylenebis(phenylisocyanate) | 101-68-8 |
| p,p'-Methylenedianiline | 101-77-9 |
| Methyl ethyl ketone | 78-93-3 |
| Methyl iodide | 74-88-4 |
| Methyl isobutyl ketone | 108-10-1 |
| Methyl methacrylate | 80-62-6 |
| N-Methylolacrylamide | 924-42-5 |
| 2-Methylpyridine | 109-06-8 |
| N-Methyl-2-pyrrolidone | 872-50-4 |
| Michler's ketone ⁽²⁾ | 90-94-8 |
| Molybdenum trioxide | 1313-27-5 |
| Naphthalene | 91-20-3 |
| Nickel ⁽⁶⁾ | * |
| Nitrate ion ⁽¹⁵⁾ | * |
| Nitric acid | 7697-37-2 |
| Nitrilotriacetic acid ⁽²⁾ | 139-13-9 |
| p-Nitroaniline | 100-01-6 |
| Nitrobenzene | 98-95-3 |
| Nitroglycerin | 55-63-0 |
| p-Nitrophenol ⁽²⁾ | 100-02-7 |
| 2-Nitropropane | 79-46-9 |
| N-Nitrosodiphenylamine | 86-30-6 |
| Nonylphenol and its ethoxylates ⁽¹⁶⁾ | * |
| Octylphenol and its ethoxylates ⁽¹⁷⁾ | * |
| Paraldehyde | 123-63-7 |
| Pentachloroethane | 76-01-7 |
| Peracetic acid ⁽²⁾ | 79-21-0 |
| Phenol ⁽²⁾ | 108-95-2 |
| p-Phenylenediamine ⁽²⁾ | 106-50-3 |
| o-Phenylphenol ⁽²⁾ | 90-43-7 |
| Phosgene | 75-44-5 |
| Phosphorus ⁽¹⁸⁾ | 7723-14-0 |
| Phosphorus (total) ⁽¹⁹⁾ | * |
| Phthalic anhydride | 85-44-9 |
| 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 |
| p-Quinone | 106-51-4 |
| Safrole | 94-59-7 |
| Selenium ⁽⁶⁾ | * |
| Silver ⁽⁶⁾ | * |
| Sodium fluoride | 7681-49-4 |
| Sodium nitrite | 7632-00-0 |
| Styrene | 100-42-5 |
| Styrene oxide | 96-09-3 |

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

* 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 No. 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 | 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 |
| 2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin | 1746-01-6 | 2,3,4,7,8-Pentachlorodibenzofuran | 57117-31-4 |
| 1,2,3,7,8-Pentachlorodibenzo- <i>p</i> -dioxin | 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 |
| 1,2,3,4,7,8-Hexachlorodibenzo- <i>p</i> -dioxin | 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzofuran | 70648-26-9 |
| 1,2,3,7,8,9-Hexachlorodibenzo- <i>p</i> -dioxin | 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzofuran | 72918-21-9 |
| 1,2,3,6,7,8-Hexachlorodibenzo- <i>p</i> -dioxin | 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzofuran | 57117-44-9 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo- <i>p</i> -dioxin | 35822-46-9 | 2,3,4,6,7,8-Hexachlorodibenzofuran | 60851-34-5 |
| Octachlorodibenzo- <i>p</i> -dioxin | 3268-87-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-furan | 67562-39-4 |
| | | 1,2,3,4,7,8,9-Heptachlorodibenzo-furan | 55673-89-7 |
| | | 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 2008 Listed by Chemical Abstracts Service Registry Number (CAS #)

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

| CAS Number | Name | CAS Number | Name |
|------------|---|------------|--|
| 4098-71-9 | Isophorone diisocyanate | 2832-40-8 | C.I. Disperse Yellow 3 |
| 4170-30-3 | Crotonaldehyde | 3118-97-6 | C.I. Solvent Orange 7 |
| 4680-78-8 | C.I. Acid Green 3 | 7782-50-5 | Chlorine |
| 5124-30-1 | 1,1-Methylenebis (4-isocyanatocyclohexane) | 7783-06-4 | Hydrogen sulphide |
| 7429-90-5 | Aluminum ⁽¹⁶⁾ | 7789-75-5 | Calcium fluoride |
| 7440-62-2 | Vanadium ⁽¹⁷⁾ | 9016-87-9 | Polymeric diphenylmethane diisocyanate |
| 7550-45-0 | Titanium tetrachloride | 10049-04-4 | Chlorine dioxide |
| 7632-00-0 | Sodium nitrite | 13463-40-6 | Iron pentacarbonyl |
| 7637-07-2 | Boron trifluoride | 15646-96-5 | 2,4,4-Trimethylhexamethylene diisocyanate |
| 7647-01-0 | Hydrochloric acid | 16938-22-0 | 2,2,4-Trimethylhexamethylene diisocyanate |
| 7664-39-3 | Hydrogen fluoride | 25321-14-6 | Dinitrotoluene ⁽¹⁹⁾ |
| 7664-93-9 | Sulphuric acid | 26471-62-5 | Toluenediisocyanate ⁽¹⁹⁾ |
| 7681-49-4 | Sodium fluoride | 28407-37-6 | C.I. Direct Blue 218 ⁽²⁰⁾ |
| 7697-37-2 | Nitric acid | 34077-87-7 | HCFC-123 and all isomers ⁽²¹⁾ |
| 7723-14-0 | Phosphorus ⁽¹⁸⁾ | 41834-16-6 | HCFC-122 and all isomers ⁽²²⁾ |
| 7726-95-6 | Bromine | 63938-10-3 | HCFC 124 and all isomers |
| 7758-01-2 | Potassium bromate | 68920-70-7 | Alkanes, C6-18, chloro |
| 7782-41-4 | Fluorine | 85535-84-8 | Alkanes, C10-13, chloro |

* 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-Pentachlorodibenzo- <i>p</i> -dioxin |
| 3268-87-9 | Octachlorodibenzo- <i>p</i> -dioxin | 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzo- <i>p</i> -dioxin |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo- <i>p</i> -dioxin | 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzo- <i>p</i> -dioxin |
| 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-Heptachlorodibenzo- <i>p</i> -dioxin |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo- <i>p</i> -dioxin | 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzo- <i>p</i> -dioxin |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran | 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzo- <i>p</i> -dioxin |

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 (expressed as NO ₂) |
| * | Volatile organic compounds | | |

(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.

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 | <i>Beta</i> -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⁾ |
| * | Dihydronapthalene ⁽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 |
|------------|---------------------------------------|
| 108-65-6 | Propylene glycol methyl ether acetate |
| 112-07-2 | Ethylene glycol butyl ether acetate |
| 112-15-2 | Diethylene glycol ethyl ether acetate |
| 112-25-4 | Ethylene glycol hexyl ether |
| 112-34-5 | Diethylene glycol butyl ether |
| 5131-66-8 | Propylene glycol butyl ether |
| 8001-58-9 | Creosote |
| 8030-30-6 | Naphtha |
| 8032-32-4 | VM & P naphtha |
| 8042-47-5 | White mineral oil |

| CAS Number | Name |
|------------|----------------------------------|
| 8052-41-3 | Stoddard solvent |
| 64475-85-0 | Mineral spirits |
| 64741-65-7 | Heavy alkylate naphtha |
| 64742-47-8 | Hydrotreated light distillate |
| 64742-48-9 | Hydrotreated heavy naphtha |
| 64742-88-7 | Solvent naphtha medium aliphatic |
| 64742-89-8 | Solvent naphtha light aliphatic |
| 64742-94-5 | Heavy aromatic solvent naphtha |
| 64742-95-6 | Light aromatic solvent naphtha |

(28) "all isomers."

(29) "all isomers", excluding n-hexane (CAS No. 110-54-3).

(30) "all isomers", excluding 1,2,4-trimethylbenzene (CAS No. 95-63-6).

Appendix 3 – Dioxin and Furan Toxic Equivalents

While individual dioxin and furan congeners are required to be reported to the NPRI in grams, the units of the estimated levels of quantification (LoQs) are in grams toxic equivalent (TEQ). Information on TEQs is provided in this Appendix to assist with calculating if LoQs are met.

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.

In order to apply TEFs and to compare values in terms of toxic equivalents (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 (or quantity) of an individual congener by its respective TEF, or weighting factor, to obtain the congener-specific TEQ concentration (or quantity). 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 4 – 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: the surrounding earth limits diurnal temperature change and 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 5 – Data Requirements for Regional Air Quality Modelling

This appendix explains the data requirements for CAC regional air quality models, and how that information will be collected through the NPRI. Refer to the *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). 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.

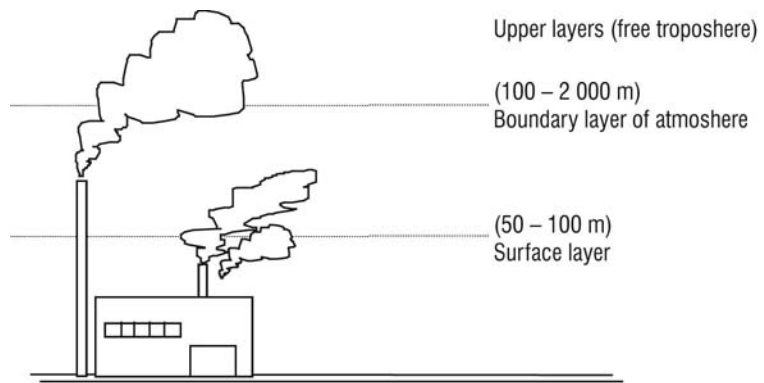
Rather than require the facility to determine the plume rise from each stack and then report for those that enter the upper troposphere, Environment Canada performed analyses to select a stack height and quantity of CAC emissions likely to be significant for modelling purposes.

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 6 – Industry Classification Codes

For the following types of industry classification codes, please refer to the Toolbox at <http://www.ec.gc.ca/npri>

- Four-Digit North American Industry Classification System (NAICS) Codes
- Six-Digit North American Industry Classification System (NAICS) Codes
- Two-Digit 1980 Canadian Standard Industrial Classification Codes
- Two-Digit 1987 U.S. Standard Industrial Classification (SIC) Codes